

US Environmental Protection Agency (EPA) Region 9
Underground Injection Control (UIC) Program
AQUIFER EXEMPTION RECORD OF DECISION

This Record of Decision provides the EPA’s decision to approve an aquifer exemption for a portion of the Walker Formation and expansions of the aquifer exemptions (AEs) for the Jewett Sand, Pyramid Hill Sand, and Vedder Formation of the Round Mountain 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 30, 2016

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

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 site-specific Class II UIC well permits, involves an expansion to an existing aquifer exemption in an active oil field, and is not a state-wide programmatic change or a revision with implications for the national 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 as to whether a program revision is substantial or non-substantial is made on a case-by-case basis.

Operators: Macpherson Oil Company owns or controls 95% of the production in the Round Mountain Oil Field. Other operators in the field include: Incremental Oil and Gas, Coffee Petroleum, and Pace Diversified Corp.

Well/Project Name: Portions of the Jewett Sand, Pyramid Hill Sand, Vedder Formation, and Walker Formation, Round Mountain Oil Field.

Well/Project Permit Number: There are 97 Class II injection wells in the area of the Round Mountain Oil Field proposed for exemption including: water disposal wells, waterflood wells, steamflood wells and cyclic steam wells.

Well/Project Location: The AE is located in: portions of Township 28 South, Range 28 East and Township 28 South, Range 29 East, portions of Township 27 South, Range 28 East, and Township 29 South Range 29 East MDB&M (Mount Diablo Base and Meridian) [see Figures 1 and 2].

County: Kern

State: California

Well Class/Type: Class II Enhanced Oil Recovery (EOR) and Waste Disposal (WD) wells.

DESCRIPTION OF PROPOSED AQUIFER EXEMPTION

Aquifers to be Exempted: Portions of the Jewett Sand, the Pyramid Hill Sand, the Vedder Formation, and the Walker Formation in the area of the Round Mountain Oil Field.

Areal Extent of Aquifer Exemption: The areal extent of the proposed AE is approximately 29,571 acres, including the original hydrocarbon producing areas, and a portion of the Walker Formation (See table below). DOGGR has provided a GIS shape file that delineates the AE boundary, which is included in the administrative record for this ROD. Refer to Figures 3A-D for a depiction of the proposed exempt formations.

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

<u>Aquifer</u>	<u>Proposed (approx.)</u>	<u>Existing Exempted Area</u>
Jewett Sand	7,029	1,318
Pyramid Hill Sand	9,272	2,097
Vedder Formation	12,744	2,372
Walker Formation	526	0

Lithology, Total Dissolved Solids (TDS), Depth, Thickness, Porosity, and Permeability of Aquifers: Sampling data provided in the AE request reflects samples taken at various depths within the aquifers over the history of the field, from 1930 to 1991. On average, the TDS in each of the aquifers is below 3,000 mg/L. The following table presents the lithology, TDS, depth, thickness, and average porosity and permeability information about the aquifers proposed for exemption.

<i>Aquifer</i>	<i>Lithology</i>	<i>TDS (mg/L)</i>	<i>Depth to Top (feet bgs)</i>	<i>Thickness (feet)</i>	<i>Average Porosity and Permeability</i>
Jewett Sand	Very fine to fine grained, silty, micaceous marine sandstone with interbedded light gray to brown gray siltstones	2,000-2,800	500- 2,500	200 - 500	35% 250 mD
Pyramid Hill Sand	Four individual sand lobes: upper three lobes grade from a silty sand in the lowest lobe to a very fine grained sand in the upper lobe	1,600-2,400	750-2,800	75 - 150	31-37% 200 mD
Vedder Formation	Unconsolidated medium- to coarse-grained, locally tuffaceous, marine sandstone containing weathered megafossils and carbonaceous material, with thin interbeds of pebbly conglomerate near the base	1,800-4,000	1,100- 2,700	125- 300	35% 1-11 D
Walker Formation	A series of non-marine greenish claystones interbedded with poorly sorted sandstone and siltstone	2,280-2,400	1,300 -3,050	500- 1,400	31% 1 D

Confining Zone(s): In the area of the AE request, the Jewett Sand, the Pyramid Hill Sand, and the Walker Formation are geologically contained by sealing faults to the east, the north, and the south with stratigraphic pinch-out to the west. The Vedder Formation is geologically contained by sealing faults in all directions. Specific faults that act as sealing boundaries around the aquifers include the Kern River and Kern Gorge Faults, Round Mountain Faults, Pond Poso Fault System, the Jewett Fault, Unnamed, Sharktooth and Alma Faults, and the Kern Front Fault [Refer to Figures 4A-H].

The upper confining zone is the Freeman Silt, which is 150-500 feet thick in the area proposed for exemption and has an average permeability of 0.9 millidarcy (mD). The lower confining zone is the granitic basement complex.

Injectate Characteristics: Injectate is sourced from produced water and is used for waterflood, steamflood, cyclic steam, and production wastewater management. On average, the injectate has a TDS of 2,063 mg/L. Injectate includes on average a maximum of 173 ppb (ug/l) of treatment chemicals (corrosion inhibitors, oxygen scavengers, clarifiers, and others).

BACKGROUND

On November 30, 2016, DOGGR submitted a request for the EPA Region 9 approval to expand the current AE designation for the Jewett Sand, Pyramid Hill Sand, Vedder Formation, and to clearly identify a portion of the Walker Formation to be exempted in the area of the Round Mountain Oil Field in Kern County, California. DOGGR reviewed the operators' AE request and proposed 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(b)(1): that 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. Subsequent to 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. DOGGR, subject to state regulatory requirements, could authorize Class II injection into the identified formations, either for EOR or for disposal of fluids associated with oil and gas production.

The Round Mountain Oil Field was discovered in 1928 and by 1947, five areas (Pyramid, Coffee Canyon, Main, Sharktooth, and Alma) of the field were in production from four reservoir units (the Jewett Sand, Pyramid Hill Sand, Vedder Formation, and Walker Formation). Since 1960, water reinjection has occurred in each of these zones. Following passage of the Clean Water Act of 1972, the Central Valley Regional Water Quality Control Board (Regional Board) adopted an Interim Water Quality Control Policy for ground and surface waters in the Poso Creek Subarea, which covers the five producing areas of the field. The Regional Board later adopted the Tulare Lake Basin Plan, which prohibited discharge of high salinity and boron-containing oil field waters to Poso Creek. DOGGR subsequently issued permits for injection of roughly 138,000 barrels per day of wastewater to the Jewett Sand, Pyramid Hill Sand, Vedder Formation, and Walker Formations in areas undergoing hydrocarbon extraction.

In 1998, a portion of the Round Mountain Oil Field was unitized (i.e. production techniques were combined among active wells in the field by agreement between the operators for consistent operation to maximize production) for the purpose of EOR via steam and waterflood injection. Since 2000, additional advanced recovery techniques such as short radius horizontal drilling and horizontal steamflood configurations were implemented. These techniques have expanded production and the productive boundaries in the Pyramid, Coffee Canyon, Main, and Sharktooth areas of the field.

Today, both water injection and steam injection using Class II wells is used as part of EOR operations. Produced water not used for EOR operations is injected using Class II disposal wells. In total, approximately 165 injection wells have been utilized since 1960 with approximately 97 active Class II wells, either for waterflood, steamflood, cyclic steam, or wastewater disposal within the proposed exemption area.

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.*

DOGGR provided the EPA with geologic and hydrogeologic information about the portions of the aquifers proposed for exemption and determined that they are not currently a source of drinking water and are not hydraulically connected to domestic or public water supply wells. This is based on an evaluation of the formations' properties, ground water flow patterns, hydraulic isolation of the formations to ground water flow between the proposed exempt formations and those which are currently used for drinking water, and information about water supply wells in the area. These evaluations demonstrate that the formations are vertically and laterally confined (separated) from USDWs such that no existing drinking water sources are hydraulically connected to the aquifers.

Water Supply Wells: The State's AE proposal included information about water wells in the area proposed for exemption to confirm that no drinking water wells or public water supplies draw from the aquifers proposed for exemption.

To ensure a complete evaluation of all water wells in the area, the State Water Resources Control Board (State Board) reviewed information about water wells within the area proposed for exemption, as well as an extended area that encompassed an additional one-mile buffer around the Round Mountain Oil Field administrative boundary (study area). Within the entire study area, field operators performed records-based and on-the-ground surveys to identify all potential water supply wells. A total of 86 water wells were identified within the study area, however none of these water wells draw from the proposed exempted aquifers.

Water well data was obtained from Kern County Water Agency, Kern County Department of Public Health Division of Environmental Health and the California Department of Water Resources. The 86 wells identified are screened in formations (Alluvium, Quaternary Terrace Deposits, Olcese Formation, and Kern River Formation) above the Freeman Silt, which is the uppermost confining layer in the area proposed for exemption. The water wells are utilized for a variety of purposes, such as stock watering and domestic services and may be used in some instances as drinking water. None of the water supply wells are completed in the Jewett Sand, Pyramid Hill Sand, Vedder Formation, or Walker Formation. [see Table 1]. In their concurrence on the AE package, the State Board determined that the portions of the four formations proposed for exemption are not currently a source of drinking water, and are not hydraulically connected to domestic or public water supply wells.

There was an additional effort by the state to capture information on any potential undocumented wells in the study area, which resulted in two additional wells (which do not draw from any of the proposed exempt formations) being identified. One of these wells was plugged and abandoned in June 2016, and the other well was determined to be screened in the Olcese Formation, which is above the Freeman Silt. There are also no public sources of drinking water within the area studied that draw from the aquifers proposed for exemption. The nearest community, Oildale, is served by imported surface water supplies from North of the River

Municipal Water District, under contract by Oildale Mutual Water Company. Oildale Mutual Water Company does use ground water as a backup for the imported surface water supplies, however, their wells draw from the Kern River Formation, which is hydraulically isolated from the formations proposed for exemption.

Ground Water Flow Patterns: DOGGR evaluated available hydrogeologic information on each of the four aquifers proposed for exemption, including ground water flow maps, ground water surface elevation, and composite ground water elevation from reported water depths at the time the water wells were drilled.

The direction of ground water flow varies within each formation based on the areas of surface input/recharge (due to injection) and areas of production/discharge (due to withdrawal from water wells and oil wells). The information provided by the State demonstrates that injected fluids will not migrate beyond the area proposed for exemption. Specific information about ground water flow in each formation proposed for exemption is presented below:

- The Jewett Sand is confined laterally by structural faulting and stratigraphic pinch-out and confined vertically by the Freeman Silt. Fluid formation gradients are controlled by production activities. The gradient direction is toward the oil production wells to the northeast.
- The Pyramid Hill Sand is confined laterally by structural faulting and stratigraphic pinch-out and confined vertically by the Freeman Silt. The fluid formation gradients are controlled by production activities; the gradient is toward the wells to the northeast.
- The Vedder Formation is confined laterally on all sides by structural faulting and is confined vertically by the Freeman Silt. Ground water gradients are controlled by production activities. Production activities create a complex gradient in this formation, with steam injection pushing shallower fluids down, and water and steam injection pushing deeper fluids up, toward producing areas. Gradients in the Main Area of the field are from the southwest and the northeast, along a central northwest/southeast axis towards the producing wells.
- The Walker Formation is confined laterally by structural faulting and stratigraphic pinch-out, and confined vertically by the Freeman Silt. Ground water gradients in the Walker Formation are controlled by production and disposal activities; gradients are from the northwest and southeast toward the center of the proposed exemption area.

Confinement of the Formations to Ground Water Flow: The Round Mountain Oil Field is comprised of a series of rock layers dipping in the same direction (known as a “homocline”), with sealing cross-faults that create fluid and gas barriers in the major producing areas. Above the production zone is a sealing layer, the Freeman Silt, which is 150 to 500 feet thick, has an estimated permeability of approximately 0.9 mD, and is continuous over the area proposed for exemption. Below the producing formations is the granitic basement complex. These impermeable layers prevent vertical migration out of the producing areas.

In the area proposed for exemption, the Jewett Sand, the Pyramid Hill Sand, and the Walker Formation are geologically contained by sealing faults to the east, the north, and the south and

geologically contained with a stratigraphic pinch-out to the west against the Freeman Silt. The Vedder Formation is geologically contained by sealing faults in all directions.

Boundary faults around the area proposed for exemption include the Round Mountain and Kern River faults to the east, and the Pond Poso Fault to the north. “Internal” faults (i.e., faults within the Round Mountain Oil Field, separating individual blocks of the formations proposed for exemption) include the majority of the Sharktooth, Alma, and Jewett Fault systems. In general, all of these faults are considered to be sealing based on their ability to hold oil, pressure differences across the fault, and/or differences in ground water levels across the faults.

DOGGR examined information about these faults, including their ability to trap hydrocarbons, pressure or temperature differences across the faults, and differences in groundwater surface elevation levels across the faults. This information demonstrates that the fault systems described below provide horizontal confinement between the aquifers proposed for exemption and drinking water supplies in the area:

- *Kern River/Kern Gorge Faults:* The sealing nature of this fault system is demonstrated by the separation of oil-saturated regions in the Round Mountain Oil Field from non-saturated formations to the east. In some but not all areas, displacement along the fault is sufficient to bound the formations proposed to be exempted with basement rock (to the east).
- *Round Mountain Faults:* Evidence of sealing/confinement by these faults is based on the trapping of hydrocarbons and the success of the mobile steam injection EOR operations.
- *Pond Poso Fault System:* Sealing behavior along the fault is supported by ground water level differences across the fault.
- *Jewett Fault:* Demonstrated to be sealing based on production differences and oil/water contact elevation changes across the fault.
- *Unnamed, Sharktooth, and Alma Faults:* Demonstrated to be sealing based on oil trapping in the Vedder Formation in the Sharktooth and Alma areas.
- *Kern Front Fault:* Demonstrated to be sealing based on ground water level differences across the fault.

The EPA reviewed the analyses in the AE application, as described above, and concludes that the portions of the aquifers proposed for exemption do not currently serve as a source of drinking water, per 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 available information on previous hydrocarbon production from the four formations, along with supporting information such as core data, well logs, and other well tests (e.g., drill stem tests) that support a demonstration of the presence of producible hydrocarbons in the areas proposed for exemption.

Production in the Jewett Sand, Pyramid Hill Sand, and Vedder Formation in the Round Mountain Oil Field began as early as 1928. Exploration and production continued expanding through 1947, by which time the Walker Formation was also undergoing production. Production increased

significantly after 1960 when waterflooding EOR operations were implemented. Since 2000, with the use of advanced recovery techniques, EOR operations have expanded to steamflooding in portions of the field. At current rates, according to DOGGR, the Round Mountain Oil Field produces 3.6 million barrels of oil per year,

DOGGR reviewed down-dip well data for the four formations to evaluate which of the down-dip or down gradient fault block areas have the potential to be commercially hydrocarbon productive in the future. While all wells were not included in this analysis, a sufficient number of wells were selected to give wide coverage across entire fault-bounded blocks in areas that are not currently producing.

The down-dip well review indicated that most of the areas of the Round Mountain Oil Field have evidence of future commercial producibility. Small, isolated areas exist in several fault blocks where future production is either unknown or not indicated. However, given that these small isolated areas lie within the oil-producing areas of the fault blocks, and based on analyses of formation water samples taken prior to re-injection as well as the historic migration pathways of the hydrocarbons from the center of the basin to Round Mountain, it is reasonable to conclude that water produced from these zones would be hydrocarbon-bearing. As a result, the entire extent of the proposed aquifer exemption area to the edge of the confinement by fault, contour closure and/or by stratigraphy is expected to be commercially hydrocarbon producing.

Specific information DOGGR reviewed regarding the production histories of the aquifers proposed for exemption includes the following:

- *Jewett Sand:* Commercial production in the Jewett Sand began in 1928 in the Main Area. Since 2011, production has been extended to the Pyramid Area. Initially, wells in the Jewett Sand also commonly tapped the Pyramid Hill Sand.
- *Pyramid Hill Sand:* The Pyramid Hill Sand is commercially productive in the Main Area (since 1927), Coffee Canyon (1928), Pyramid Area (1944) and Sharktooth (2007). Waterflooding was initiated in the 1960s and steamflooding in 1998. Horizontal drilling is being used to expand productive areas.
- *Vedder Formation:* The Vedder Formation is commercially productive in all five areas of the field. Production began in 1927 in the Main Area, followed by Coffee Canyon in 1928, Pyramid Area in 1937, Sharktooth in 1943 and Alma in 1947. Waterflooding was initiated in the 1960s and steamflooding in 1998.
- *Walker Formation:* The Walker Formation is commercially productive in the Pyramid Area, beginning in 2011, and has been historically productive in the Main Area. The Walker Formation is currently being developed in the Main Area and it is anticipated that this development will continue in the Coffee Canyon, Sharktooth, and Alma Areas. It is anticipated that future production in the Walker Formation will be similar to the productive areas in the Pyramid Hill Sand and the Vedder Formations.

Based on a review of information such as core data, well logs, and other well tests (e.g., drill stem tests) and given the long history of hydrocarbon production, the implementation of enhanced recovery techniques, and recent trends in field production, the EPA has determined that the four aquifers in the area proposed for exemption meet the criteria at 40 CFR § 146(b)(1).

PUBLIC NOTICE AND COMMENT

DOGGR provided public notice of this proposed AE on May 12, 2016. A public hearing was held in Bakersfield, CA on June 14, 2016. The written comment period closed on June 25, 2016. A supplemental 15-day public comment period closed on September 6, 2016. 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 verbal comments.

In making this decision, the EPA considered all of the information submitted by the State, including all the written and oral comments submitted to the State during its public comment process. In two public comment letters to DOGGR, which were also provided to the EPA, the Center for Biological Diversity (CBD) raised concerns regarding protection of species under the federal Endangered Species Act. This issue is outside the scope of EPA's AE decision as this action does not authorize future injection activities at the surface. Approval of this aquifer exemption concerns groundwater over 500 feet below the surface, and a review of materials submitted by the commenter indicate that there are no subsurface listed threatened or endangered species that would be affected by the EPA's approval.

Additionally, the EPA considered written comments in an unsolicited letter from the Center for Biological Diversity submitted directly to the EPA outside the public comment process provided by DOGGR. In the letter, CBD requested that the EPA conduct formal notice and provide an opportunity for public comment and a public hearing for the proposed aquifer exemption. However, federal UIC regulations do not require the EPA to provide an additional opportunity for public comment for a non-substantial program revision, and it was determined that an additional public comment period would not likely yield additional comments that were not already raised during the State's process, which was conducted consistent with 40 CFR § 144.7. While the EPA is not required to conduct public notice on non-substantial program revisions submitted by a primacy state, the EPA is exercising its discretion to respond to the comments that pertain to the EPA's action and authority. The majority of the issues raised in the unsolicited comment letter from CBD are addressed above in this decision document or are outside the scope of the EPA's review (e.g. state law matters such as CEQA); additional responses are below.

CBD noted that there are water supply wells within the boundaries of the proposed exemption. The EPA examined the available information about water wells in the area – including the results of records searches and on-the-ground surveys to identify all potential water supply wells, and confirmed that none of the water supply wells are completed in the Jewett Sand, Pyramid Hill Sand, Vedder Formation, or Walker Formation, nor are any of the wells hydraulically connected to any of the specific formations proposed for exemption.

The commenter also questioned whether the current technical criteria to consider future drinking water uses is adequate to consider changing climate conditions and new technology available for water treatment. In considering whether the area proposed for exemption cannot now and will not in the future serve as a source of drinking water because it is hydrocarbon producing the EPA reviewed data about hydrocarbon production on the formations—including historic oil production and potential future commercial producibility. Based on a review of core data, well

logs, and other well tests (e.g., drill stem tests), the EPA believes that it is reasonable to conclude that the Round Mountain Oil Field will continue to be commercially producible into the foreseeable future.

The commenter also requested 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 EPA's UIC regulations and the enabling legislation in the SDWA provide a functionally equivalent environmental review for this action.

An additional comment suggested that the aquifer exemption request should be considered "substantial" by the EPA guidance as the proposed changes are less stringent under Section 1425 of SDWA due to endangerment of nearby USDWs. The EPA is approving this aquifer exemption as it meets the criteria found at 40 CFR § 146.4. The proposed aquifer exemption is not a program revision to DOGGR's approved primacy program for Class II that makes the program less stringent than SDWA Section 1425. In this case, the EPA's conclusion is that the geologic and hydrogeologic information provided by the State about the area proposed for exemption demonstrates that the aquifer is not a current source of drinking water and will not serve as a future source of drinking water under 40 CFR §146.4. Therefore, this aquifer exemption is not a "substantial" change to DOGGR's primacy program that is less stringent than required by Section 1425 of SDWA.

Commenters suggest that even if the EPA determines this aquifer exemption request is non-substantial, that it is a "complex" exemption request and should be subject to notice and comment because they state there is controversy over the aquifer's future use as a drinking water source and incomplete data on the aquifer and potential effect on beneficial or protected aquifers. This exemption request was made under 40 CFR § 146.4(b)(1), as it was determined that the portion of the aquifer 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. The EPA has determined that the aquifer exemption request adequately demonstrates that the formation will not be a future source of drinking water due to the presence of commercially producible hydrocarbons. Likewise, the EPA does not agree with the assertion that the exemption proposal has incomplete data regarding local residential water wells. The current source analysis conducted by the State Board, which included review of state well data and on-the-ground surveys, concluded there were no drinking water supply wells completed in the proposed exemption area and included a broader review of potential surface recharge influences and potential wells in a buffer area of one-mile beyond the exemption boundaries. The conclusion on zonal isolation of the proposed exemption areas was based on state legal requirements and does not impact the EPA's current source analysis. Determinations of whether an aquifer exemption request is substantial or non-substantial is made on a case-by case basis but the commenter has not pointed to circumstances of this exemption request that present "significant and far-reaching" effects or "complex" considerations. Upon review of the proposed exemption, the EPA does not view this exemption request as presenting unusual risks to

USDWs, unique policy considerations, or other circumstances that have “significant and far reaching effects.” Therefore, the EPA determined that this aquifer exemption approval represents a non-substantial program revision.

The commenter expressed concern about an evaluation of the cumulative effects of this exemption with potential future exemption requests for the same formations. This concern is out of the scope of the EPA’s review in approving an aquifer exemption. Another comment pertains to the proposed exemption of the Walker Formation, which has been historically treated as exempt by the State and is subject to the State’s determination that the Walker Formation underlying the Round Mountain Oil Field formation is not currently exempt, but can be the subject of future exemption requests to the EPA.¹ The State’s request to the EPA seeks to exempt approximately 526 acres of the Walker Formation within the Round Mountain Oil Field and is consistent with DOGGR’s determination regarding the Eleven Aquifers Historically Treated as Exempt. The EPA believes DOGGR has demonstrated that the portion of the Walker Formation proposed for exemption in the Round Mountain Oil Field meets the federal criteria for exemption and the State has concluded that the portion proposed for exemption is hydraulically isolated from other non-exempt portions of the Walker Formation.

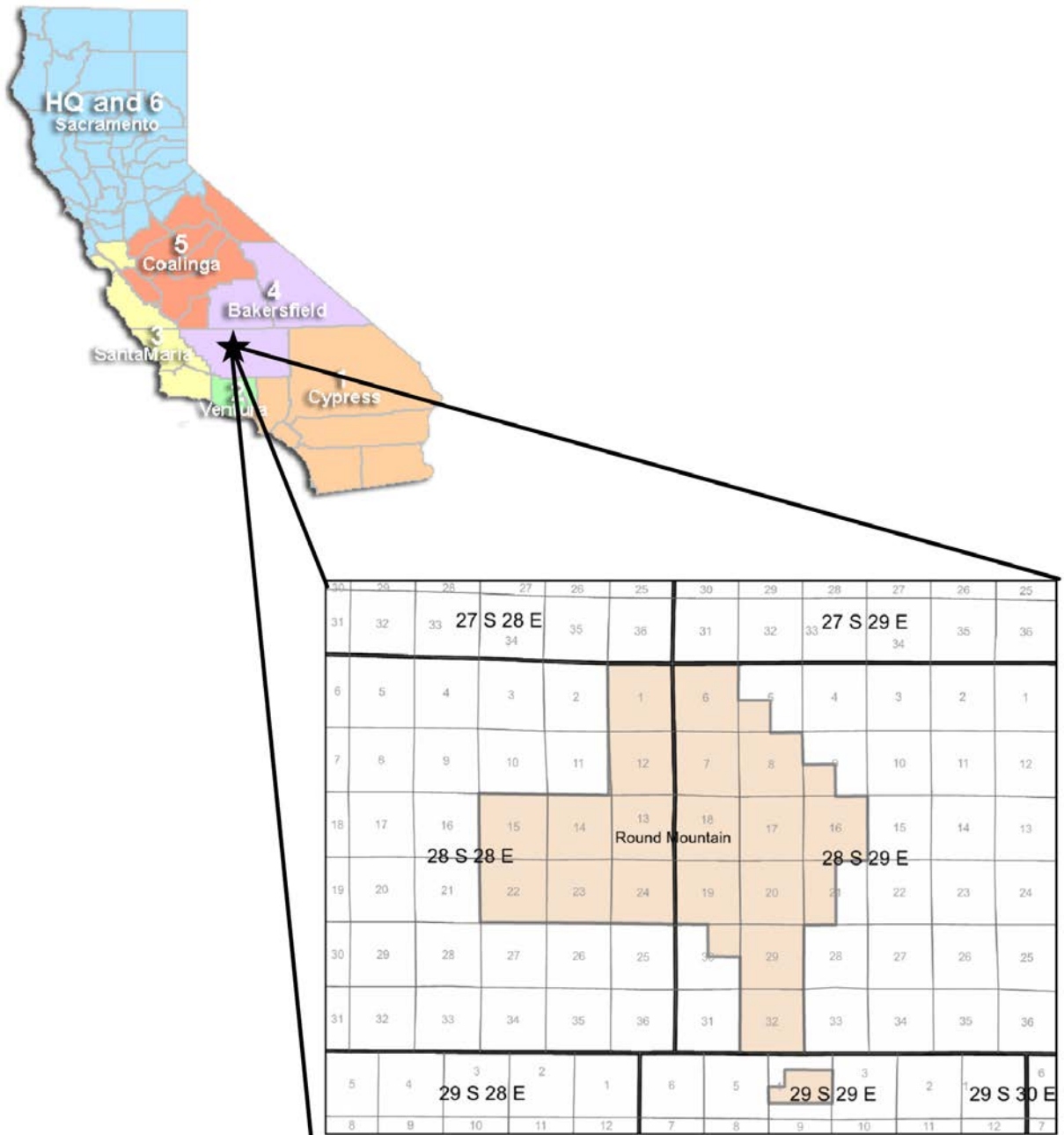
CONCLUSION AND DECISION

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(b)(1) have been met and the EPA approves the AE request as a non-substantial program revision.

Effective Date: February 9, 2017

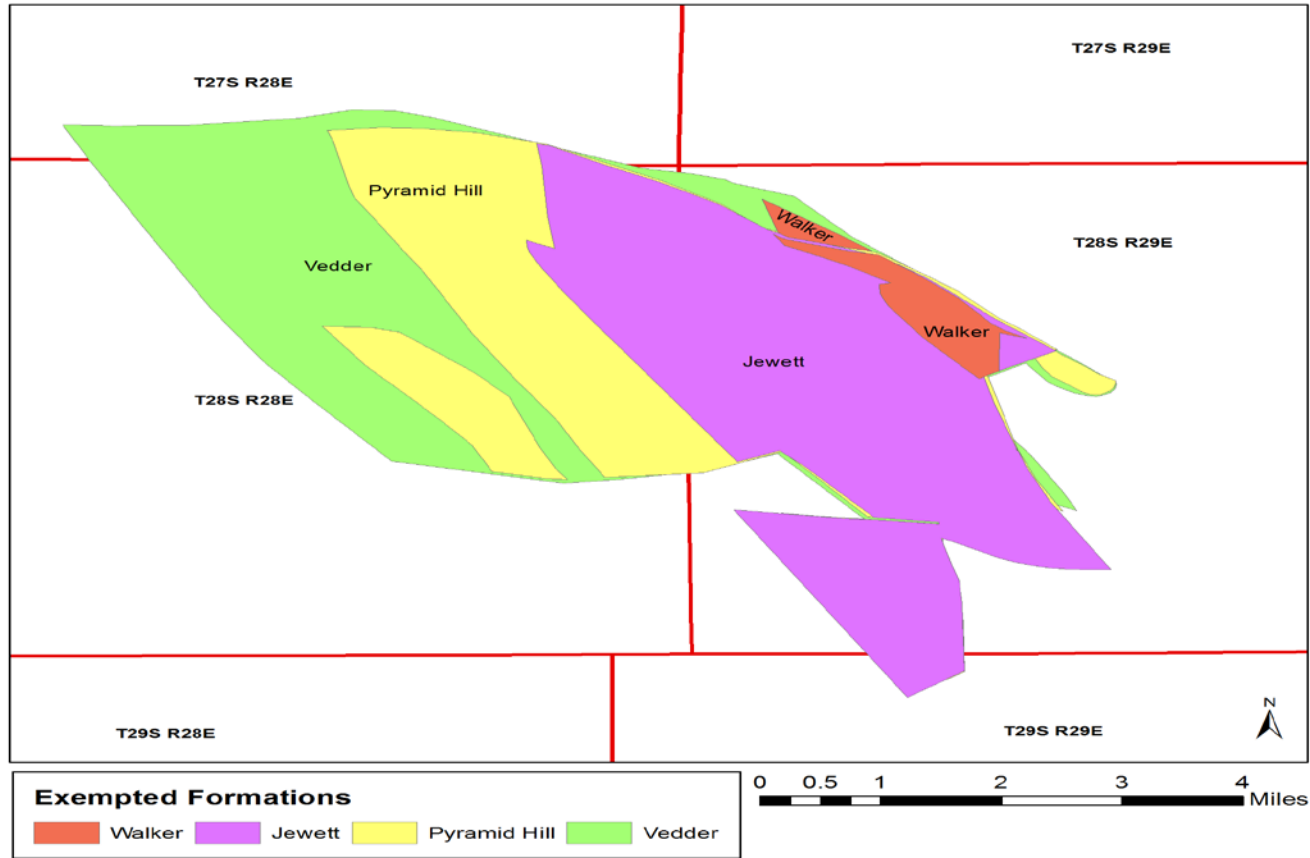
¹ Department of Conservation, Division of Oil, Gas and Geothermal Resources, Public Notice of Determination and Request for U.S. EPA Action Regarding Eleven Aquifers Historically Treated as Exempt (Nov. 15, 2016), *available at* ftp://ftp.consrv.ca.gov/pub/oil/Aquifer_Exemptions/HTAE/Public_Notice_for_11_HTAE_Aquifers-20161114.pdf.

Figure 1: Location of the Round Mountain Oil Field, Kern County, California



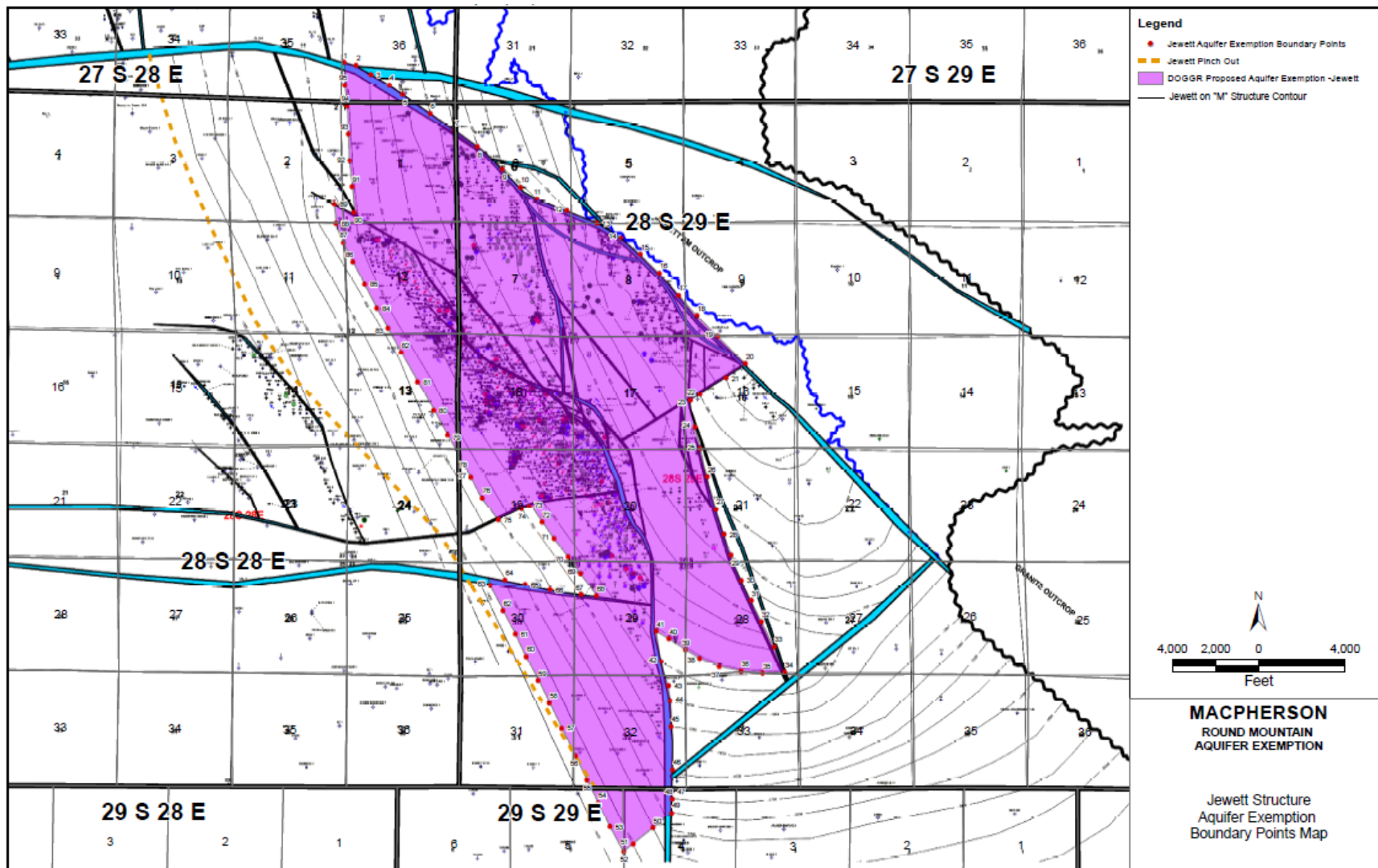
Source: Figure 2.1, DOGGR's Aquifer Exemption Application for the Round Mountain Oil Field

Figure 2: Areal Extent of Proposed Aquifer Exemptions



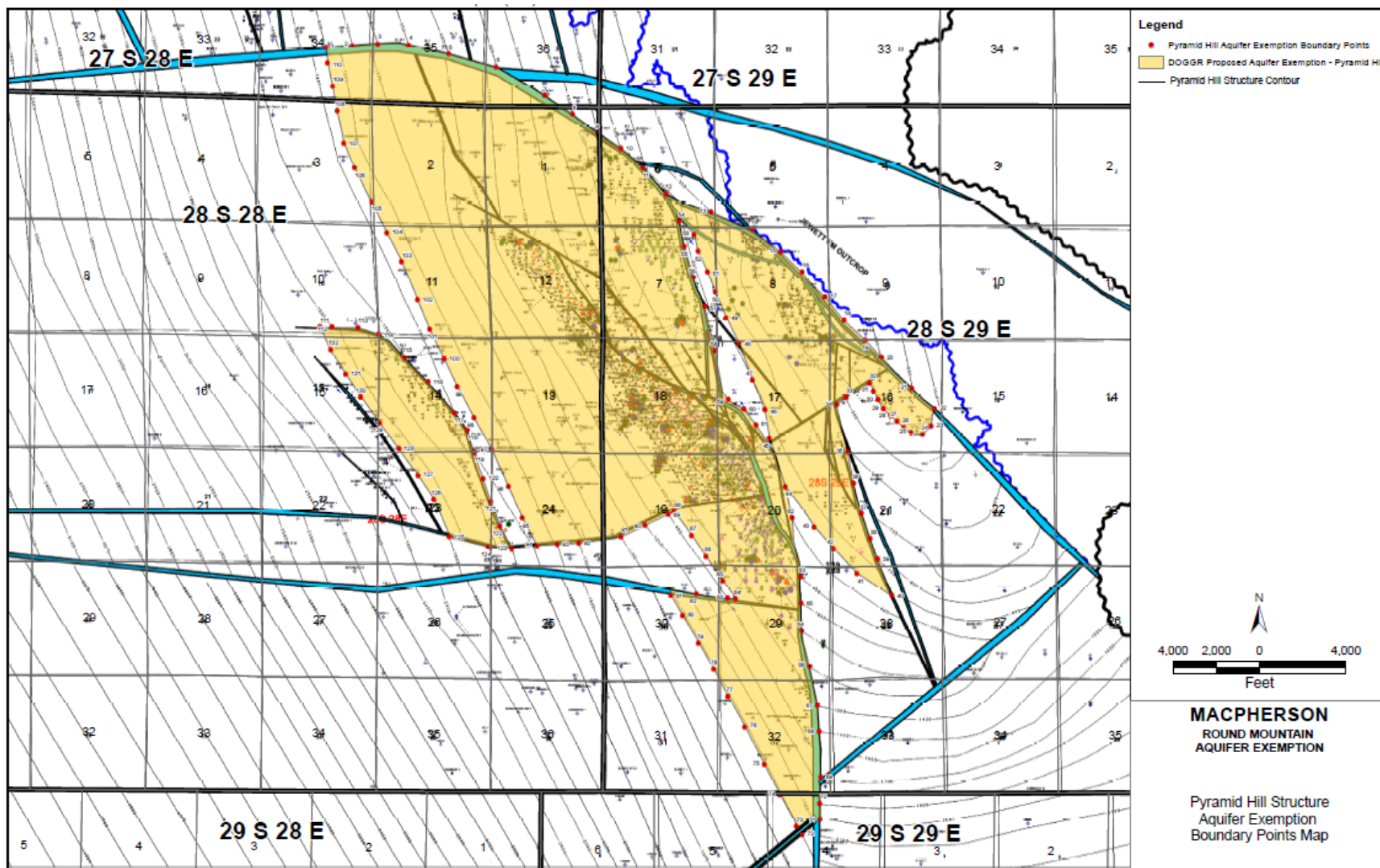
This map displays the maximum lateral extent of the proposed AE expansion for each formation. This figure is generalized and does not show all areas of overlap across individual formations. Exemption depth is also variable across the exemption area. Cross section diagrams in the exemption application should be reviewed for additional information on exemption depth and the stratigraphic relationship among the formations.

Figure 3A: Jewett Sand Aquifer Exemption Location Map with Identifying Features, Round Mountain Oil Field, Kern County, California



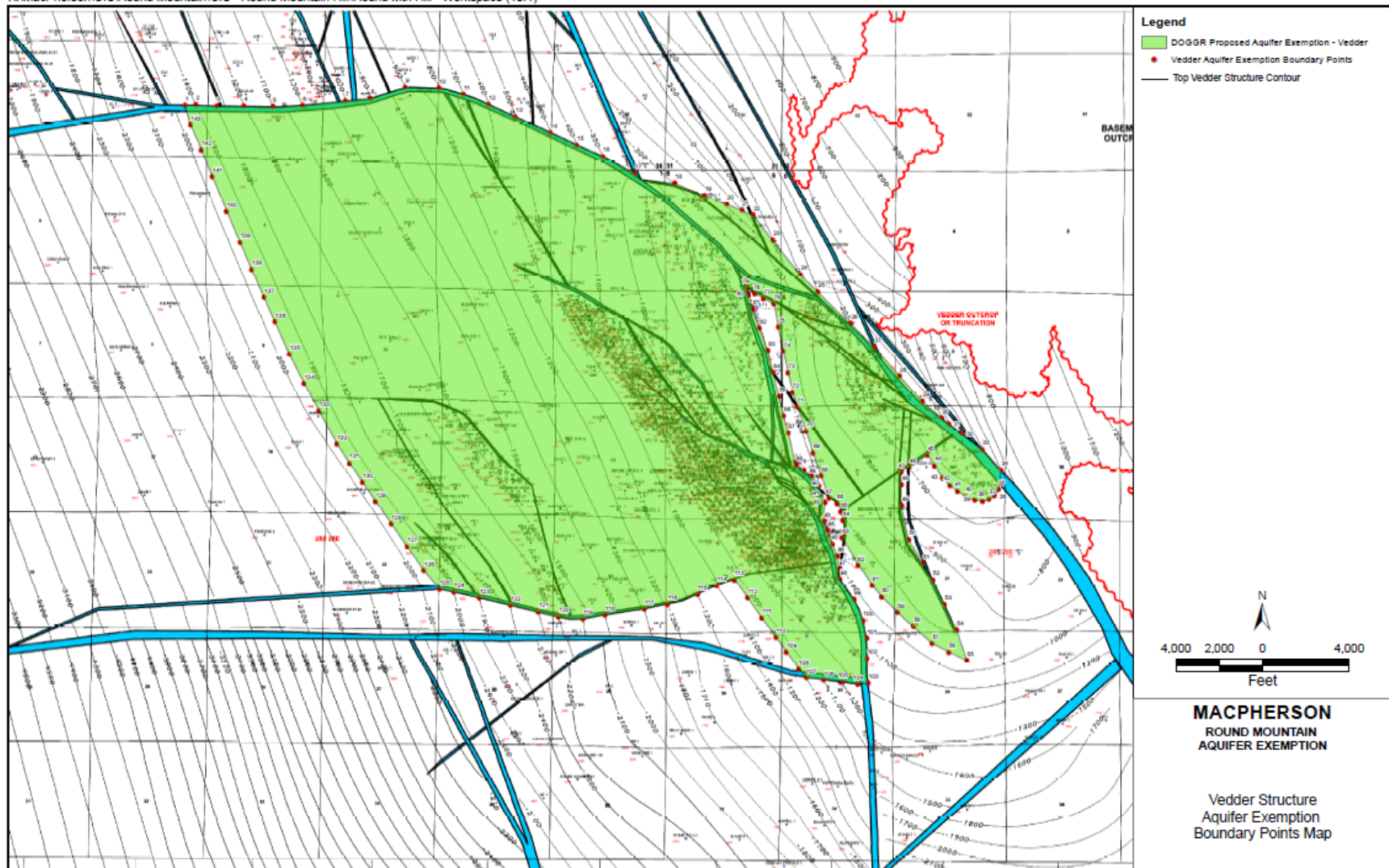
Source: DOGGR's Aquifer Exemption Application for the Round Mountain Oil Field

Figure 3B: Pyramid Hill Sand Aquifer Exemption Location Map with Identifying Features, Round Mountain Oil Field, Kern County, California



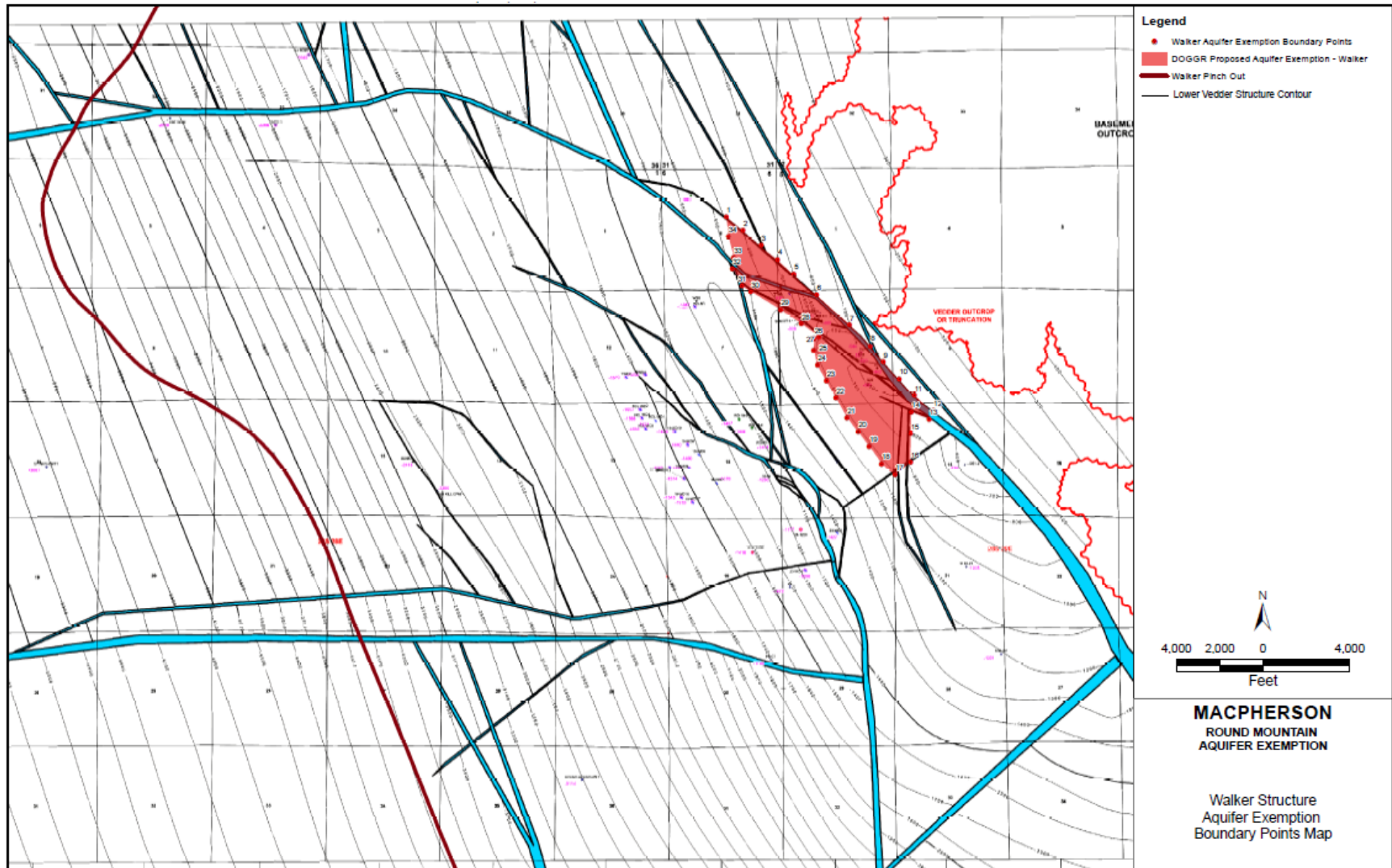
Source: DOGGR's Aquifer Exemption Application for the Round Mountain Oil Field

Figure 3C: Vedder Formation Aquifer Exemption Location Map with Identifying Features, Round Mountain Oil Field, Kern County, California



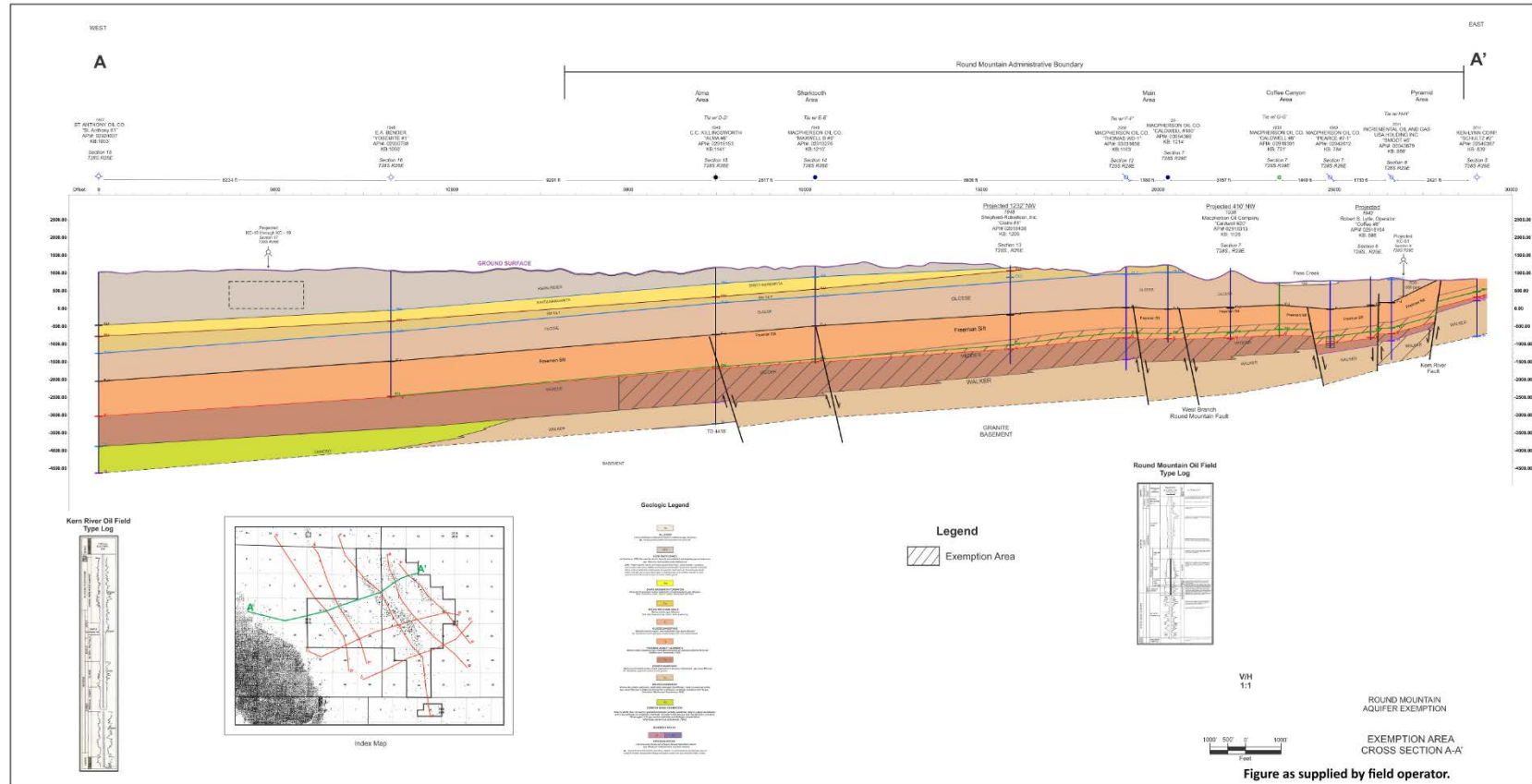
Source: DOGGR's Aquifer Exemption Application for the Round Mountain Oil Field

Figure 3D: Walker Formation Aquifer Exemption Location Map with Identifying Features, Round Mountain Oil Field, Kern County, California



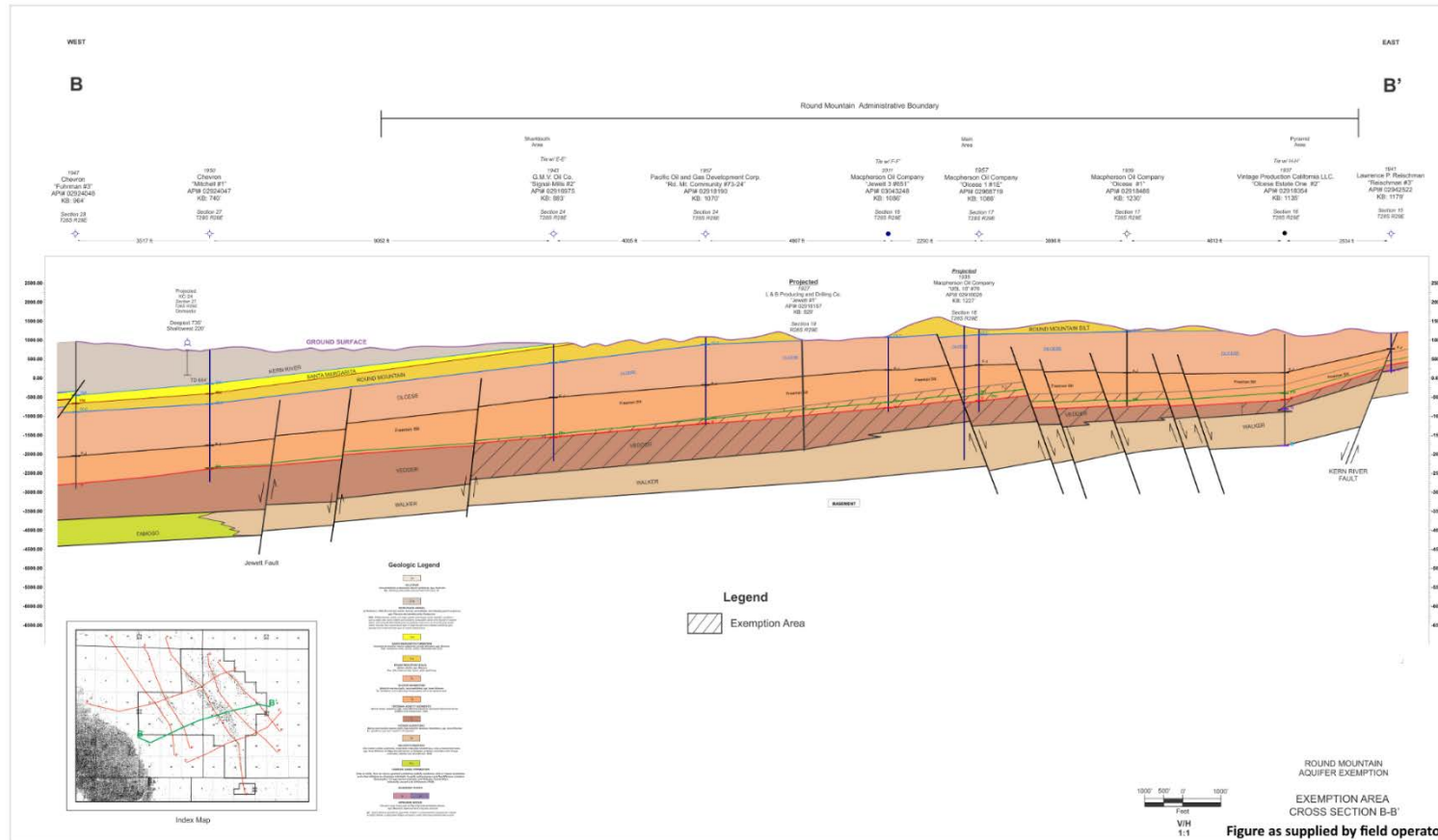
Source: DOGGR's Aquifer Exemption Application for the Round Mountain Oil Field

Figure 4A: Cross Section A – A' across the Proposed Exemption Area



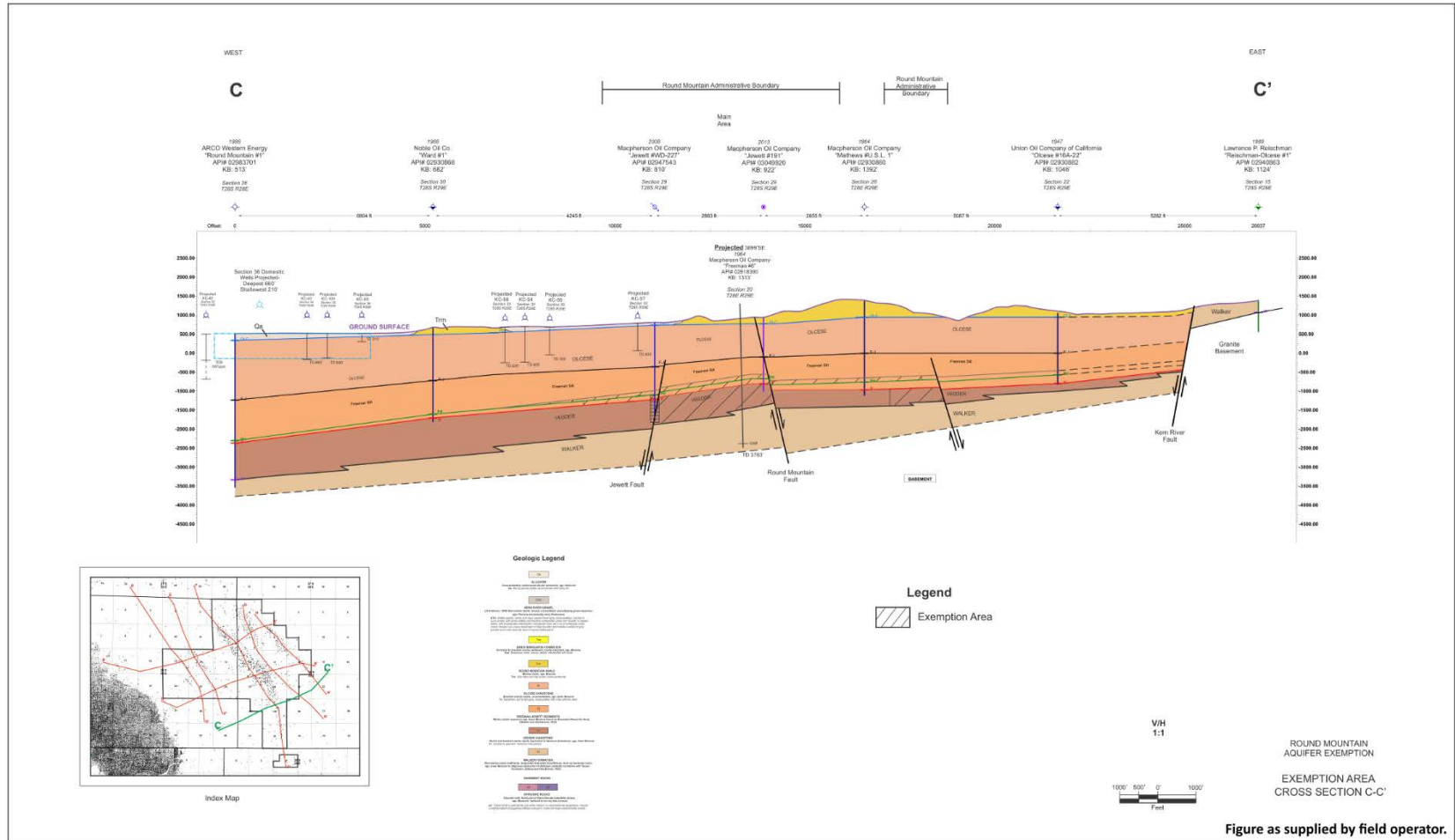
Source: Figure 2.31, DOGGR’s Aquifer Exemption Application for the Round Mountain Oil Field

Figure 4B: Cross Section B – B' across the Proposed Exemption Area



Source: Figure 2.32, DOGGR's Aquifer Exemption Application for the Round Mountain Oil Field

Figure 4C: Cross Section C – C' across the Proposed Exemption Area



Source: Figure 2.33, DOGGR's Aquifer Exemption Application for the Round Mountain Oil Field

Figure 4D: Cross Section D – D' across the Proposed Exemption Area

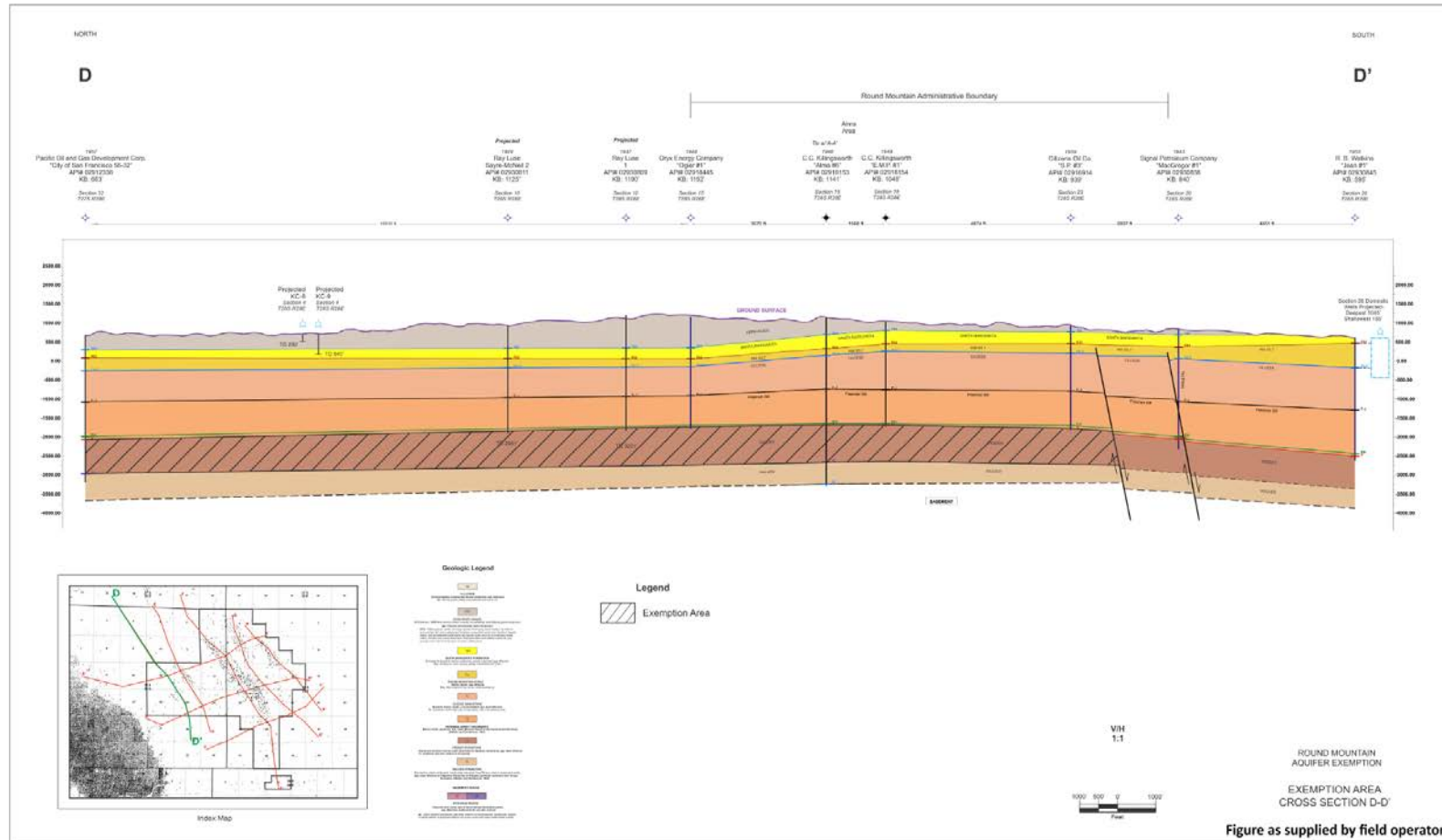
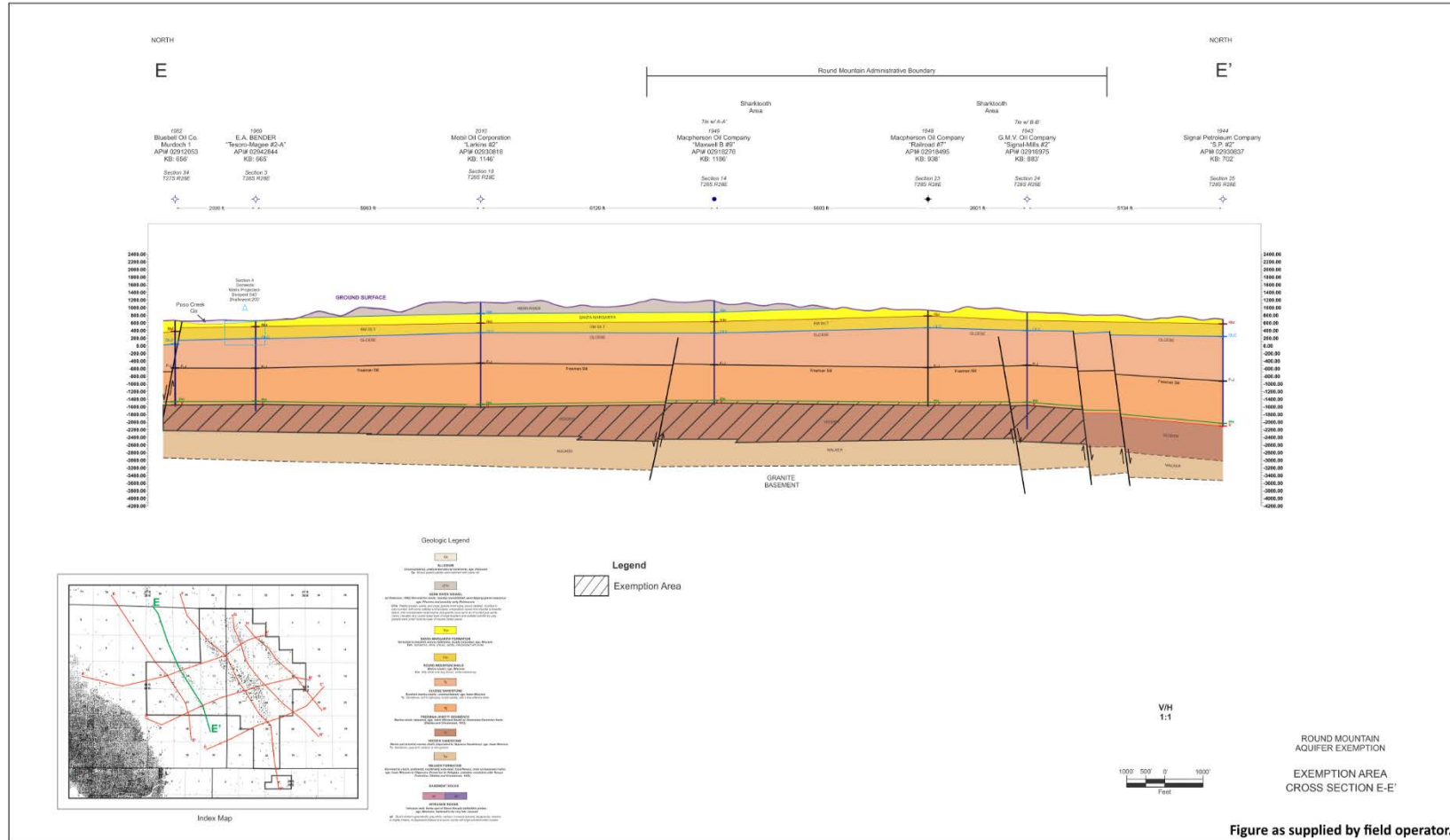


Figure as supplied by field operator.

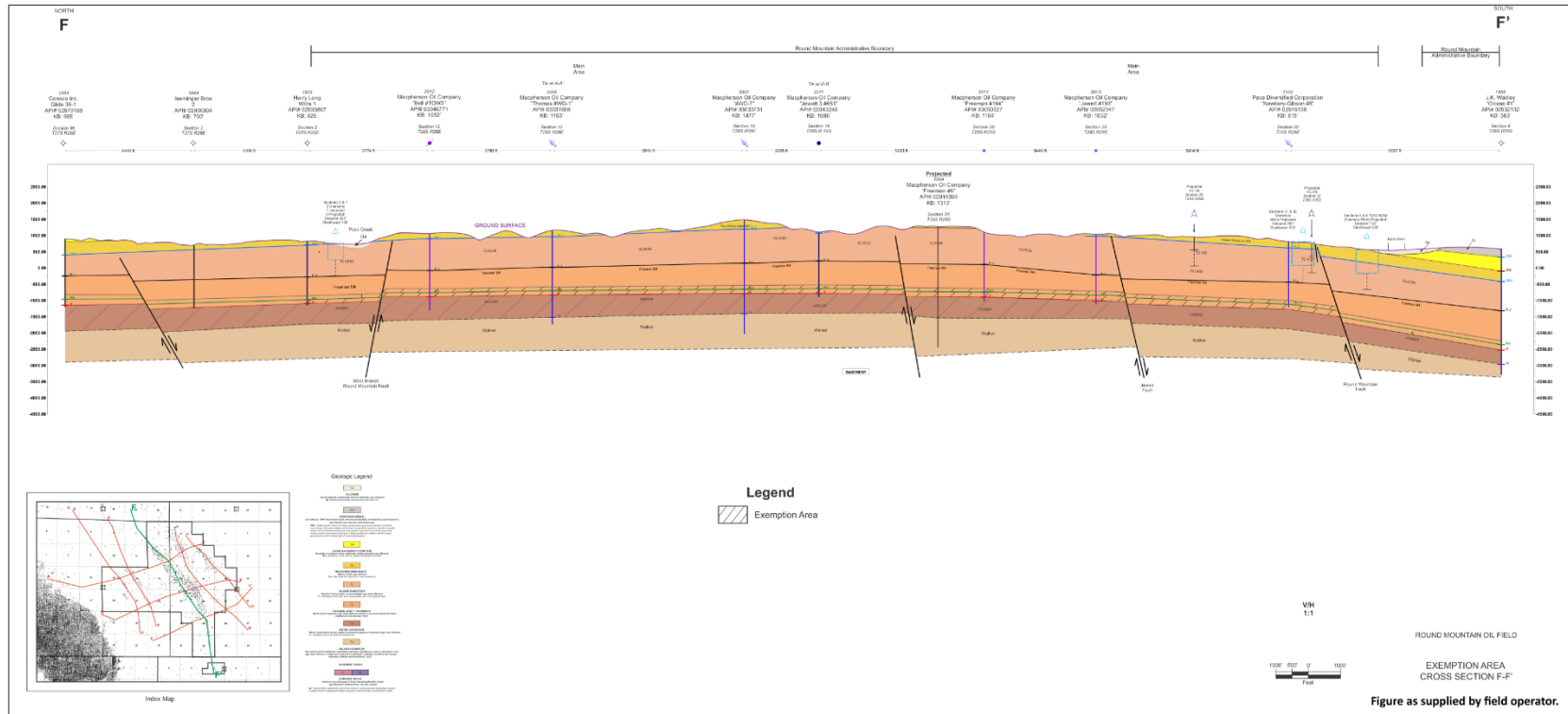
Source: Figure 2.34, DOGGR's Aquifer Exemption Application for the Round Mountain Oil Field

Figure 4E: Cross Section E – E' across the Proposed Exemption Area



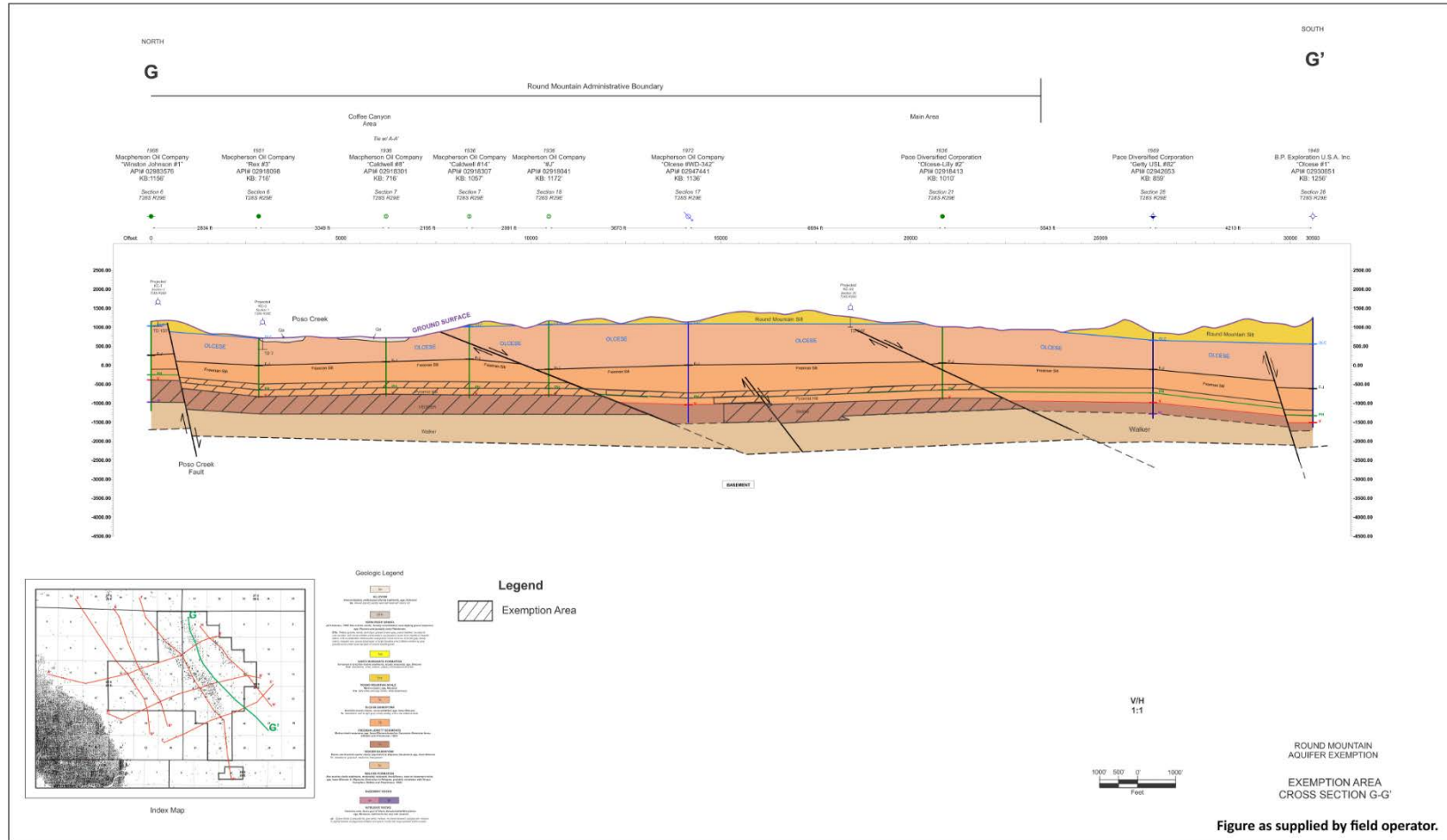
Source: Figure 2.35, DOGGR's Aquifer Exemption Application for the Round Mountain Oil Field

Figure 4F: Cross Section F – F’ across the Proposed Exemption Area



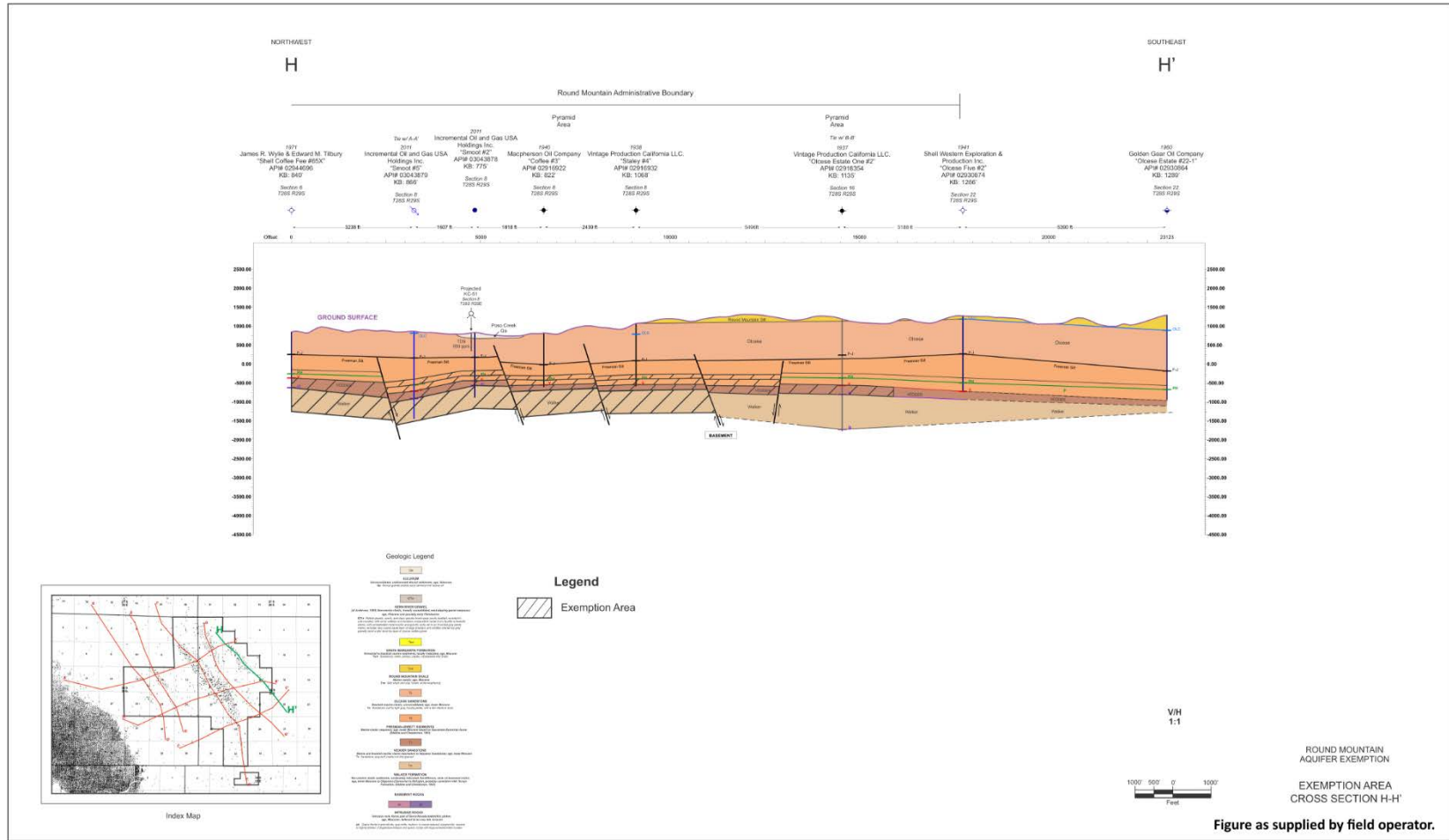
Source: Figure 2.36, DOGGR’s Aquifer Exemption Application for the Round Mountain Oil Field

Figure 4G: Cross Section G – G' across the Proposed Exemption Area



Source: Figure 2.37, DOGGR's Aquifer Exemption Application for the Round Mountain Oil Field

Figure 4H: Cross Section H – H' across the Proposed Exemption Area



Source: Figure 2.38, DOGGR's Aquifer Exemption Application for the Round Mountain Oil Field

Table 1: Water Wells Inventory

Location	Well number	Kern County Reference Well Number	Owner	Date Drilled	Depth Drilled (feet)	Depth Completed (feet)	Water Depth (feet)	Screened Interval	Proposed use	Zone	Source
1-28S/28E	1C01	KC-1	JUNE UHALT	6/1/1987	150	150	40	70-150	Domestic	Alluvium, Olcese	DWR, KCEH USGS/ DWR WDL
1-28S/28E	01Q001M	KC-2	NA	NA	NA	NA	13.8	NA	NA	NA	DWR/ DWR WDL/ USGS DWR
1-28S/28E	01R01	KC-3	W.F. SMOOT	8/19/1953	74	74	18	44-66	Domestic	Olcese	DWR/ DWR WDL/ USGS DWR
2-28S/28E	2F01	KC-4	CHEMICAL WASTE MGT	7/16/1986	800	505	15	145-485	Industrial	Olcese	DWR
2-28S/28E	2F02	KC-5	NA	NA	NA	802	NA	NA	NA	Olcese	KCWA Files
4-28S/28E	4B01	KC-6	NA	NA	NA	540	NA	NA	NA	SM/Olcese	KCWA
4-28S/28E	4C01	KC-7	NA	NA	NA	1100	NA	NA	NA	Olcese	KCWA
4-28S/28E	4F01	KC-8	EUGENE MON	11/11/1966	200	200	124	120-200	Domestic	Kern River	DWR
4-28S/28E	4M01	KC-9	WARREN PLASKETT	12/5/1997	545	540	265	285-540	Domestic	Santa Margarita	DWR
4-28S/28E		KC-10	PATRICK WEINS	6/19/2006	830	800	70	450-830	Domestic	Olcese	DWR
8-28S/28E	8C01	KC-11	MIKE HOOD	10/8/2007	820	813	700	540-560 & 610-813	Domestic	Kern River	DWR
8-28S/28E	8E01	KC-12	JOHN TANT & MIKE ROZA	12/3/2004	975	925	840	715-975	Domestic	Kern River	DWR
8-28S/28E	8F01	KC-13	RON DAVIS	5/9/1993	940	900	700	800-900	Domestic	Kern River	DWR
8-28S/28E	8G01	KC-14	WENDEL WELLER	10/18/1966	840	840	752	720-828	Stock	Kern River	DWR
8-28S/28E	8G02	KC-15	NA	NA	NA	980	NA	NA	NA	Kern River	KCWA
14-28S/28E	14D01	KC-89	SMOOT		NA	904	NA	NA	Grazing	Olcese	Field Insp
17-28S/28E	17C01	KC-16	NA	NA	NA	NA	1000	NA	NA	Kern River	KCWA
17-28S/28E	17C02	KC-17	TOM WILSON	8/29/2006	820	800	638	400-800	Domestic	Kern River	DWR
17-28S/28E	17D01	KC-18	NA	NA	NA	NA	1200	NA	NA	Kern River	KCWA
17-28S/28E		KC-19	THOMAS GAFFORD	4/27/1995	1200	1200	880	880-1200	Domestic	Kern River	DWR
20-28S/28E	20F01	KC-20	NA	NA	NA	NA	956	NA	NA	NA	KCWA Files
20-28S/28E	20H01	KC-21	NA	NA	NA	NA	932	NA	NA	NA	KCWA Files
20-28S/28E	20N01	KC-22	NA	NA	NA	NA	1681	NA	NA	NA	KCWA Files
24-28S/28E	24M01	KC-23	NA	NA	NA	NA	NA	NA	NA	NA	DWR WDL
27-28S/28E		KC-24	AUTUMN TREE SERVICE	4/26/1980	654	654	180	300-654	Domestic	Kern River	DWR
28-28S/28E	28D01	KC-25	NA	NA	NA	896	NA	NA	NA	Kern River	KCWA Files
28-28S/28E	28E01	KC-26	NA	NA	NA	NA	NA	NA	NA	NA	DWR WDL
33-28S/28E	33A01	KC-27	NA	NA	NA	NA	NA	NA	NA	NA	DWR WDL
33-28S/28E	33H01	KC-28	NA	NA	NA	NA	NA	NA	NA	NA	DWR WDL
33-28S/28E	33M01	KC-29	NA	NA	NA	972	NA	NA	NA	Kern River	KCWA Files
34-28S/28E	34J01	KC-30	NA	NA	NA	NA	NA	NA	NA	NA	DWR WDL
34-28S/28E	34R01	KC-31	TENNECO WEST INC.	9/28/1983	266	266	40	146-266	Domestic	Alluvium/ Kern River	DWR
35-28S/28E		KC-32	CLINT SMOOT	9/28/1965	150	149	18	4-150	Irrigation	Alluvium/ Kern River	DWR
35-28S/28E	35L01	KC-33	TENNECO WEST INC.	10/31/1983	225	225	30	125-225	Domestic	Alluvium/ Kern River	DWR
35-28S/28E	35M01	KC-34	TENNECO WEST INC.	2/1/1984	263	263	30	163-263	Domestic	Alluvium/ Kern River	DWR
35-28S/28E	35M02	KC-35	HAROLD ELLIOTT	4/22/1976	160	160	90	80-160	Domestic	Alluvium/ Kern River	DWR
35-28S/28E	35N01	KC-36	STAN AHLF	4/22/1974	155	155	90	95-155	Domestic	Alluvium/ Kern River	DWR
35-28S/28E	35N02	KC-37	STAN ALF	11/2/1991	220	220	20	180-220	Domestic	Alluvium/ Kern River	DWR
35-28S/28E	35N03	KC-38	MEADOWS OF KERN MUTUAL WATER CO.	7/10/2012	390	320	120	140-260 & 300-320	Domestic	Alluvium/ Kern River	DWR
35-28S/28E	35R01	KC-39	KERN COUNTY PARK	2/25/1949	1045	1045	NR	NR	NR	Kern River/ Olcese	DWR
36-28S/28E	36A01	KC-40	EDISON CO.	2/1/1923	171	171	NR	NR	Grounding Well	Olcese	DWR
36-28S/28E	36A02	KC-41	BILL FRENCH	5/9/1973	210	210	200	170-205	Domestic	Olcese	DWR
36-28S/28E	36E01	KC-42	NA	NA	700	NA	NA	NA	NA	Alluvium, Olcese	KCWA

Location	Well number	Kern County Reference Well Number	Owner	Date Drilled	Depth Drilled (feet)	Depth Completed (feet)	Water Depth (feet)	Screened Interval	Proposed use	Zone	Source
36-28S/28E	36G01	KC-43	ROBERT THOMPSON	8/20/1986	640	640	620	440-640	Domestic	Olcese	DWR
36-28S/28E	36G02	KC-44	JIM ROMINES	10/15/1992	680	650	300	540-640	Domestic	Olcese	DWR
36-28S/28E	36M01	KC-45	ERIC & PRISCILLA DOBB	4/24/1991	230	220	NR	100-220	Domestic	Alluvium, Olcese	DWR
36-28S/28E		KC-46	JESSELE COLLEEN MORLE	2/13/1990	640	640	FLOWING"	560-640	Domestic	Olcese	DWR
36-28S/28E		KC-47	DICK DARROW	12/15/1992	660	660	FLOWING"	540-640	Domestic	Olcese	DWR
36-28S/28E		KC-48	LEE COVIN	3/20/1990	640	640	FLOWING"	560-620	Domestic	Olcese	DWR
36-28S/28E		KC-49	IKE SIMONSON	7/10/1991	640	640	NR	560-620	Domestic	Olcese	DWR
6-28S/29E	6M01	KC-50	MOC								
8-28S/29E	8C01	KC-51	Brett and Constance Cooper	NA	NA	NA	NA		Domestic	Alluvium, Olcese	KCEH
8-28S/29E	8J01	KC-90	Staley 13*	7/25/1943	1420	1219	NA	455-495	Grazing	Olcese	DOGGR
20-28S/29E	20A1	KC-52	JACK VA HANNICK	5/26/1950	259	249	117	137-243	Irrigation	Olcese	DWR
29-28S/29E	29R01	KC-53	Phillip Ganong	NA	NA	700	NA	NA	Domestic	Olcese	KCEH, KCWA
30-28S/29E	30D01	KC-54	ENV. PROTECTION CORP	6/5/1978	639	639	280	468-639	Domestic	Olcese	DWR
30-28S/29E	30K01	KC-55	MEL MCKINNEY	4/24/1973	380	380	145	280-380	Domestic	Olcese	DWR
30-28S/29E	30K02	KC-56	MEL MCKINNEY	11/26/1977	404	404	180	254-404	Domestic	Olcese	DWR
30-28S/29E	30H01	KC-57	HAROLD CARSON	8/20/1991	400	400	310	300-390	Domestic	Olcese	KCEH/DWR
30-28S/29E	30L01	KC-58	CHEVRON EMC	6/3/2012	610	600	169	180-600	Industrial	Olcese	DWR
31-28S/29E	31D01	KC-59									
31-28S/29E	31K01	KC-60	NA	NA	NA	400	NA	NA	NA	Olcese	KCWA
31-28S/29E	31R01	KC-61	NA	NA	NA	320	NA	NA	NA	Quaternary, Olcese	KCWA
31-28S/29E	31R02	KC-62	NA	NA	NA	400	NA	NA	NA	Quaternary, Olcese	KCWA
32-28S/29E	32N01	KC-63	STEVE THURMAN	11/15/1991	360	360	120	260-360	Domestic	Quaternary, Olcese	KCEH/DWR
32-28S/29E	32N02	KC-64	STEVE THURMAN	NA	NA	561	NA	NA	Domestic	Quaternary, Olcese	KCEH
32-28S/29E	32P01	KC-65	JACK JOST	7/18/2006	733	700	NR	300-700	Domestic	Olcese	KCEH/DWR
3-29S/29E	3R01	KC-66	OLCSE RANCH	3/29/1967	65	48	18	18-48	Domestic	Olcese	DWR
3-29S/29E	3D01	KC-67	KERN COUNTY GOLF COL	10/23/1948	590	590	93.6	NR	NR		DWR
3-29S/29E	3D02	KC-68	KERN COUNTY GOLF COL	1957/1958	628	628	NR	380-628	NR		DWR
3-29S/29E	3R02	KC-69	OLCSE RANCH	3/29/1967	65	48	18	18-48	Domestic	Olcese	DWR
4-29S/29E	A-101	KC-70	GERALD CROWN	2/28/1974	435	435	432	335-435	Domestic	Olcese	DWR
4-29S/29E	4G01	KC-71	A1 HADDAD	11/23/1953	797	797	375	600-797	NR		DWR
4-29S/29E		KC-72	A1 HADDAD	?	810	805	NR	600-810	Irrigation		DWR
4-29S/29E	4M01	KC-73	CAVU ROCK PROPERTY P	4/5/2008	580	580	NR	500-580	NR		DWR
5-29S/29E		KC-74	JIM & MARY CARROLL	11/8/1994	260	260	100	200-260	Domestic		DWR
5-29S/29E	5B01	KC-75	TONY & JOY CORDOVA	7/1/1996	300	300	120	240-300	Domestic		DWR
5-29S/29E	5A01	KC-76	ROBERT BOZBY	6/8/1990	500	500	120	420-480	Domestic		DWR
5-29S/29E		KC-77	DAVID LONG	4/6/1992	740	740	735	600-700	Domestic		DWR
5-29S/29E	5D01	KC-78	JOHN BANDUCCI	10/25/1978	420	420		180-420	Domestic		DWR
5-29S/29E	A451	KC-79	JEFF REDFEAIRN	3/8/1985	220	220	110	120-220	Domestic		DWR
5-29S/29E	A411	KC-80	JEFF HADDOCK	5/4/1983	400	400	40	140-200	Domestic		DWR
5-29S/29E		KC-81	MARK AND JILL HALLING	10/19/1990	400	400	125	300-400	Domestic		DWR
5-29S/29E		KC-82	ED HADDOCK	ND	240	240	48	140-240	Domestic		DWR
5-29S/29E	A-418	KC-83	CARNACION P MORIN	6/15/1983	336	336	125	231-336	Domestic		DWR
5-29S/29E	05B1	KC-84	WILLIAM B HANNA	7/14/1992	360	340	120	240-340	Domestic		DWR
5-29S/29E		KC-85	JAMES G BOWLES	8/15/1973	265	265	25	155-265	Domestic		DWR
5-29S/29E		KC-86	EDDIE HADDOCK	3/6/1974	315	315	120	212-315	Domestic		DWR
* converted to water well from oil well (API#02916941) in 1997											
NA- Not Available											
NR- Not Reported											
DOGGR- Division of Oil, Gas and Geothermal Resources											
DWR- Department of Water Resources											
DWR WDL- Department of Water Resources Water Data Library											
KCEH- Kern County Environmental Health											
KCWA- Kern County Water Agency											

Source: Table 4.1, DOGGR's Aquifer Exemption Application for the Round Mountain Oil Field