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# Data in Support of the Aquifer Exemption Boundary Expansion Application for the Kern River Reservoir including the Kern River Formation and Upper Chanac Formation Kern River Field Kern County, California

K/J Project No. 2565005*00

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26 March 2025

This report was prepared by the staff of Kennedy/Jenks Consultants, Inc. in association with Chevron U.S.A. Inc., under the supervision of the geologist whose seal and signature appear below.

The findings, recommendations, specifications or professional opinions presented in this report were prepared in accordance with the generally accepted professional geologic practice and within the scope of the project. No other warranty, either expressed or implied, is provided.

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K/J Project No. 2565005*00

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# Executive Summary

In accordance with Code of Federal Regulations, Title 40, Chapter 1, Subchapter D, Part 146.4 (40 CFR §146.4), Kern River Field operators (Chevron U.S.A. Inc., E&B Natural Resources Management Corporation, Gray Development Co. LLC, Kern River Holdings, Inc., and California Resources Corporation) request that the California Department of Conservation, Geologic Energy Management Division (CalGEM) expand the currently exempted aquifer boundary for the hydrocarbon producing portion of the Kern River Reservoir which throughout this document is considered to consist of both the Kern River Formation and Upper Chanac Formation beneath the Kern River Field (Figure 1). The Kern River Field exempted aquifer was included in the 1981 Primacy Application submitted by the California Department of Oil, Gas and Geothermal Resources (DOGGR, now CalGEM) to the U.S. Environmental Protection Agency (USEPA), and approved by the USEPA on 29 September 1982 as part of the Memorandum of Agreement between CalGEM and the USEPA Region IX. The exempted aquifer boundary is based on 1973-74 CalGEM maps of the oil/water contact. As stated in Section 3106 of Article 2 in Chapter 1 of Division 3 of the State of California Public Resources Code, the Supervisor of the CalGEM is directed to encourage the wise development of oil and gas resources to best meet oil and gas needs in California.

The Kern River Field operators have been permitted to produce oil from wells located outside the 1982-approved aquifer exemption boundary (Figure 4) using enhanced oil recovery (EOR) methods (e.g., steam injection). Continuing production operations outside the current exempted aquifer boundary will require that portions of the Kern River and Upper Chanac Formations that contain producible oil be exempted from an underground source of drinking water, under 40 CFR §146.4. Based on field evidence, and past practices, commercially producible quantities of oil exist outside the current exempted aquifer boundary. As such, the Kern River Field operators are requesting that the proposed exemption area include those zones containing producible oil.

Upon recommendation from the State, the USEPA may exempt an aquifer from a potential underground source of drinking water (USDW) if it satisfies 40 CFR §146.4, which states “An aquifer or a portion thereof which meets the criteria for a USDW in §146.3 may be determined under §144.7 of this chapter to be an “exempted aquifer” for Class I-V wells if it meets the criteria in paragraphs (a) through (c) of this section.” In accordance with §146.4, the relevant criteria for the subject exemption for Class II injection (subsurface injection of liquids associated with oil and gas production) include:

a. It does not currently serve as a source of drinking water; and
b. It cannot now and will not in the future serve as a source of drinking water because it is hydrocarbon producing, or can be demonstrated by a permit applicant as part of a permit application for a Class II operation to contain hydrocarbons that considering their quantity and location are expected to be commercially producible.

In order to submit a proposal by the State to the USEPA, the CalGEM shall consult with the appropriate Regional Water Quality Control Board and the State Water Resources Control Board to ensure that the subject proposal meets California Public Resources Code (PRC) 3131(a), which states that the State must “…ensure the appropriateness of [the] proposal…” concerning the conformity with all of the following:

a) Criteria set forth in Section 146.4 of Title 40 of the Code of Federal Regulations;

b) The injection of fluids will not affect the quality of water that is, or may reasonably be, used for any beneficial use; and
c) The injected fluid will remain in the aquifer or portion of the aquifer that would be exempted.

The main body of the Kern River Field occupies approximately 17,900 acres in the southern San Joaquin Valley, approximately 2 miles northeast of Bakersfield, California (Figure 1). In the Kern River Field, oil is produced from the Kern River and Upper Chanac Formations. Commercial production occurs at depths ranging from less than 100 feet below ground surface (bgs) near the eastern extent of the field, where the Kern River Formation outcrops, to more than 1,600 feet bgs at the western extent of the field.

The faults along the southwestern, western, northern, and northeastern proposed exemption boundaries, the updip outcrop of the Kern River Formation to the east, and the tar seals along the southern and southeastern proposed exemption boundaries limit lateral fluid movement into and out of the Kern River Field. The vertical upward (decreasing) pressure gradient prevents fluid flow vertically downward out of the Kern River Reservoir. The absence of fluids in the upper portion of the Kern River Formation, and presence of nine field-wide silts, which are continuous across the eastern subcrop area, prevent fluid flow vertically upward out of the oil production zone. These physical features establish the Kern River Field as a closed hydrologic basin. The relatively low recharge from meteoric water and the Kern River, the significant volume of fluid removed from the reservoir, and the overall decline in fluid elevation in the Kern River and Upper Chanac Formations across the field further demonstrates that the fluids are hydraulically controlled and contained in a closed basin.

Oil extracted from the Kern River Field is classified as heavy oil, with an API gravity between 10° and 16°. Kern River Field operators use EOR methods to produce oil from the Kern River Field.

Oil at the Kern River Field is currently produced from over 10,000 production wells, of which 157 (1 percent) exist outside the 1982-approved exempted aquifer boundary (Table 1, Figure 56). In 2014, approximately 440,500 barrels of oil (1.7 percent) of the oil produced from the Kern River Field was from wells outside the 1982-approved exempted aquifer boundary. The following summarizes information and provides data supporting the aquifer exemption request for the Kern River and Upper Chanac Formations in the Kern River Field:

1. The best use of the oil-bearing formations in the Kern River Field is its current use, oil and gas extraction. A portion of the Kern River Formation in the Kern River Field is included as an exempted aquifer, due to hydrocarbon production, in the 1981 Primacy Application and in the Memorandum of Agreement between CalGEM and the USEPA Region IX, dated 29 September 1982. This request seeks to expand that exempted aquifer boundary laterally and vertically based on the presence of commercially producible oil in the expanded productive zone.

2. There are multiple bounding conditions for the lateral limits of the requested aquifer exemption area (Figure 17). The west, north, northeast and southwest limits are bounded by faults that represent barriers to flow. In the east, the oil-bearing formations outcrop within the Kern River Field administrative boundary, limiting the eastern extent of

fluid flow through the proposed exempted aquifer boundary. The southeast and south proposed aquifer exemption boundaries are established by areas containing tar seals. The north and northeast boundaries are also defined by the highest known oil limit; and the southwest boundary is defined by the lowest known oil limit. Oil field operations through fluid extraction activities related to hydrocarbon production have formed a low pressure zone in the center of the field, creating an inward hydraulic gradient and establishing hydraulic control within the oil field boundaries (Figure 33).

3. Production in the Kern River Field, a heavy oil reservoir, cannot economically occur without the use of EOR methods, primarily steam injection, which was first used in 1961. Results have shown significant increase in production using EOR methods (Figure 56). Water is produced in conjunction with the EOR process and is separated from the hydrocarbons before it is treated and beneficially reused for steam generation or other oil field operations (Figure 61). Produced water not needed for in-field uses is further treated and provided to a local water district for beneficial reuse.

4. One municipal and nine private/irrigation wells exist within the 1982-approved aquifer exemption boundary. Five private wells located at the eastern extent of the oil field are screened within the oil-bearing zone (Appendix F) and are isolated and protected from impact from oil field operations by the strong inward hydraulic gradient toward the center of the field. Two private/irrigation and the one municipal well within the 1982-approved aquifer exemption boundary are screened within the Kern River Formation at elevations above the oil-bearing zone (Table 3) and are physically separated from the oil-bearing formations by pervasive silt and clay (shale) layers that represent vertical barriers to flow. These wells extract water from a zone above and not hydraulically connected to the hydrocarbon-bearing formation. Two private wells have unknown completion depths.

5. Based on water well database searches, well records review, and site reconnaissance, there are no private or municipal drinking water supply wells within the proposed expanded aquifer exemption area. Twenty domestic/municipal water supply wells exist outside but in close proximity to the proposed expanded aquifer exemption boundary (Appendix F). These wells are protected hydraulically by the strong hydraulic gradient towards the center of the field created by production operations. Additionally, zone of contribution calculations were completed for each of these 20 wells, based on well-specific information, to confirm that the origin of the water potentially extracted from these wells is outside the proposed expanded aquifer exemption boundary.

# Section 1: Field Information

## 1.1 Project/Field Name and Location

Kern River and Upper Chanac Formations,
Kern River Field,
Kern County, California

## 1.2 Well Class and Purpose of Injection

Class II
Enhanced Oil Recovery

## 1.3 Areal and Vertical Extent/Dimensions of Study Area

The Kern River Field is located in the north central portion of Kern County (southern San Joaquin Valley), approximately 2 miles northeast of Bakersfield, California (Figure 1), within Township 28 South / Range 27 East (T28S/R27E), T28S/R28E, and T29S/R28E, Mount Diablo Basin and Meridian (M.D. B.&M.). The requested expansion will result in a total exempted aquifer lateral area that is approximately 25,300 feet wide near its southern extent, 9,400 feet at the northern extent, 36,900 feet long in the north-south direction, and totals approximately 15,335 acres. The differential area between the existing approved aquifer exemption boundary and the new proposed boundary is approximately 3,900 acres. The areal extent of the proposed aquifer exemption boundary is shown on Figure 2.

The vertical extent of the aquifer exemption top, as expanded, will cover the Kern River and the base of the Upper Chanac Formations that range from approximately 740 feet true vertical depth subsea (TVDSS) to 40 feet TVDSS near the eastern side of the oil field and from approximately 40 TVDSS to -1,500 TVDSS on the western side of the oil field. The gross thickness of the proposed aquifer exemption is shown on Figure 3. The upper limit of this proposed aquifer exemption is limited to strata below the C Silt. Up-dip, along the east margin of the field, the C Silt of the Kern River Formation outcrops and is absent eastward. In this region, the top of the proposed aquifer exemption is further limited. Where the C Silt is 50 feet or less from the surface, the top of the exemption and future injection would be limited to 150 feet below ground surface. The lower limit of this proposed aquifer exemption is defined by a confining silt in the Chanac Formation that separates confined aquifers below from the oil-bearing, unconfined aquifer above. The depths are illustrated in the cross-sections included in Figures 6 through 10 and the structure contour maps included as Figure 13.

## 1.4 Name and Address of the Owners/Operators

Chevron U.S.A. Inc. (Chevron) is the largest operator in the Kern River Field and is responsible for more than 95 percent of the exploration and production activities within its administrative boundaries. Operators within the Kern River Field include:

Chevron U.S.A. Inc.
Chevron North America Exploration and Production Company
San Joaquin Valley Business Unit
1546 China Grade Loop
Bakersfield, California 93308

Kern River Holdings, Inc.
7700 Downing Avenue
P.O. Box 10207
Bakersfield, California 93389

E&B Natural Resources Management Corporation
1400 Easton Drive, Suite 141
Bakersfield, California 93309

California Resources Corporation
9600 Ming Avenue, Suite 300
Bakersfield, California 93311

Gray Development Co. LLC
2701 Patton Way
Bakersfield, California 93308

# Section 2: Aquifer Exemption Description

As Chevron is the largest operator in the Kern River Field, this application support package has been compiled by Chevron, with the concurrence of the other operators identified in Section 1.4. Letters in support of the application to expand the aquifer exemption boundary, prepared by the other operators in 2020, are included in Attachment 1.

## 2.1 Aquifer/Zone Name

Kern River and Upper Chanac Formations

## 2.2 Depth/Thickness of Aquifer

The depth to the top of the aquifer ranges from approximately 0 to 790 feet below ground surface. The thickness of the aquifer generally ranges from 700 to 1200 feet, within the Kern River and Upper Chanac Formations, and is limited physically to the area immediately around the Kern River Field.

## 2.3 Lateral Extent of the Area Proposed for Exemption

The Kern River Field has multiple defined boundaries. The CalGEM established a field boundary in 1973-74 which established the limits of the Kern River and upper Chanac Formations as an exempt aquifer (Figure 4). In 1982, the boundary was modified to reflect field activity and expansion. Notwithstanding this field boundary expansion of the Kern River Field, no expansion of the exempt aquifer boundary was made at that time. Additionally, the CalGEM has an Administrative Boundary which serves as the official boundary between the Kern River Field and neighboring oil fields for permitting and other controls.

Permitted drilling and operational activities targeting the Kern River and Upper Chanac Formations have extended beyond both the 1973-74 and 1982 field boundaries as well as the Administrative Boundary. For Chevron and other operators to continue to enhance development of the Kern River and Upper Chanac Formations beyond the 1973-74 boundary, by means of steam injection, an application to extend the limits of the exempted aquifer is being submitted. As expanded, the total exempted aquifer lateral area is approximately 25,300 feet wide near the southern extent of the field; about 9,400 feet in the east-west direction at northern extent of the field; and approximately 36,900 feet long in the northwest-southeast direction along the center of the field. This proposed expansion of the aquifer exemption boundary will expand the existing approved boundary by approximately 3,900 acres.

The proposed exempted aquifer boundaries extend to the east to the edge of the existing aquifer exemption boundary; to the northeast to a series of unnamed faults and to the limit of known oil; to the north to the limits of known oil; to the west to the limits of practical oil production; to the southwest to the limits of lowest known oil; and to the south and southeast to the limits of oil production (Figure 2). Each of the six lateral boundaries, as well as the two vertical boundaries, are described in detail in Section 4.

## 2.4 Description of Aquifer/Zone Containment

Detailed descriptions of the varying hydraulic barriers that control fluid flow in and around the Kern River Field are provided in Section 4. In general, hydraulic containment is provided by sealing faults, pressure boundaries (pressure gradients), geologic structure and tar seals.

- To the west, flow is controlled by the Kern Front Fault (Figures 5 and 19), which separates the Kern River Field from the Kern Front Field, and by a sustained inward pressure gradient created by production operations (more fluid is extracted than injected, creating an inward hydraulic gradient; Figures 33 and 34).

- To the north, the Poso Creek Fault, an east-west normal fault, acts as a hydraulic barrier. The proposed northern limit of the aquifer exemption lies south of the Poso Creek Fault and is established by the northern-most extent of oil.

- Hydraulic control at the northeast extent of the Kern River Field is created by multiple unnamed normal faults that act as barriers to fluid flow along the westward dipping regional hydraulic gradient (Figures 5 and 19). The proposed northeast limit is positioned downdip (southwest) of the sealing normal faults and is established by the northeast extent of known oil.

- At the eastern extent of the field, the Kern River Formation outcrops, creating a natural stratigraphic hydraulic barrier (Figure 30).

- To the south and southeast, containment for most of the Kern River Field is controlled by tar seals (immobile cold oil) that exist within the Kern River Reservoir outside the limits of production (see Section 4.3); and by the strong inward pressure gradient created by production operations (Figures 33 through 35). In the southeast portion of the field, south of the Kern River, the proposed boundary extension is established by the limits of production (Figure 57).

- To the southwest, the proposed aquifer exemption boundary is limited to the lowest known oil (Figures 38 and 39), with containment being provided by the strong inward hydraulic gradient resulting from production operations (Figure 40). In the southwest portion of the field, west of the Kern River, the proposed boundary extension is established by the limits of production (Figure 39).

Vertical containment of injected fluid is controlled in the upward direction by the water/oil surface, and by fine-grained silt and clay layers that persist throughout the Kern River Field. Vertical containment in the downward direction is controlled by a silt unit within the Chanac Formation that provides vertical hydraulic separation between the overlying unconfined aquifer that extends into the Kern River Formation and the underlying confined aquifer that extends deeper into the Chanac Formation as illustrated on Figure 56 (Coburn and Gillespie, 2002).

### 2.4.1 Cross-Section Descriptions

Five field-wide geologic cross-sections have been produced for this report, along with numerous smaller localized sections. The cross-sections display geologic, hydrogeologic and oil production information relative to the request to expand the aquifer exemption boundary for the Kern River Reservoir. The locations of the field-wide generalized geologic cross-section are illustrated on Figure 3, and cross-sections are included as Figures 6 through 10. Additional cross-sections illustrating the relationship of the aquifer exemption zone and water source wells are in included in Section 6.3. The following are brief descriptions of the information illustrated on the five field-wide geologic cross-sections.

Cross-Section FW1-FW1' (Figure 6) trends northeast through the northern part of the Kern River Field. As expanded, the aquifer exemption area is approximately 14,000 feet wide in this area. The westward dipping C-Silt top seal to base Upper Chanac interval is generally 1,000 to 1,200 feet thick. The depths of the C-Silt top seal and base Upper Chanac are shallowest near the updip east side at approximately 200 feet bgs and 1,300 feet bgs, and deepest on the west side at approximately 600 feet bgs and 1,800 feet bgs, respectively. Lateral fluid containment is controlled by the regional southwestward groundwater gradient on the east side, by the Kern Front Fault on the west side, and by the inward hydraulic gradient created by field operations (Section 2.4). Vertical fluid containment is controlled in the upward direction by silt and clay barriers. Confinement of fluids is enhanced by highly viscous heavy oil which is immobile and acts as a plug and barrier to fluid flow at ambient conditions. Fluid containment is controlled in the downward direction by a confining silt in the Chanac Formation.

Cross-Section FW2-FW2' (Figure 7) trends northeast through the north-central part of the Kern River Field. As expanded, the aquifer exemption area is approximately 16,900 feet wide in this area. The westward dipping C-Silt top seal to base Upper Chanac interval is generally 1,000 to 1,200 feet thick. The depths of the C-Silt top seal and base Upper Chanac are shallowest near the updip east side at 0 feet bgs (outcrop edge) and 1,100 feet bgs, and deepest on the west side at approximately 900 feet bgs and 2,200 feet bgs, respectively. Lateral fluid containment is controlled by the regional southwestward groundwater gradient on the east side, by the Kern Front Fault on the west side, and by the inward hydraulic gradient created by field operations (Figures 33 and 34). Vertical fluid containment is controlled in the upward direction by silt and clay barriers. Confinement of fluids is enhanced by highly viscous heavy oil which is immobile and acts as a plug and barrier to fluid flow at ambient conditions. Fluid containment is controlled in the downward direction by a confining silt in the Chanac Formation.

Cross-Section FW3-FW3' (Figure 8) trends northeast through the southcentral portion of the Kern River Field, and, as expanded, the aquifer exemption is approximately 21,000 feet wide in this area. The westward dipping C-Silt top seal to base Upper Chanac interval is generally 725 to 825 feet thick in the eastern portion of the field and thickens to approximately 1,500 at the western expanded aquifer exemption edge. The depths of the C-Silt top seal and base Upper Chanac are shallowest near the updip east side at 0 feet bgs (outcropping) and 850 feet bgs, and deepest on the west side at approximately 850 feet bgs to 2,500 feet bgs, respectively. Lateral fluid containment is controlled by the regional southwestward groundwater gradient on the east side, and by the inward hydraulic gradient created by field operations (Figures 33 and 34). Vertical fluid containment is controlled in the upward direction by silt and clay barriers. Confinement of fluids is enhanced by highly viscous heavy oil which is immobile and acts as a plug and barrier to fluid flow at ambient conditions. Fluid containment is controlled in the downward direction by a confining silt in the Chanac Formation.

Cross-Section FW4-FW4’ (Figure 9) trends northeast through the southern part of the Kern River Field, and, as expanded, the aquifer exemption area is approximately 19,000 feet wide in this area. The westward dipping C-Silt top seal to base Upper Chanac interval is 550 feet thick at the eastern aquifer exemption edge, with a maximum thickness of approximately 1,400 feet at the western aquifer exemption edge. The depths of the C-Silt top seal and base Upper Chanac are shallowest near the updip east side at 0 feet bgs (outcropping) and 600 feet bgs, respectively. On the west side, the depths of the C-Silt top seal and base Upper Chanac are 600 feet bgs and 1,900 feet bgs, respectively, at well KOS 1TO (API 03051487), and then deepens to 650 and 2,100 feet bgs, respectively, at the western edge of the aquifer exemption area. Lateral fluid containment is controlled by the regional southwestward groundwater gradient on the east side, and by the inward hydraulic gradient created by field operations (Figures 33 and 34). Vertical fluid containment is controlled in the upward direction by silt and clay barriers. Confinement of fluids is enhanced by highly viscous heavy oil which is immobile (i.e. tar seals) and acts as a plug and barrier to fluid flow at ambient conditions. Fluid containment is controlled in the downward direction by a confining silt in the Chanac Formation.

Cross-Section FW5-FW5’ (Figure 10) trends southeast down the length of the Kern River Field (parallel to strike of the Kern River Formation), and, as expanded, the proposed aquifer exemption area is approximately 39,200 feet long. In this strike-parallel view, the C-Silt top seal to base Upper Chanac interval is generally 1,100 to 1,200 feet thick. The depths of the C-Silt top seal and base Upper Chanac, in this view, are influenced by the southward sloping ground surface. At the north end, the depths of the C-Silt top seal and base Upper Chanac are approximately 600 feet bgs and 1,700 feet bgs, respectively, at well KRU 511 (API 03051476). At the down-slope south end, the C-Silt top seal and base Upper Chanac are 0 feet bgs (outcropped) and 1,100 feet bgs, respectively, at well MCM 229 (API 03049871). Lateral fluid containment is controlled by the inward hydraulic gradient resulting from field operations and the net negative fluid balance, the Poso Creek Fault to the north (Figure 26), and the tar seals to the south of the Kern River Field. Vertical fluid containment is controlled in the upward direction by silt and clay barriers. Confinement of fluids is enhanced by highly viscous heavy oil which is immobile and acts as a plug and barrier to fluid flow at ambient conditions. Fluid containment is controlled in the downward direction by a confining silt in the Chanac Formation.

# Section 3: Justification for Aquifer/Zone Exemption

40 CFR §146.4, states that "An aquifer or a portion thereof which meets the criteria for an "underground source of drinking water" in §146.3 may be determined under §144.7 of this chapter to be an "exempted aquifer" for Class I-V wells if it meets the criteria in paragraphs (a) through (c) of this section." In accordance with §146.4, the relevant criteria for the subject exemption for Class II well (subsurface injection of liquids associated with oil and gas production) include:

a. It does not currently serve as a source of drinking water; and

b. It cannot now and will not in the future serve as a source of drinking water because it is hydrocarbon producing, or can be demonstrated by a permit applicant as part of a permit application for a Class II operation to contain hydrocarbons that considering their quantity and location are expected to be commercially producible.

In accordance with 40 CFR §146.4, the Kern River Field operators request the CalGEM expand the currently exempted aquifer boundary for the hydrocarbon producing portion of the Kern River and Upper Chanac Formations in the Kern River Field to the lateral limits illustrated on Figure 2. The current aquifer exemption boundary for the Kern River Formation in the Kern River Field (Appendix A, Exhibit A-4) was included in the 1981 Primacy Application submitted by the CalGEM to the USEPA, and approved by the USEPA on 29 September 1982 in the Memorandum of Agreement between the CalGEM and the USEPA.

In accordance with State of California Public Resources Code, Division 3, Chapter 1, Article 2.5, Section 3131(a), this report demonstrates that:

a. The criteria set for an aquifer exemption in 40 CFR §146.4 have been met for the proposed aquifer exemption boundary;

b. The injection of fluids will not impact the quality of water in the municipal and private wells in the laterally expanded aquifer exemption area due to vertical confinement provided by impermeable silt and clay layers; and

c. The physical and hydrogeologic barriers that define the proposed aquifer exemption boundary will be adequate to contain the injected fluids within the exempted portion of the aquifer.

As stated in Section 3106 of Article 2 in Chapter 1 of Division 3 of the State of California Public Resources Code, the Supervisor of the CalGEM is directed to encourage the wise development of oil and gas resources to best meet oil and gas needs in California. Commercially producible and expected producible quantities of oil exist outside the 1982-approved limits for the aquifer exemption boundary. The Kern River Field operators are seeking the expansion of the aquifer exemption boundary to include those commercially producible and expected producible areas that exist outside the current exempted aquifer (Figure 2). Increasing the production from the Kern River Field necessitates expansion of the currently exempted area to include these additional portions of the Kern River and Upper Chanac Formations.

Using produced water for steam generation and other beneficial use purposes associated with oil production preserves groundwater as a natural resource and eliminates the need to use freshwater for the same purpose. As produced water is treated (oil removal and softening) prior to being used as steam, the quality of the water being injected back into the oil-bearing zone is the same or better than the quality of the raw produced water from that same zone.

# Section 4: Aquifer/Zone Characterization

This section describes the primary geologic formations beneath the Kern River Field identifies significant structural features found in the project area and presents information to demonstrate that fluids injected into the oil-bearing strata can be safely contained and controlled within the designated formation. Supplemental information, including geologic and geophysical logs, and field pressure data are included in Appendices A through C.

## 4.1 Basis for Proposed Aquifer Exemption Area

The Kern River Field is located in the southern San Joaquin Valley, approximately 2 miles northeast of Bakersfield, California (Figure 1). The commercially producible and expected producible oil-bearing zone defines the limits of the proposed aquifer exemption area, and occupies approximately 15,335 acres (Figure 2). The oil-bearing zone includes only the Kern River and Upper Chanac Formations throughout the proposed aquifer exemption area (Figures 3 and 6 through 10). Currently, production occurs at depths ranging from less than 100 feet bgs near the eastern extent of the field, where the Kern River Formation outcrops, to greater than 1,600 feet bgs at the western extent of the field. The proposed aquifer exemption boundary extends to the north and northeast to include specific wells that have historical oil production at commercially producible rates. Boundaries are also constrained by investigative dry holes that have been drilled at the periphery of the Kern River Field.

## 4.2 Kern River Field Geology and Stratigraphy

The Kern River Field is located on the gently westward dipping west flank of the Sierra Nevada block, east of the San Joaquin Valley. The Kern River waterway flows through the southern portion of the oil field. The Kern River Field is bounded on the west, north and east by multiple oil fields, including the Fruitvale, Kern Front, Poso Creek, Mount Poso, Round Mountain and Kern Bluff (Figure 1). The stratigraphic formations related to oil production are the Upper Miocene to Pliocene Kern River and Upper Chanac Formations (Figure 11). The geology of the Kern River Field is illustrated on the generalized geologic cross-sections FW-1 through FW-5 (Figures 6 through 10).

The Kern River Formation stratigraphy is well documented in readily available, peer-reviewed literature, and is summarized herein from Coburn and Gillespie (2002) and several other papers. The Kern River Formation has been divided into nine producing sand layers which vary from 50 to 170 feet thick and generally thicken to the west. The Chevron-established nomenclature is illustrated in the stratigraphic column presented on Figure 11 and a cross-section illustrating the specific zones and their relationship in the field is presented on Figure 12. The upper Kern River Formation includes zones C, C1, G, K, K1, and K2. The lower Kern River Formation includes the R, R1, and R2 zones.

The Chanac Formation stratigraphy is also well documented in readily available, peer-reviewed literature, and is summarized herein from Olson et al (1986) and several other papers. The Chanac Formation comprises a maximum total thickness of 700 feet in the western area of the Kern River Field. The Chanac Formation thins to the east and has unconformable contacts with the underlying Santa Margarita and overlying Kern River Formations. There are no observable differences between the Chanac and Kern River Formations in the Kern River Field making the contact an arbitrary decision on the part of the interpreter with continuous sedimentation across the boundary.

Contour maps depicting the top and base elevation (TVDSS), and gross thickness of the oil-bearing zone (i.e., the proposed aquifer exemption area) are presented on Figures 13 and 14.

The Kern River and Upper Chanac Formations compose the primary oil-bearing reservoir beneath the Kern River Field, with producing zones ranging from less than 100 feet bgs to greater than 1,600 feet bgs (Bartow and Pittman, 1983). The Kern River and Upper Chanac Formations form an arcuate, thickening fan wedge that extends from surface outcrops along the east side of the Kern River Field westward 12 miles into the San Joaquin Valley (Figure 12). Surface exposures of the Kern River Formation extend along the foothills on the east side of the field. The formation dips approximately 3 to 6 degrees to the southwest due to uplift and westward tilting of the Sierra block. The top of the Chanac roughly parallels the top of the Kern River Formation (Figure 15).

The Kern River and Upper Chanac Formations represent a non-marine, fluvial, braided stream system deposited during Late Miocene to Pleistocene time (Figure 11). Both formations consist of two primary lithofacies: 1) channelized, amalgamated sand lobes; and 2) overbank/floodplain interbeds composed of finer grained silt and clay.

The Kern River Formation has informally been subdivided into nine zones, designated C, C1, G, K, K1, K2, R, R1 and R2, with each zone composed of one or more sand beds separated by relatively impermeable silt/clay zones (Figure 11). The “C Sand” is the uppermost mapped sand unit of the Kern River series, stratigraphically the youngest and shallowest. The Kern River Formation is generally considered to extend to the ground surface with a veneer of alluvium. The channel sand packages behave as semi-continuous reservoirs, with each zone containing commercial quantities of oil, separated by relatively impermeable silt and clay interbeds. The sands within the Kern River Formation tend to have high porosities (approximately 32 percent) and permeabilities in the thousands of millidarcies (Coburn and Gillespie, 2002).

The Chanac Formation lithology, porosity and permeability are similar to the Kern River Formation. Net-to-Gross sand distribution in the Chanac Formation decreases from southeast to northwest resulting in additional sand unit divisions within the formation.

The Kern River flows through the southern part of the field and the ancestral river was itself in-part or in-whole responsible for deposition of the Kern River Reservoir.

## 4.3 Oil Field Structural Features

A dominant structural feature in the southern San Joaquin Basin is the southwest-plunging Bakersfield Arch (Figure 16). The Kern River Field and other oil fields lie along the crest of this structural salient. Hydrocarbons, sourced in deep rocks to the northwest and southeast, migrated up the flanks of the arch to the structural high formed at its crest. Numerous, mostly down-to-the-basin, normal faults exist in and around the Kern River Field.

The Kern Front Fault, China Grade/Gun Club Fault complex (Figure 5), Poso Creek Fault (Figure 19), and unnamed fault complex to the northeast represent significant geologic features that control fluid flow beneath and in the vicinity of the Kern River Field. Several other unnamed fault systems within the field boundaries displace strata and impact fluid flow to varying degrees within the field. Figure 17 illustrates the lateral extent of the proposed aquifer exemption boundary. Detailed descriptions of the lateral and vertical boundaries are provided below.

### 4.3.1 West, North and Northeast Proposed Aquifer Exemption Limits

Normal faults bounding the field to the west, north and northeast provide the most direct means of hydraulic confinement. On the northeast margin of the field, this confinement is augmented by the southwest dipping regional groundwater gradient. Within these confining conditions, the proposed aquifer exemption boundary is further constrained by the extent of known oil. In particular, a line separating oil-bearing versus non-oil bearing formations on the north and northeast margins of the field is drawn based on the exploration data illustrated on Figure 18. To be considered as having no oil, a well has to have zero trace in any of the drilling records. The proposed west, north and northeast boundaries are illustrated on Figure 19.

#### 4.3.1.1 West, North and Northeast Oil Field Lateral Confinement

The proposed limit of the exempt aquifer along these field margins is based on a combination of fluid confinement by sealing (barriers to hydraulic flow) faults and the southwest dipping regional groundwater gradient (Figure 20). Based on published literature, where oil is present, virtually all north-to-south or northwest-to-southeast trending normal faults in surrounding fields are sealing faults. Examples of the published literature include:

- California Oil and Gas Fields, Volume 1, TR11, 1998 (CalGEM)
- Multiple individual field reports published as *Summary of Operations* volumes (CalGEM)
- United States Department of the Interior Geological Survey, Professional Paper 1245, Plate 1
- Multiple articles published by the American Association of Petroleum Geologists (AAPG) and Pacific Section of the AAPG

Examples of normal faults as sealing faults at other oil fields within the area are illustrated on Figure 21. In addition to faults published by CalGEM and the United States Geological Survey, private industry (including Chevron) has mapped, identified and interpreted similar faults in the same region and with generally the same conclusion, that the faults associated with this extensional structural style in this part of Kern County are sealing (barriers to fluid flow). In some cases, faults shown in Figure 22 may represent the same dipping surface but mapped at different levels (i.e., ground level, subcrop sand level, etc.) as those shown in Figures 5 and 21.

Further evidence that these faults are sealing is noted when oil-well location and production maps are overlain with fault maps. Figure 23 illustrates oil production wells in the Kern River Field and surrounding fields, and shows a compelling correlation between faults and abrupt terminations of field limits. The same evidence is seen within the Kern River Field, with local small normal faults displaying sealing behavior (Figure 24).

The specific faults or fault complexes observed or interpreted to be sealing features responsible for aquifer containment on the west, north and northeast sides of the Kern River and Upper Chanac Formations are illustrated in Figure 25. The Kern Front Fault defines the western extent of the oil bearing zone in the Kern River Formation. The Kern Front Fault is a normal fault striking nearly north-south with the western block displaced down. It is nearly coincident with the western administrative boundary of the Kern River Field and separates oil bearing formations in the Kern River Field from those in the Kern Front Field. Cross-section FW1-FW1' (Figure 6) illustrates that the Kern Front Fault provides a truncating boundary for the Kern River Field's western boundary. Figure 6 also illustrates that the Kern Front Fault provides an updip seal trapping oil in the Etchegoin and Chanac formations west of the Kern River Field (Link et al., 1990) and blocking groundwater flowing westward out of Kern River Field (Coburn and Gillespie, 2002).

The proposed exempted aquifer boundary to the north is constrained by the Poso Creek Fault as well as by the northernmost and structurally highest known oil, as described below. The Poso Creek Fault is an east-west trending strike-slip fault north of the CalGEM administrative boundary for the Kern River Field. The fault separates the Kern River Field from the Mount Poso Field (to the north), and appears to provide a hydraulic boundary at the northern extent of the reservoir (Coburn and Gillespie, 2002). However, natural regional-scale hydraulic gradients in the vicinity of the Kern River Field dip to the southwest. As such, significant fluid flow under natural (non-production) conditions is not expected to migrate to the north, making it difficult to demonstrate the restricting nature of the fault to fluid flow.

The proposed exempted aquifer boundary to the northeast is constrained by an unnamed series of normal faults (Figure 25), the southwest dipping regional groundwater gradient (Figure 26), and the northernmost and structurally highest known oil, as described below. The proposed exempted aquifer boundary expansion to the northeast has also been adjusted to account for a water supply well in the area (Section 6.3).

#### 4.3.1.2 North and Northeast Known Oil Limits

In an effort to chart the extent of known hydrocarbons within the area bounded by sealing faults, drilling records from Chevron and CalGEM sources were extensively researched. These records include historical production records, open- and cased-hole geophysical logs, whole core and sidewall core samples, mudlogs and driller's logs. The objective was to document the extent of oil, including liquid oil or tar, oil staining or drilling-mud shows such that future efforts can potentially be made to recover the oil. Figure 18 illustrates a summary of a portion of this data. Cross-section HO1-HO1', drawn roughly along strike through several updip wells (Figure 27) near the proposed aquifer exemption boundary illustrates the presence of oil in wells outside the current aquifer exemption boundary.

### 4.3.2 East Proposed Aquifer Exemption Limits

The Kern River Formation crops out along the eastern side of the field and is completely eroded approximately one to two miles east of the field (Figures 29 and 30). The aquifer exemption boundary along the eastern edge of the field (Figure 31) is a combination of the C Silt outcrop edge and the existing aquifer exemption boundary (Figure 26). As discussed earlier, in this region, the top of the proposed expanded exemption is further limited. Where the C Silt is 50 feet or less from the surface, the top of the exemption and future injection would be limited to 150 feet below ground surface. Along this margin the formation is characterized by air-filled sands, shallow perched oil and little to no groundwater (Figure 28) except in areas proximal to the Kern River. In places, exposed formation contains degraded and dry oil.

Near the eastern boundary limits, fluids within the field are confined by the southwest dipping regional groundwater gradient (Figure 26). Confinement of fluids is enhanced by tar seals (Figure 28). As demonstrated by current and historic field practices, Kern River heavy oil remains immobile unless heated by steam.

### 4.3.3 Southeast and South Proposed Aquifer Exemption Limits

Fluids within this boundary are confined primarily by a strong pressure gradient as well as by tar seals.

#### 4.3.3.1 Oil Field Pressure Gradients

Figure 33 illustrates the decreasing pressure gradient (green arrows) toward the interior of the field. This inward gradient is attributed to a net fluid withdrawal occurring for more than a century. As with the eastern and northeastern proposed aquifer exemption boundaries, the southwest dipping regional groundwater gradient enhances the hydraulic control along the proposed southeast boundary (Exhibits C-1, C-2 and C-3) and would restrict water from migrating to the south under natural (non-operating) conditions.

Pressure surveillance and mapping is a primary element of reservoir management in the Kern River Field. Reservoir pressure is acquired using open-hole wireline tools and continuous monitoring in multiple dedicated pressure monitoring wells. This data is carefully mapped to support tactical reservoir management decisions, including steamflood design and operations. This practice enables Chevron to delineate the pressure regime of the Kern River and Upper Chanac Formations, including pressure gradients within and around the field.

An example of a mapped pressure surface, in this case the 50 pounds per square inch absolute pressure (PSIA) surface, is illustrated in Figure 33. Pressure monitoring locations are also illustrated on Figure 33. Cross-section RP1-RP1’ (Figure 34) represents a northeast-southwest oriented pressure profile through the center of the field. Both figures illustrate a bowl-shaped region of depressed pressure aligned with the central and western portions of the field. This region corresponds to the portion of the field that is most actively produced currently and has experienced the highest level of net fluid withdrawal over the past several decades. Two conclusions can be drawn from this observation:

1. Pressure gradients exist on all fronts of the field with pressure decreasing from the periphery to the center of the field; and
2. Fluid introduced into the field, in the form of condensed steam (softened produced formation water), will flow inward toward the zone of low pressure (away from the margins of the field) and remain contained within the limits of operation and therefore within the proposed aquifer exemption boundary.

An examination of field data provides an empirical example of this pressure relationship. Figure 35 is an example of open-hole pressure data acquired in two wells at approximately the same time along the southern boundary of the field. The pressure differential between the updip and downdip wells demonstrates that pressure is lower toward the interior of the field, in this case a 185 PSIA decrease over a structural difference of 265 ft. A portion of the pressure differential can be related to the China Grade Fault, which separates these two wells. The China Grade Fault is considered an internal sealing feature with oil saturation on both the north and south sides. To the north side of the fault, oil occurrence and production is limited to the central part of the field with little to no oil occurring on the north side of the fault system near it lateral limits. The China Grade and Gun Club Faults are nearly east-west trending strike-slip faults, similar to the Poso Creek Fault, and are located just inside the southern administrative field boundary. Kodl et al. (1990) show potentiometric contours of the regional water table bending to the east as the China Grade Fault is approached from the north, and conclude the fault is a “sealing” fault at the south end of the field.

#### 4.3.3.2 Cold Low Viscosity Oil

Fluid confinement is enhanced at the southern boundary by low viscosity, heavy oil which acts as a plug and barrier to fluid flow unless heated by steam. This “tar seal” becomes more effective to the south where oil is described as very high viscosity tar and degraded/dead oil (Figure 36). This hydrocarbon does not flow under ambient conditions and dead oil may not flow even if heated.

### 4.3.4 Southwest Proposed Aquifer Exemption Limits

The southwest boundary (Figure 37) is extended to the contour of lowest known oil (LKO) as illustrated on Figure 38. LKO occurs in the basal section of the Kern River Formation (top of K2 to the base of R2) and ranges in gross thickness from 0’ to 400’ (Figure 39). Fluids are confined by a decreasing pressure gradient to the northeast toward the interior of the field. As described in the previous section, empirical data provides an example of the pressure relationship near the southwestern extent of the field boundary. Figure 40 illustrates open-hole pressure data acquired in two wells at approximately the same time along the southwest boundary of the field. The pressure differential between the updip and downdip wells demonstrates that pressure is lower toward the interior of the field, in this case a 107 PSIA decrease over a structural difference of 250 ft.

Additional confinement is provided by downdip sealing faults including the possible extension and intersection of the Kern Front and China Grade Faults and trapping-faults in the Fruitvale Field (Figure 41). The presumed extensions of these faults are based on mapped traces in the Kern Front and Fruitvale Fields but have not been confirmed by Chevron.

### 4.3.5 Vertical Proposed Aquifer Exemption Limits

In addition to defining the lateral boundaries of the proposed aquifer exemption area, both the upper and basal surfaces of this zone have been mapped. The contour maps of these surfaces are displayed in Figure 13. Figure 14 illustrates the gross thickness map for the area between the two surfaces. The surfaces were delineated using control points in and around the Kern River Field, including open- and cased-hole geophysical logs and available core data. Fundamentally the upper and basal surfaces correspond to the top of oil and base of oil, respectively. In some cases, the upper portion of the zone may represent the processed reservoir containing steam vapor and residual oil. Five field-wide cross-sections were generated: four dip sections; and one strike section (Figures 6 through 10). The area shaded in dark green on these figures corresponds to the limits of oil and the proposed aquifer exemption zone. These cross-sections illustrate the southwest-dipping, lozenge-shaped zone with lateral termination either by pinch-out or fault-truncation.

Detailed field-wide cross-sections are also presented in Appendix B. Three versions of each cross-section were prepared to illustrate the stratigraphic correlation of key layers, faults where present, estimated vadose zone thickness and current and proposed aquifer exemption zone lateral boundaries. The vadose zone is characterized as that portion of the Upper Kern River Formation, and overlying alluvium, which is either air-filled or contains perched water. The three versions of each cross-section include the following elements:

- Version (a) illustrates open- and cased-hole log data, including vapor saturation (air or steam) and oil saturation. The proposed aquifer exemption zone is shaded in pale green.
- Version (b) illustrates the proposed aquifer exemption zone including areas that contain producible oil (shaded dark green) and areas that have been produced and contain only residual oil (shaded light green and referred to as "Previously Produced"). These cross-sections are also included as Figures 6 through 10. This version does not include log data. Shallow groundwater, where present, is labeled as "FIRST WATER". First encountered fluid (oil or water) at the logged locations is also shown. The (b) cross sections highlight the pervasive nature of the field-wide "C Silt", a low-permeability barrier to vertical flow.
- Version (c), similar to version (a), illustrates open- and cased-hole log data, including vapor saturation (air or steam) and oil saturation. However, this version correlates the low-permeability silts throughout the entire Upper Kern River Formation, including several that are pervasive across the field.

As presented in Section 4.2, the Kern River and Upper Chanac Formations consist of two basic lithofacies: channelized, amalgamated sand lobes and fine-grained overbank/floodplain deposits. Figure 42 illustrates this stratigraphic pattern as seen in the Kern River Formation at both a field-wide and a project-level view. As noted, the interbedded fine-grained material is predominantly silt with some clay. It is these interbedded silts that provide a high degree of vertical confinement and represents barriers to flow for oil, water, gas and steam. Figure 43 shows horizontal effective permeability expressed as "permeability relative to sand". According to the relationship shown in Figure 43 these interbedded silt layers are expected to have effective horizontal permeabilities approximately 35 to 40 percent of the sand beds they separate. This differential is adequate to prevent fluid and vapor from communicating across a silt/clay barrier. As such, communication between sands is hindered by the pervasive fine-grained layers separating the sand units (Figure 42). Vertical flow is further impeded by the aggregate-effect of the multiple stacked sequences of sand and silt layers. Contour maps illustrating the structural top of the nine most prominent silt layers (C, C1, G, K, K1, K2, R, R1 and R2) which also provide upward vertical confinement are included as Figures 44 through 52.

The effectiveness of these fine-grained layers as confining barriers is demonstrated through abundant and varied examples. An examination of open-hole pressure data illustrates the presence of vertical compartmentalization resulting from the lack of communication between highly permeable sands. Figure 53 shows the open-hole logs and pressure data for well KOS 1 TO (API 03051487). At this location, the Kern River Reservoir is vertically divided into at least seven pressure compartments by silt layers as thin as 2 to 3 feet. This vertical isolation operates in both upward and downward directions, with vertically downward flow being further restricted by the pressure gradient created by field operations.

Another example of zonal isolation resulting from interbedded silt can be made by examining temperature data. Figure 54 illustrates steam injection areas and resulting steam-chest areas under the Kern River waterway. On this figure, the red highlighted wellbores depict the interval into which steam has been injected and the red-shaded log trace on the three Temperature Observation (TO) wells shows where elevated temperatures (i.e. steam) have been recorded. The data indicate that, with good wellbore mechanical integrity, the injected steam remains vertically isolated in the zone into which it was injected due to the presence of the confining silt beds.

A robust 3-dimensional (3D) full field model of the Kern River Field allows for detailed mapping of silt layers within the Kern River Formation. This intricate model allows for detailed 3D characterization and mapping of subsurface lithofacies, providing a comprehensive understanding of fluid behavior and flow within the various field structures. It is this comprehensive understanding of subsurface rock formation architecture and fluid flow that provides the basis for demonstrating the vertical fluid isolation to water source wells (Section 6.3).

### 4.3.6 Hydrogeology Within the Study Area

The hydrogeologic characteristics of the Kern River and Upper Chanac Formations in the Kern River Field are described below. The information in this section demonstrates that fluids within the Kern River and Upper Chanac Formations are naturally constrained to the boundaries of the oil field, on the north, west and south sides by fault systems, and on the east by the outcropping formations. Detailed geologic cross-sections illustrating hydrogeologic features of the Kern River Reservoir are presented in Appendix B. Historical groundwater contour maps for select stratigraphic units within the Kern River and Upper Chanac Formations are presented in Appendix C.

Field data indicate thick, extensive silt and clay barriers exist within the K2 zone, which acts to separate the upper and lower Kern River Formation into different aquifers over most of the Kern River Field. According to Coburn and Gillespie (2002), the silt and clay barriers thin to the west in the southern part of the field and are absent in the southwest down-dip part of the field so that in those areas the K, K1, K2 zones are saturated and in hydraulic communication with the lower Kern River unit. The unconfined aquifer in the Lower Kern River Formation extends downward to a confining silt within the Chanac Formation (Coburn and Gillespie, 2002).

#### 4.3.6.1 Groundwater Gradients

Coburn and Gillespie (2002) presented potentiometric maps using 1992-1993 data based on a vadose zone contact derived from neutron logs and water agency water level data. The maps show the potentiometric surface generally following the regional structural dip, indicating water flowing generally downdip (from northeast to southwest), with the surface along the eastern edge of the field dipping west at 10-100 feet per mile. The potentiometric surface is shown to be flattening in the western part of the field as the Kern Front Fault is approached. The change in gradient to nearly zero indicates that the downdip flow of fluids is stopped by the Kern Front Fault. Preparing a shallow groundwater surface contour map for current conditions is not appropriate as production and field operations have removed water from the field and reduced the potentiometric surface down to the top of the oil-bearing formation, leaving only perched groundwater zones separated by unsaturated soils (commonly referred to as “air sands”). As illustrated on Figure 55, geophysical well logs and data collected from temperature observation wells demonstrate that, over time, fluids are being drained from the upper lithologic units (G, K, and K1 sands) as a result of field operations.

Coburn and Gillespie (2002) also presented potentiometric maps of 1992-1993 data from the Upper Chanac and the R1 zones of the lower Kern River Formation (Appendix C). The map illustrates the effect of the Kern Front Fault and the local effect of other faults within the field on fluid flow by interrupting the groundwater gradient and influencing the flow pattern and gradient magnitude.

#### 4.3.6.2 Field Pressure Gradients

As described above, part of Chevron’s reservoir management process includes pressure surveillance and mapping is a primary element of reservoir management in the Kern River Field. Reservoir pressure is acquired using open-hole wireline tools and continuous monitoring in multiple dedicated pressure monitoring wells. This field is carefully mapped to support tactical reservoir management decisions, including steamflood design and operations. The results of this practice enable delineation of the pressure regime of the Kern River and Upper Chanac Formations, including pressure gradients within and around the field. These data are also used to characterize vertical and horizontal flow barriers, individualize reservoir lenses, and monitor steam flood performance. Discrete pressure data is obtained as part of Chevron’s drilling program in 5 to 20 wells each year. Measurements are taken at 10 to 25 points in each well across multiple zones. In addition, seven dedicated pressure monitoring wells actively measure pressure in 2 to 5 zones each. The map on Figure 33 shows the network of measurements taken in 2013 and 2014, and active pressure monitoring wells.

The contoured results of pressure monitoring on Figure 33 show that a zone of low pressure exists in the interior of the field. This pressure regime establishes an inward flow pattern for reservoir fluids and injected fluids from all directions. It is an important controlling mechanism for containment of fluids in the proposed aquifer exemption boundary. This pressure regime is maintained by ongoing production of the field. This pressure differential represents an important isolation mechanism between field production and water source wells (Section 6.3).

The pressure monitoring results illustrated on Figure 56 show that pressures generally increase across the stratigraphic breaks to successively higher regimes with depth. Figure 34 represents a northeast-southwest oriented profile through the center of the field and reveals a bowl-shaped region of depressed pressure aligned with the western half of the field. This region corresponds to the portion of the field that has experienced the highest level of net fluid withdrawal over the past several decades. The information displayed in Figures 33 and 34 demonstrate that pressure gradients exist on all fronts of the field with pressure decreasing from the periphery to the center of the field; and fluid introduced into the field will flow away from the margins of the field and remains contained within the limits of the proposed aquifer exemption boundary. Coburn and Gillespie (2002) plotted formation pressure measurements and groundwater elevations in the Lower Kern River Formation and Upper Chanac (Figure 56) to show there is a confining silt within the Chanac Formation that separates confined aquifers below from the unconfined aquifer above. The unconfined aquifer extends from the Chanac up through the Lower Kern River Formation including units R2, R1, R, and K2. Above the K2 in the Upper Kern River Formation, groundwater occurs as perched zones on the shallow silts. Pressures at the bottom of the unconfined aquifer indicate upward flow from the Chanac into the Lower Kern River Formation. Coburn and Gillespie (2002) note that significant depletion in water level in the K2, R, and R1 in the up-dip part of the field demonstrates hydraulic connectivity between those zones.

#### 4.3.6.3 Surface and Groundwater Recharge

Groundwater recharge from precipitation will occur updip of the field, at the Kern River Formation outcropping. Currently, the area around the Kern River Field receives on average approximately 6 inches of precipitation annually and has an evapotranspiration rate of approximately 73 inches annually (RWQCB 2005). Therefore, very little recharge will occur by precipitation at the outcrop along the east edge of the field. This conclusion agrees with those reached by Dale et al. (1966), which showed that precipitation in the area does not infiltrate below the root zone.

Groundwater inflow into the field is considered to be negligible because of the presence of major faults on the west, south, north and northeast boundaries of the field (Figure 5). The Kern Front Fault provides a seal, eliminating fluids in the Etchegoin, Chanac and Kern River Formations west of the Kern River Field from crossing the boundary (Link et al., 1990). Cross-sections prepared by Kodl (1990) across the China Grade Fault show that this fault changes air-oil and oil-water contact elevations on either side of the fault, indicating that it presents a barrier to flow.

The Kern River waterway is the largest potential source of recharge, as it directly flows over the K2, R1, and R2 zones in the eastern and southeastern parts of the Kern River Field; hence, infiltration of surface water would generally be expected to reach groundwater. However, recharge from the river, on a field-scale basis, is low. Low recharge is shown by the drainage of fluids from wells near the river and potentiometric contours that do not dip away from the river (Appendix C). Low recharge and lack of communication between the Kern River and groundwater is also supported by field temperature logs, which indicate a significant separation and lack of connection between the Kern River and the producing zone beneath the river (Figure 56).

Colburn and Gillespie (2002) note that total water production from the Kern River Field in Section 3 (Township 28S, Range 28E) dropped since 1990, whereas oil production increased (Figure 57). They also observed that the volume of water produced after 1992 matches injected water volumes, suggesting minimal influx from the nearby Kern River. Similar production results from four leases adjacent to the river were observed by Jones et al. (1995). Ginger et al. (1995) noted that the intervals that make up the perched aquifer (the C1, G, and K zones) are very silt rich relative to the underlying zones in the regional unconfined aquifer. This may also contribute to the low amounts of river-derived recharge to the producing zones in the unconfined aquifer.

Empirical data, principally open-and cased-hole neutron logs, show that the Kern River and Upper Chanac Formations have experienced net depletion (more fluids extracted than naturally recharged resulting in declining fluid levels throughout the field) since at least the beginning of the 20th century. This demonstrates that recharge from precipitation and/or infiltration from Poso Creek and the Kern River is inadequate to refill pore space vacated by fluid withdrawal associated with oil field operations, resulting in a vadose zone that contains only air and isolated perched water. Figure 55 is one of many examples of open- and cased-hole geophysical logs, in this case historic and recent logs from well Oakland 1TO in the northwest part of the field (Section 24, T28S/R28E, M.D.B. &M.) show depletion of unheated water and heated oil over an 18-year period. Appendix C contains additional examples of historic and current fluid and vapor conditions within the Kern River Field, including:

a. Cross-section AR1-AR1’ (Exhibits C-6 through C-8, Appendix C) at the northeast edge of the field (Sections 20 & 21, T28S/R28E, M.D.B.&M.) showing:
   i. Original groundwater and oil emplacement
   ii. Water depletion over time
   iii. Remaining perched oil and air sand

b. Cross-section AR2-AR2’ (Exhibits B-2 and B-3, Appendix B) at the southeast corner of the field (Sections 2, 3 & 11, T29S/R28E, M.D.B.&M.) showing:
   i. Air-filled, fluid-depleted, shallow sand in immediate proximity to the river bed of the Kern River
   ii. Correlation of openhole well logs, specifically of fine-grained, impermeable silt and clay layers

### 4.3.7 Field Drainage

Potentiometric maps indicate that groundwater flow is predominantly westward in the lower Kern River Formation. However, faults on the northern, western, and southern boundaries of the field act as barriers to groundwater outflow along these boundaries. Therefore, groundwater outflow is considered to be negligible. Coburn and Gillespie (2002) note the regional 1992-1993 groundwater table surface (Appendix C) is lower than the surface published in 1966 (Dale 1966), and some zones in the eastern updip part of the field have been drained, further supporting the evidence that the water table within the field boundaries is decreasing with time. Coburn and Gillespie (2002) conclude that over time, production from the field is removing water from production zones and lowering the reservoir pressure, further illustrating the laterally confined nature of the aquifers within the oil field boundary. Figures 58 through 60 illustrate changes in water level over time on geologic cross-section AR1-AR1’, located near the eastern extent of the Kern River Field. Figure 58 represents historic water levels prior to oil emplacement and assumes that static shallow groundwater level historically is approximately equal to the known top of oil surface. Figure 59 illustrates the emplacement of oil to the top of the ground water table as it existed at this point in geologic time. This is consistent with the “floating oil” concept for the Kern River Field. Figure 60 illustrates the condition of fluids within the reservoir today. The water table has dramatically retracted leaving only a deep-water table and perched water and oil.

The main source of water removal from the Kern River Reservoir is oil field production activities. Coburn and Gillespie (2002) reported the average production reported to the CalGEM for the period 1986 to 1994 was 121,000 BOPD and 880,000 BWPD (California Division of Oil, Gas and Geothermal Resources, 1986–1994).

The assumption that the amount of natural recharge to the producing zones is negligible is supported by the observation that the upper zones of the Kern River Formation are virtually drained of fluids in the updip areas along the eastern edge of the field. In addition, nuclear logs indicate that zones in the lower Kern River Formation are partially drained in these updip areas. Pressure logs indicate that fluid pressures are low, suggesting that only limited quantities of mobile liquids remain in the zones of the lower Kern River Formation in the updip part of the aquifer. These quantities should decrease as more water is removed by production in the downdip areas of the field.

#### 4.3.7.1 Field Water Balance

A volumetric balance for the study area can be defined as:

Recharge – Discharge = ΔV (Change in Reservoir Fluid Volume)

Potential recharge sources in the study area include:

- Effective precipitation (i.e., that precipitation not lost to evaporation and transpiration)
- Groundwater inflow around the perimeter of the study area
- Infiltration from the Kern River
- Water (as steam) injected into the Kern River Formation associated with EOR activities.

Potential discharge sources in the study area include:

- Groundwater outflow
- Water extracted from the Kern River Formation as part of EOR activities.

The change in fluid volume (ΔV) in the reservoir can be determined from observations of the change in fluid level in the reservoir over time. Using an effective porosity of 22%, an estimated area of 24,000 acres (area bounded by faults and outcrop), and the average water influx and removal rates (above), Coburn and Gillespie (2002) calculated a fluid level change (decrease) of approximately 4.5 feet per year between 1986 and 1994. In five non-producing locations in the field, the average fluid level change per year was measured during the same time period. The measured change from these five locations averaged 6.65 feet per year (decrease). Additionally, Coburn and Gillespie (2002) report that fluid level declines measured at water supply wells over a 30-year period averaged approximately 5.6 ft/year. Although the measured decreases in fluid level in the reservoir are slightly greater than those predicted by the mass balance, the results support the conclusion that the Kern River Field is essentially a hydraulically closed system (at least on the timescale required for producing operations) and receives minimal recharge from natural sources, including the Kern River.

## 4.4 Summary

The faults along the southwestern, western, northern, and northeastern proposed exemption boundaries, the updip outcrop of the Kern River Formation to the east, and the tar seals along the southern and southeastern proposed exemption boundaries limit lateral fluid movement into and out of the Kern River Field. A confining silt in the Chanac Formation separates confined aquifers below from the unconfined aquifer above that comprises the Kern River Reservoir. The absence of fluids in the upper portion of the Kern River Formation, and presence of nine field-wide silts, which are continuous across the eastern subcrop area, prevent fluid flow vertically upward out of the oil production zone. These physical features establish the Kern River Field as a closed hydrologic basin. The relatively low recharge from meteoric water and the Kern River, the significant volume of fluid removed from the reservoir, and the overall decline in fluid elevation in the Kern River and Upper Chanac Formations across the field further demonstrates that the fluids are hydraulically controlled and contained in a closed basin.

# Section 5: Kern River Field Production

Oil production started in 1899 from a hand-dug well in the eastern part of the Kern River Field and has grown over the past 116 years to encompass most of the CalGEM administrative field boundary. A graph of oil production over time is included as Figure 61.

## 5.1 Oil Field Production

Oil extracted from the Kern River Field is classified as heavy oil, with an API gravity between 10° and 16°. To date, more than 2 billion barrels of oil have been extracted from the Kern River Field. Figure 62 illustrates the development of the Kern River Field from before 1975 and as of June 2015. Comparing the two maps indicates that a significant number of infill wells have been added in the last 40 years, and that an increasing number of permitted wells are located outside the existing aquifer exemption boundary. Currently, there are more than 10,000 permitted production wells in operation, of which 157 (1 percent) exist outside the 1982-approved exempted aquifer boundary (Figure 62 and Table 1). In 2014, approximately 1.7 percent of the oil produced from the Kern River Field was from permitted wells outside the 1982-approved aquifer exemption boundary.

## 5.2 Oil Saturation

The current aquifer exemption boundary is based on the 1973-1974 production limits for the Kern River Formation in the Kern River Field as defined by CalGEM, which existed at the time the USEPA approved the application for Primacy in 1982. The proposed extension of the existing aquifer exemption boundary is based on historical and current oil production and from key oil saturation control points located outside the current exemption boundary that indicate the presence of commercially producible volumes of oil. This application seeks the expansion of the currently exempted aquifer area to include those oil-bearing strata that exist outside the current exempted aquifer area (Figures 6 through 10). Continuing commercial production of the Kern River Field necessitates expanding the currently exempted area to include additional portions of the Kern River and Upper Chanac Formations where oil is known to exist.

Hydrocarbon saturations were derived from various locations (Figure 63) and sources of information. In some cases, actual oil production data is used. In other cases, indirect methods are used to evaluate saturation, including side-wall cores, whole core and log correlations, and cased-hole carbon/oxygen logs. These logs provide accurate estimates of oil saturation and have been calibrated throughout the field with hundreds of wells using industry standards and methodologies. The data are collected from over 700 dedicated temperature observation wells (TOWs), approximately 50 other monitoring wells and stratigraphic test wells. That data combined with well data from the periphery of the Kern River Field was used to delineate the proposed extension of the existing aquifer exemption boundary for the Kern River and Upper Chanac Formations. There are total of 858 wells with calculated oil saturation ranging up to greater than 100 feet in thickness in the Upper Chanac interval (Figure 64) within the proposed aquifer exemption boundary. The presence of oil saturation within the Upper Chanac exists across the field from the southwest to northeast boundaries of the proposed aquifer exemption boundary (Figure 65).

Appendix B provides examples of various downhole information that was used to assess oil saturation. Exhibits in Appendix B illustrate oil saturation and geophysical logging data on the geologic cross-sections to demonstrate expected production and illustrate that the lateral extent of the field is undefined in certain areas.

## 5.3 Kern River Reservoir Extraction and Injection

On a daily and annual basis, the Kern River Field produces excess fluids resulting in a net negative fluid balance. In 2014, Chevron produced approximately 24,560,000 barrels of oil and 273,750,000 barrels of formation water; and re-injected approximately 77,015,000 barrels of water (as steam) into the field.

Water sources at the Kern River Field include produced formation water, groundwater (for minimal daily operational uses) and interdiction water (Figure 66). Interdiction water is deep formation water that is extracted to reduce pressures throughout the productive portions of the field and help maintain the steam chest in the middle of the field. Produced and interdicted water are pumped to Station 36, where water is separated from the oil and treated. After treatment, the produced and interdicted waters are used for steam generation, as lease water (routine field operations), as a permitted beneficial reuse (e.g., treated water supplied for agricultural use), or disposed into deep permitted Class II injection wells.

### 5.3.1 Enhanced Oil Recovery/Steam Injection

Operators in the Kern River Field use steam injection to heat and mobilize heavy oil so it can be recovered (this process is referred to as enhanced oil recovery or EOR). Steam is generated on-site from softened produced water and injected into the Kern River Formation (Figure 67 and Appendix E). This mobilizes the heavy oil thereby accelerating production and improving overall recovery as part of this EOR technique. In Chevron’s operations, roughly 380 injection wells injected a continuous flow of approximately 137,000 BPD of steam in 2020.

### 5.3.2 Produced Water

Using Chevron as an example, Chevron’s Station 36 is the central gathering facility for the produced fluids generated at the Kern River Field. Produced fluids are transported to Station 36 where the oil and water are separated. The produced water is treated before it is beneficially reused for general oilfield operations (i.e., well servicing) known as “lease water”, treated and filtered (Figure 68) before it is beneficially reused for steam generation (after water softening) in Chevron’s operations at the Kern River Field, or for agricultural irrigation in the Cawelo Water District. The water Chevron conveys to the Cawelo Water District is regulated by a permit issued by the Central Valley Regional Water Quality Control Board (R5-2012-0058).

### 5.3.3 Interdiction Water

Chevron’s operations in Kern River Field include extracting and handling interdiction water (Figures 66 and 68). Interdiction water is deep formation water that is extracted from high water-cut oil wells in the western (downdip) portion of the oil field, to reduce hydrostatic field pressures and help maintain and promote the low-pressure zone/steam chest in the middle of the field. Figure 66 illustrates the locations of the water interdiction wells along the western edge of the field and the relative extraction volumes from each well. Interdiction well information is summarized in Table 2.

### 5.3.4 Lease Water

Lease water is produced water that is used for routine field operations, such as flushing vessels during well testing at some Automatic Well Testing sites or in well servicing operations. It is also used to flush pipelines and for various other maintenance and operational activities. Approximately 20,000 to 30,000 bbls of lease water is used on a daily basis.

### 5.3.5 Water Disposal

Excess produced water that cannot be used for any other purpose is disposed of in permitted Class II disposal wells.

# Section 6: Water Quality and Protection

## 6.1 Beneficial Use

The Water Quality Control Plan for the Tulare Lake Basin, Second Edition – revised January 2004, (Basin Plan) (CRWQCB, 2004) designates beneficial uses, establishes water quality objectives and contains implementation plans and policies for protecting waters of the basin.

### 6.1.1 Designated Beneficial Uses

The Kern River Field is located in the South Valley Floor Hydrologic Unit and within Detailed Analysis Units 254 and 257 as defined in the Basin Plan (CRWQCB, 2004). The beneficial uses of groundwater, as stated in the Basin Plan for Detailed Analysis Unit 254 within the Kern County Basin hydrologic unit, are municipal and domestic supply, agricultural supply, industrial service and process supply, water contact recreation, non-contact water recreation and wildlife habitat. The beneficial uses of groundwater in Detailed Analysis Unit 257 are municipal and domestic supply, agricultural supply, industrial service and water contact recreation. Both of these units encompass areas outside of the Kern River Field and proposed new aquifer exemption boundary.

The Basin Plan establishes narrative water quality objectives for chemical constituents, tastes and odors, and toxicity in groundwater. The Basin Plan's narrative water quality objectives for chemical constituents, at a minimum, require waters designated as domestic or municipal supply to meet the maximum contaminant levels (MCLs) specified in Title 22 of the California Code of Regulations (Title 22). The narrative toxicity objective requires that groundwater be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, animal, plant, or aquatic life associated with designated beneficial uses.

### 6.1.2 Water Wells

Groundwater in portions of the Kern River Formation within the Kern River Field is currently used for industrial supply (e.g., oil field operations), municipal and domestic water supply and irrigation. Available data indicates the municipal and domestic water supply and irrigation wells are located within the lateral extents of the 1982-approved aquifer exemption boundary; and several of the domestic water wells are screened within the oil-bearing zone.

CalGEM performed a water well search and capture zone analysis and published its findings and conclusions in a memo dated 22 March 2019. A copy of the memo is provided in Appendix F. The water well search used a combination of California Department of Water Resources (DWR) water well completion reports, Kern County Environmental Health (KCEH) water well completion reports, Geotracker GAMA, and field reconnaissance to identify water wells that are located in or near the Kern River Field. CalGEM reviewed the information to determine the three-dimensional proximity of the wells to the proposed aquifer exemption area. CalGEM used the well data to analyze and map the capture zone for each of the wells, and recommended adjustments of the aquifer exemption area boundary to accommodate the capture zones. The proposed aquifer exemption area presented in the figures of this report incorporate CalGEM's recommendation based on their analysis. Following is a brief summary of CalGEM's findings that are presented in greater detail along with the tables and figures in Appendix F.

Table F-1 lists a total of 67 water wells that were identified in the CalGEM well search, and Figure F-1 shows the locations of the wells with respect to the Kern River Field and a previously proposed aquifer exemption area. Based on review of the well construction details, CalGEM differentiated the wells into the following four categories and mapped them accordingly on Figure F-1:

- 3 wells penetrating or with high probability for hydraulic connection to the proposed aquifer exemption interval.
- 30 wells in the shallower, A and/or B Kern River Interval.
- 21 wells in shallow perched aquifer laterally separated from the exemption interval.
- 13 wells in shallow perched aquifer vertically above the exemption interval.

### 6.1.3 Capture Zone Analysis

CalGEM analyzed the capture zone for each of the wells listed above using the following formula:

$$R_t = \sqrt{\frac{\mathrm{Q}t}{\pi\varphi\mathrm{H}}}$$

where:
Rt = Radius (feet) for time period
Q = pumping rate of well (ft$^3$/year), where ft$^3$/year = gpm x 70,267
t = travel time
$\pi$ = 3.1416
$\varphi$ = effective porosity (decimal percent)
H = screened interval of well (feet)

The length of the well screen interval is typically identified in the DWR Well Completion Reports; however, some of the wells evaluated did not have well completion reports on file with DWR. For these wells, a well screen interval of 40 feet was selected, which was the minimum documented well screen interval within the dataset.

CalGEM describes the methodology for the calculation, assumptions, and their rationale for the selection of values for these parameters in the memo in Appendix F. The resulting 30-year capture zones for individual wells are depicted on Figure F-4.1 through F-4.4, and for combined pumping effects of wells on Figure F-4.2 and F-5.2.

In addition, CalGEM used the Neuman equation for zone of endangering influence (ZEI) calculations for stem injection to establish a 300-foot buffer zone around each of the wells. The proposed aquifer exemption boundary was then adjusted to either the 30-year capture zone of the well or the 300-foot buffer, whichever was greater. The resulting recommended aquifer exemption boundary adjustments are shown on Figures F-5.1, F-5.2, and F-5.3.

Accepting CalGEM's recommendations, the resulting proposed aquifer exemption area is shown on Figure 2 and on the subsequent figures of this report.

## 6.2 Water Quality Evaluation

Water quality information has been collected from individual wells, as well as from Chevron's Station 36 (the central treatment facility for the produced fluids Chevron generates within the Kern River Field). Water quality data are summarized in Tables 4 through 8, and presented in Appendices D and E. The following evaluates the water quality data for several groups of wells, based on use and location relative to the oil-bearing formations and proposed aquifer exemption zone.

### 6.2.1 Water Quality from Wells Within the 1982-Approved Aquifer Exemption Boundary

There are 10 water supply wells within the 1982-approved aquifer exemption boundary: one municipal, one irrigation and eight domestic supply wells (Table 3). Three of the 10 water wells within the 1982-approved aquifer exemption boundary are screened above the top of the oil-bearing formation, with the base of each well extending to within 500 feet (vertically) of the oil-bearing formation (Table 3). Two wells have unknown completion depths, and five wells have screened intervals completed within the oil-bearing formation.

The potential for water quality impacts has been evaluated through review of available water quality data. Table 6 summarizes water quality data available for wells within the 1982-approved aquifer exemption boundary, and includes results from three wells (well ID 6 screened within the oil-bearing zone and well IDs 12 and 14 screened above the oil-bearing zone). Comparison of the two data sets shows that wells screened within the oil bearing formation have similar median concentrations of manganese (2.0 mg/L versus 4.8mg/L) potassium (3.0 mg/L versus 2.2 mg/L), chloride (16 mg/L versus 28 mg/L), sulfates (48 mg/L versus 28 mg/L), boron (0.20 mg/L versus 0.08 mg/L) and EC (378 µhoms/cm versus 357 µhoms/cm). Similar results are apparent when comparing the water quality data from inside the oil-bearing zone to wells outside the proposed aquifer exemption boundary (Table 7).

#### 6.2.1.1 Municipal Wells Within 1982-Approved Aquifer Exemption Boundary

Two municipal wells, owned by River Ranch Home Owner's Association (RRHOA), are within the 1982-approved exemption boundary and screened within 500 feet of the oil-bearing zone. The wells are co-located in the southwest portion of the Kern River Field and are listed as Well ID 14 in Table 3. The deeper of the two wells is screened approximately 42 feet above the top of the proposed aquifer exemption boundary and separated from the oil-bearing units by multiple fine-grained layers. Two water quality samples were recently collected from the RRHOA well and are summarized in Table 5. Comparison of the laboratory results to primary and secondary drinking water standards demonstrates that the water in this well is of good quality and has not been adversely impacted by the presence of the oil-bearing formation or past or present oil field operations.

#### 6.2.1.2 Domestic/Irrigation Wells Within 1982 Approved Aquifer Exemption Boundary

Five of the nine domestic/irrigation wells within the 1982-approved aquifer exemption boundary are screened within the oil-bearing zone. Table 6 summarizes the water quality data collected from Well ID 6 and provides a comparison to other samples collected from wells within proximity to the oil-bearing zone. Laboratory data of samples collected from the wells demonstrates that water quality has not been adversely impacted by the presence of the oil-bearing formation or past or present oil field operations.

### 6.2.2 Kern River Reservoir Water Quality

The water quality in the Kern River Reservoir below the C silt (primary unit from which produced and interdiction water are captured) ranges from good to moderate. As described in Section 4.3.6.3, given the low recharge and lack of communication between the Kern River and groundwater, the waters of the Kern River likely have a minimal effect on groundwater quality in the Kern River Reservoir.

#### 6.2.2.1 Historical Water Quality

Amec/Foster Wheeler (Amec 2015) evaluated historical water quality data from 40 wells screened in the Kern River Formation collected from a period of 1967 to 2008 (Appendix D). The geochemistry of groundwater samples collected from the lower Kern River is predominately represented by the cations sodium and calcium and the anions bicarbonate and chloride. Total dissolved solids (TDS) data from the wells studied range from 187 to 1,380 mg/L with an average of 579 mg/L (Appendix D). The average TDS concentration exceeds the recommended secondary MCL for TDS of 500 mg/L and the maximum TDS concentration exceeds the secondary upper MCL for TDS of 1,000 mg/L. Sulfate concentrations ranged from non-detect to 459 mg/L with an average of 30 mg/L. Neither the average nor the maximum sulfate concentrations exceeded the secondary upper MCL of 500 mg/L. Chloride concentrations ranged from 26 to 530 mg/L with an average of 120 mg/L. Only one groundwater sample exceeded the secondary upper MCL of 500 mg/L. Nitrate concentrations (reported as nitrate) ranged from non-detect to 1.53 mg/L with an average of 0.47 mg/L. The average and maximum nitrate concentrations did not exceed the MCL of 10 mg/L. Fluoride concentration data was not available for these supply wells.

Dissolved magnesium concentrations ranged from 0.36 to 19.3 mg/L with an average of 5.38 mg/L. The minimum, average, and maximum concentrations of magnesium exceed the secondary MCL of 0.05 mg/L. Historical data for Title 22 metals were limited to arsenic and barium. Barium ranged from non-detect to 9 mg/L with an average of 0.61 mg/L. Only one groundwater sample out of 19 exceeded the MCL of 1 mg/L for barium.

#### 6.2.2.2 Interdiction Well Water Quality

The water interdiction wells owned by Chevron that are perforated in the lower Kern River Formation are high water-cut oil wells. Typically, high water-cut wells would be operated minimally, to reduce operating costs; however, operation of the interdiction wells provide several benefits, such as reducing hydrostatic pressures in the production field and providing water for beneficial reuse. These wells are located along the western portion of the oil field and extract oil and water from the Lower Kern River Formation. Table 8 summarizes analytical data from water samples collected from the interdiction wells. The TDS in water interdiction wells ranges from 176 mg/L to 2,084 mg/L, which is comparable to other oil field operations wells. Arsenic and boron concentrations are low, below their respective MCLs. Two of the 16 samples exceeded the secondary MCL of 500 mg/L for chloride. One sample contained an elevated sulfate concentration of 459 mg/L, which is still below its secondary MCL. Water quality data from the interdiction wells is graphically represented on Exhibit D-3.

### 6.2.3 Station 36

Station 36 is Chevron's central fluids gathering facility. Produced water from Chevron's operations in the Kern River Field is pumped to Station 36 for treatment prior to reuse or disposal. In 2014, Chevron produced approximately 750,000 BPD of produced water from the Kern River Field and transported it to Station 36 for processing and treatment. Treated produced water leaving Station 36 is split into three streams; with approximately 211,000 BPD used in steam generation, 24,000 BPD used for routine field operations and over 515,000 BPD provided to the Cawelo Water District.

Water chemistry data collected from Station 36 provides representative quality information for steam injected into the field as part of the EOR program. Water quality data associated with Station 36 operations are presented in Table 4 and Appendix E, Exhibit E-2. The TDS in Station 36 influent water is around 600 mg/L, which is comparable to oil field operations wells. Bicarbonate alkalinity averages around 250 mg/L, chlorides are approximately 124 mg/L and sulfates are approximately 34 mg/L. Copies of the lab reports are included in Appendix D.

## 6.3 Potential Migration of Injected Fluids

Geologic and hydrogeologic information also demonstrates that the Kern River Field is situated in a closed system bounded on three sides by faults that represent barriers to fluid flow; and on the fourth side by the outcropping for the oil-bearing formations. Information presented in Section 4 demonstrates that fluids contained in the Kern River and Upper Chanac Formations within the Kern River Field are hydrogeologically constrained laterally and flowing towards the center of the field under an induced pressure gradient caused by production operations. Fluids are also constrained vertically, being separated by continuous or semi-continuous, relatively impermeable, silt and clay beds Therefore, under operating conditions, there is no potential for fluids to migrate outside the proposed exemption area, and vertical migration is constrained. Steam injected into the Kern River Formation condenses into water and will migrate towards the low pressure zone created near the center of the field where it will be extracted from the Kern River Formation from nearby production wells. As such, no additional monitoring of the proposed exempted aquifer, or water wells within close proximity to the proposed exempted aquifer, is warranted or proposed.

A conduit analysis was performed to identify abandoned, idle, or active wells in the proposed Aquifer Exemption expansion area that could potentially represent conduits for the vertical migration of fluids from the oil-bearing zone to USDW. A Potential Conduit Well Assessment was prepared that documents plugging and abandonment of potential conduit wells that were identified in the revised Aquifer Exemption Boundary. A copy of the revised Potential Conduit Well Assessment dated 26 March 2025 is provided in Appendix G.

## 6.4 Summary

The origin of the water injected into the Kern River Formation (as steam) for EOR is the oil-bearing zone of the Kern River and Upper Chanac Formations. The extracted water is separated from the crude oil at Station 36 and then softened prior to being generated into steam and re-injected back into the oil-bearing zone. The water (as steam) used for the EOR process meets the Basin Plan Water Quality Objectives for the Tulare Lake Basin (Amec 2015). Because the water is treated and softened prior to re-use for EOR, its quality is higher than when it was extracted from the Kern River and Upper Chanac Formations.

Available analytical data from water supply wells within the proposed aquifer exemption boundary have not been degraded by oil field operations. Some wells are completed in zones where water quality has been impacted by the presence of the oil in the subsurface (elevated TDS, EC, metals), but there is no indication that water quality has been degraded from EOR operations.

Water wells that are perforated in the Kern River Formation also appear to be unaffected by EOR practices. The geochemistry of water supply wells in the Kern River Field is comparable to what is found in neighboring domestic, municipal and industrial water wells (Amec 2015). A comparison of historic and recently collected analytical data from the RRHOA water supply well indicates that EOR activities south of the China Grade Fault have not impacted water quality in nearby water supply wells.

The available lithologic information indicates that the screened intervals for three of the ten domestic, irrigation and municipal water wells located within the 1982-approved aquifer exemption boundary are not within the vertical limits of the aquifer exemption boundary for the Kern River Formation, and are physically isolated from the oil-bearing zone by the pervasive low-permeability fine-grained layers that separate the various sand zones within the Kern River Field. Five of the wells screened within the 1982-approved aquifer exemption boundary are screened within the oil-bearing zone at the eastern upgradient extent of the oil field and are protected from impacts by the inward hydraulic gradient created by oil field operations.

# Section 7: Summary of the Data in Support of the Aquifer Exemption Application

The Kern River Formation in the Kern River Field was included in the 1981 Primacy Application submitted by the CalGEM to the USEPA, and approved by the USEPA on 29 September 1982. The 1982 exempted aquifer boundary is based on 1973-1974 CalGEM maps of the oil/water contact. Exploration and production activities conducted since 1973-1974 have demonstrated that commercially producible quantities of oil exist outside the existing exempted aquifer boundary.

Oil extracted from the Kern River Field is classified as heavy oil, with an API gravity between 10° and 16°. Kern River Field operators use EOR methods to produce oil from the Kern River Field. As such, continuing production outside the 1982-approved exempted aquifer boundary will require the expansion of that boundary. Therefore, the Kern River Field operators, in accordance with 40 CFR §146.4 and PRC 3131(a), request that CalGEM propose to the USEPA expanding the currently exempted aquifer boundary to include the hydrocarbon-containing portions of the Kern River and Upper Chanac Formations beneath, and in the immediate vicinity of, the Kern River Field. The requested expansion will result in a total exempted aquifer lateral area that is approximately 25,300 feet wide near its southern extent, 9,400 feet at the northern extent, and 36,900 feet long in the north-south direction (approximately 15,335 acres). The differential area between the existing 1982-approved aquifer exemption boundary and the new proposed boundary is approximately 3,900 acres.

The vertical extent of the aquifer exemption, as expanded, will cover the Kern River and Upper Chanac Formational units that range from approximately -940 feet TVDSS to 40 feet TVDSS near the eastern side of the oil field and from approximately -40 TVDSS to -1,400 TVDSS on the western side of the oil field. The upper limit of this exemption expansion is limited to strata below the C Silt. Where the C Silt is 50 feet or less from the surface, the top of the exemption and future injection would be limited to 150 feet below ground surface. The lower limit is defined by a confining silt in the Chanac Formation that separates confined aquifers below from the unconfined aquifer above, which extends up into the Lower Kern River Formation.

In accordance with §146.4, the relevant criteria for the subject exemption for Class II wells include:

1) The exempted zone does not currently serve as a source of drinking water; and

2) It cannot now and will not in the future serve as a source of drinking water because it is hydrocarbon producing, or can be demonstrated by a permit applicant as part of a permit application for a Class II operation to contain hydrocarbons that considering their quantity and location are expected to be commercially producible.

As presented in Sections 3 through 6 above, the following points support the request to expand the existing aquifer exemption boundary of the Kern River and Upper Chanac Formations in the Kern River Field:

1) The best use of the oil-bearing Kern River and Upper Chanac Formations in the Kern River Field is its current use, oil and gas extraction. A portion of the Kern River Formation in the Kern River Field is included as an exempted aquifer in the 1981 Primacy Application and in the Memorandum of Agreement between CalGEM and the USEPA Region IX.

2) Expansion of the exempted aquifer boundary is required to continue EOR methods at the lateral extents of the field.

3) Production of the Kern River Field cannot economically occur without the use of EOR methods, which include steam injection. Water, produced in conjunction with and separated from the hydrocarbons, is treated (softened) and beneficially reused for steam generation. The quality of the water being injected as steam into the exempted aquifer is better than the quality of the water naturally present and removed during oil production.

4) The Kern River and Upper Chanac Formations within the Kern River Field are hydraulically separated from those areas outside the field boundaries.

   a) Hydraulic containment to the west is controlled by the Kern Front Fault;

   b) To the north and northeast, hydraulic containment is provided by the Poso Creek Fault and a series of un-named normal faults;

   c) To the east, hydraulic control is established by the outcropping of the Kern River Formation;

   d) To the southeast and south, containment for the field is controlled by the pressure gradient generated by production activities (more fluid is extracted than injected, creating an inward hydraulic gradient) and by tar seals;

   e) To the southwest, hydraulic control is established by the pressure gradient generated by production activities and by the presence of the sealing faults to the southwest and west of the Kern River Field;

   f) Vertical containment is provided in the upward direction by the water/oil surface and the presence of the silt and clay layers that persist throughout the Kern River Field. Vertical containment in the downward direction is controlled by a confining silt in the Chanac Formation that separates confined aquifers below from the unconfined aquifer above; and

   g) The overall decline in groundwater elevation in the Kern River and Upper Chanac Formations across the field results in lower fluid pressures within the interior of the field driving fluids toward the center of the Kern River Field, and further demonstrates that the geologic features near the boundaries of the Kern River and Upper Chanac Formations create a closed system.

5) On a daily and annual basis, the Kern River Field produces excess fluids resulting in a net negative fluid balance and the inward hydraulic pressure gradient. Water sources at the Kern River Field include produced formation water, groundwater (for minimal daily operational uses) and interdiction water. After treatment, some of the produced and

interdicted waters are treated and beneficially reused for EOR operations and in routine field activities. These waters meet the Basin Plan water quality objectives for the Tulare Lake Basin.

6) There are no known private or municipal drinking water supply wells located within the Kern River Reservoir within the proposed exemption area that have been impacted by EOR operations that have occurred over the past 50 years. Some of the water wells are separated from the oil-bearing zone by fine-grained silt and clay (shale) layers; while other wells are screened in the oil-bearing zone and are protected from downgradient field operations by an inward hydraulic gradient toward the center of the field. Water wells screened within the same zone as the oil-bearing strata but outside the oil-bearing zone, and outside the proposed aquifer exemption boundary, are protected by the inward hydraulic gradient toward the center of the field created by production operations.

7) Twenty domestic/municipal water supply wells exist outside but in close proximity to the proposed expanded aquifer exemption boundary. These wells are protected hydraulically by the inward hydraulic gradient created by production operations. Additionally, zone of contribution calculation estimates for each of these 20 wells based on well-specific information confirm that the origin of the water potentially extracted from these wells is outside the proposed expanded aquifer exemption boundary.

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# Tables

# Table 1: Production Wells Outside 1982 Aquifer Exemption Boundary

| API No.[a] | Well ID | Well Status | Operator | Lease Name | Section | Township | Range | Base Meridian | Elevation[b] | Coordinates[c] X | Coordinates[c] Y | Location Description[d] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 02900089 | 6 | A | Chevron U.S.A. Inc. | Mitchell | 18 | 28S | 28E | MD | 970 DF | -119.00481400000 | 35.48742500000 | Fr SW cor 970N 1965E |
| 02900094 | 16-25 | I | Chevron U.S.A. Inc. | Chaparral | 18 | 28S | 28E | MD | | -119.00666300000 | 35.49917000000 | Fr NW cor 545S 1642E |
| 02900463 | 16-21 | A | Chevron U.S.A. Inc. | Chaparral | 18 | 28S | 28E | MD | | -119.00667600000 | 35.49734700000 | Fr NW cor 710S 1356E |
| 02900554 | 5-31 | I | Vintage Production California LLC | KRU | 12 | 28S | 27E | MD | | -119.01603400000 | 35.50186800000 | Fr SE cor 940N 1430W |
| 02900555 | 10-42 | I | Chevron U.S.A. Inc. | Bakersfield Fuel & Oil | 12 | 28S | 27E | MD | | -119.01258400000 | 35.50687700000 | Fr SE cor 2755N 422W |
| 02940013 | 8 | A | Chevron U.S.A. Inc. | Mitchell | 18 | 28S | 28E | MD | 996 DF | -119.00710600000 | 35.48783200000 | Fr S/4 cor 1110N 1150W |
| 02940097 | 3-13 | I | Chevron U.S.A. Inc. | KRU | 13 | 28S | 27E | MD | | -119.01825800000 | 35.49374800000 | Fr NE cor 2030S 2076W |
| 02940098 | 4-16 | A | Chevron U.S.A. Inc. | KRU | 13 | 28S | 27E | MD | | -119.01730900000 | 35.49512000000 | Fr NE cor 1535S 1790W |
| 02940110 | 7-15 | I | Chevron U.S.A. Inc. | KRU | 13 | 28S | 27E | MD | | -119.01437700000 | 35.49463200000 | Fr NE cor 1705S 924W |
| 02940112 | 13-14 | I | Chevron U.S.A. Inc. | Chaparral | 18 | 28S | 28E | MD | | -119.00955600000 | 35.49416700000 | Fr NW cor 1865S 498E |
| 02940121 | 13 | A | Chevron U.S.A. Inc. | Mitchell | 18 | 28S | 28E | MD | 1011 DF | -119.00483100000 | 35.48962200000 | Fr S/4 cor 1790N 485W |
| 02940124 | 5-15 | I | Chevron U.S.A. Inc. | KRU | 13 | 28S | 27E | MD | | -119.01636500000 | 35.49466700000 | Fr NE cor 1700S 1504W |
| 02940211 | 16 | A | Chevron U.S.A. Inc. | Mitchell | 18 | 28S | 28E | MD | 1044 DF | -119.00609000000 | 35.49043100000 | Fr S/4 cor 2110N 810W |
| 02940212 | 17 | A | Chevron U.S.A. Inc. | Mitchell | 18 | 28S | 28E | MD | 1035 DF | -119.00373800000 | 35.49048600000 | Fr S/4 cor 2095N 145W |
| 02940214 | 12 | A | Chevron U.S.A. Inc. | Mitchell | 18 | 28S | 28E | MD | 990 DF | -119.00388300000 | 35.48886900000 | Fr S/4 cor 1500N 180W |
| 02940236 | 18 | A | Chevron U.S.A. Inc. | Mitchell | 18 | 28S | 28E | MD | 1030 DF | -119.00491700000 | 35.49151700000 | Fr S/4 cor 2465N 500W |
| 02940237 | 19 | A | Chevron U.S.A. Inc. | Mitchell | 18 | 28S | 28E | MD | 1048 DF | -119.00701400000 | 35.49156900000 | Fr S/4 cor 2455N 1115W |
| 02940779 | 3-17 | I | Chevron U.S.A. Inc. | KRU | 13 | 28S | 27E | MD | | -119.01834700000 | 35.49557200000 | Fr NE cor 1370S 2076W |
| 02940838 | 4-12 | A | Chevron U.S.A. Inc. | KRU | 13 | 28S | 27E | MD | | -119.01733400000 | 35.49328900000 | Fr NE cor 2195S 1790W |
| 02940839 | 6-10 | I | Chevron U.S.A. Inc. | KRU | 13 | 28S | 27E | MD | | -119.01540800000 | 35.49237500000 | Fr SE cor 2525N 1218W |
| 02940840 | 8-10 | A | Chevron U.S.A. Inc. | KRU | 13 | 28S | 27E | MD | | -119.01349000000 | 35.49238700000 | Fr NE cor 2525S 646W |
| 02940856 | 3 | A | Chevron U.S.A. Inc. | U.S.A. | 18 | 28S | 28E | MD | 1037 DF | -119.00262000000 | 35.48778600000 | Fr S/4 cor 1120N 200E |
| 02949640 | 4-10 | I | Chevron U.S.A. Inc. | KRU | 13 | 28S | 27E | MD | | -119.01738200000 | 35.49236400000 | Fr NE cor 2525S 1790W |
| 02950055 | 6-32 | I | Vintage Production California LLC | KRU | 12 | 28S | 27E | MD | | -119.01492100000 | 35.50277200000 | Fr SE cor 1270N 1100W |
| 02950056 | 16-10 | I | Chevron U.S.A. Inc. | Chaparral | 18 | 28S | 28E | MD | | -119.00664400000 | 35.49245600000 | Fr W/4 cor 150S 1399E |
| 02950201 | 7-13 | A | Chevron U.S.A. Inc. | KRU | 13 | 28S | 27E | MD | | -119.01442700000 | 35.49376300000 | Fr SE cor 2030N 932W |
| 02950202 | 3-15 | A | Chevron U.S.A. Inc. | KRU | 13 | 28S | 27E | MD | | -119.01829000000 | 35.49469000000 | Fr NE cor 1700S 2076W |
| 02950203 | 3-11 | I | Chevron U.S.A. Inc. | KRU | 13 | 28S | 27E | MD | | -119.01827400000 | 35.49286700000 | Fr NE cor 2360S 2076W |
| 02950204 | 12-10 | I | Chevron U.S.A. Inc. | Chaparral | 18 | 28S | 28E | MD | | -119.01049500000 | 35.49245000000 | Fr W/4 cor 450S 255E |
| 02950206 | 14-10 | I | Chevron U.S.A. Inc. | Chaparral | 18 | 28S | 28E | MD | | -119.00857200000 | 35.49244900000 | Fr W/4 cor 150N 827E |
| 02950267 | 5-7 | A | Chevron U.S.A. Inc. | KRU | 13 | 28S | 27E | MD | | -119.01636000000 | 35.49103100000 | Fr NE cor 3020S 1504W |
| 02950270 | 11-14 | I | Chevron U.S.A. Inc. | KRU | 13 | 28S | 27E | MD | | -119.01157100000 | 35.49414900000 | Fr NE cor 1865S 74W |
| 02950272 | 5-9 | A | Chevron U.S.A. Inc. | KRU | 13 | 28S | 27E | MD | | -119.01635000000 | 35.49194600000 | Fr NE cor 2690S 1504W |
| 02950273 | 8-12 | A | Chevron U.S.A. Inc. | KRU | 13 | 28S | 27E | MD | | -119.01346400000 | 35.49328400000 | Fr NE cor 2195S 646W |
| 02952805 | 13-11 | I | Chevron U.S.A. Inc. | Chaparral | 18 | 28S | 28E | MD | | -119.00971200000 | 35.49279100000 | Fr NW cor 2360S 498E |
| 02952807 | 22 | A | Chevron U.S.A. Inc. | Mitchell | 18 | 28S | 28E | MD | 983 DF | -119.00603000000 | 35.48801400000 | Fr S/4 cor 1100N 830W |
| 02955754 | 6-16 | I | Chevron U.S.A. Inc. | KRU | 13 | 28S | 27E | MD | | -119.01532800000 | 35.49515800000 | Fr SE cor 1510N 1210W |
| 02955755 | 7-9 | I | Chevron U.S.A. Inc. | KRU | 13 | 28S | 27E | MD | | -119.01444900000 | 35.49214200000 | Fr E/4 cor 20S 930W |
| 02959235 | 7-41 | I | Chevron U.S.A. Inc. | Bakersfield Fuel & Oil | 12 | 28S | 27E | MD | | -119.01444800000 | 35.50658100000 | Fr NE cor 2625S 990W |
| 02959738 | 18-5 | A | Chevron U.S.A. Inc. | | 18 | 28S | 28E | MD | | -119.00949700000 | 35.49162000000 | Fr SW cor 2480N 550E |
| 02962059 | 11-10 | A | Chevron U.S.A. Inc. | KRU | 13 | 28S | 27E | MD | | -119.01154500000 | 35.49234700000 | Fr NE cor 2525S 74W |
| 02962686 | 25-43 | I | Chevron U.S.A. Inc. | | 25 | 28S | 27E | MD | | -119.02377500000 | 35.46008100000 | Fr NW cor 3705S 1715E |
| 02963273 | 18-502 | A | Chevron U.S.A. Inc. | | 18 | 28S | 28E | MD | | -119.01001300000 | 35.48988200000 | Fr NW cor 3420S 390E |
| 02963291 | 18-7 | A | Chevron U.S.A. Inc. | | 18 | 28S | 28E | MD | | -119.01061100000 | 35.49149500000 | Fr NW cor 2835S 200E |
| 02963292 | 18-8 | A | Chevron U.S.A. Inc. | | 18 | 28S | 28E | MD | | -119.00832700000 | 35.49147300000 | Fr NW cor 2835S 878E |
| 02963293 | 18-9 | A | Chevron U.S.A. Inc. | | 18 | 28S | 28E | MD | | -119.01064200000 | 35.49042400000 | Fr NW cor 3226S 200E |
| 02963294 | 18-10 | A | Chevron U.S.A. Inc. | | 18 | 28S | 28E | MD | | -119.00944900000 | 35.49041200000 | Fr NW cor 3226S 555E |
| 02963295 | 18-11 | A | Chevron U.S.A. Inc. | | 18 | 28S | 28E | MD | | -119.00832300000 | 35.49040200000 | Fr NW cor 3226S 885E |
| 02963297 | 18-13 | A | Chevron U.S.A. Inc. | | 18 | 28S | 28E | MD | | -119.00830700000 | 35.48934400000 | Fr NW cor 3618S 900E |
| 02963599 | 25-56 | I | Chevron U.S.A. Inc. | | 25 | 28S | 27E | MD | 822 MAT | -119.02253200000 | 35.46104700000 | Fr NW cor 3350S 2065E |
| 02963605 | 25-64 | I | Chevron U.S.A. Inc. | | 25 | 28S | 27E | MD | 801 MAT | -119.02255700000 | 35.45906900000 | Fr NW cor 4070S 2081E |
| 02964073 | 37 | A | Chevron U.S.A. Inc. | Chanslor | 24 | 28S | 27E | MD | 920 MAT | -119.01648200000 | 35.48111700000 | Fr NW cor 1298S 3785E |
| 02965412 | 5-14 | A | Chevron U.S.A. Inc. | KRU | 13 | 28S | 27E | MD | | -119.01625700000 | 35.49377800000 | Fr NE cor 2037S 1467W |
| 02968658 | 106 | A | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 1073 DF | -119.01191900000 | 35.49051200000 | Fr SE cor 2067N 165W |
| 02968659 | 107 | A | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 1051 DF | -119.01190200000 | 35.49157800000 | Fr SE cor 2455N 165W |
| 02968662 | 205 | A | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 1045 DF | -119.01304300000 | 35.48953900000 | Fr SE cor 1709N 495W |

# Table 1: Production Wells Outside 1982 Aquifer Exemption Boundary

| API No.[a] | Well ID | Well Status | Operator | Lease Name | Section | Township | Range | Base Meridian | Elevation[b] | Coordinates[c] | |  Location Description[d] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | X | Y | |
| 02968663 | 206 | A | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 1047 DF | -119.01302500000 | 35.49059900000 | Fr SE cor 2095N 495W |
| 02968664 | 207 | A | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 1235 DF | -119.01301200000 | 35.49166000000 | Fr SE cor 2481N 495W |
| 02968938 | 406 | A | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 1037 KB | -119.01524300000 | 35.49062500000 | Fr SE cor 2095N 1155W |
| 02972340 | 18-515 | A | Chevron U.S.A. Inc. | | 18 | 28S | 28E | MD | | -119.00885000000 | 35.48974300000 | Fr NW cor 3474S 750E |
| 02973164 | 23 | A | Chevron U.S.A. Inc. | Mitchell | 18 | 28S | 28E | MD | | -119.00742800000 | 35.49052400000 | Fr S/4 cor 2080Nly 1272Wly |
| 02973210 | 156 | A | Chevron U.S.A. Inc. | Government 3 | 18 | 28S | 28E | MD | | -118.99763100000 | 35.49571400000 | Fr NE cor 1325S 925W |
| 02973211 | 157 | A | Chevron U.S.A. Inc. | Government 3 | 18 | 28S | 28E | MD | | -118.99679100000 | 35.49571800000 | Fr NE cor 1325S 675W |
| 02974970 | 304 | A | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 1030 KB | -119.01410200000 | 35.48853300000 | Fr SE cor 1333N 808W |
| 02974971 | 305 | A | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 1050 KB | -119.01408400000 | 35.48959000000 | Fr SE cor 1719N 804W |
| 02974972 | 306 | A | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 1031 KB | -119.01406100000 | 35.49065100000 | Fr SE cor 2105N 798W |
| 02974973 | 307 | A | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 1086 KB | -119.01401300000 | 35.49169800000 | Fr SE cor 2491N 794W |
| 02974974 | 407 | A | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 1058 KB | -119.01512500000 | 35.49171900000 | Fr SE cor 2495N 1125W |
| 02975058 | 815 | A | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 1043 KB | -119.01361000000 | 35.48900900000 | Fr SE cor 1523N 642W |
| 02975063 | 820 | A | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 1042 KB | -119.01469900000 | 35.48902200000 | Fr SE cor 1529N 971W |
| 02975064 | 821 | A | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 1010 KB | -119.01465600000 | 35.48800900000 | Fr SE cor 1142N 975W |
| 02975067 | 824 | A | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 993 KB | -119.01587500000 | 35.48690500000 | Fr SE cor 754N 1317W |
| 02975069 | 403 | A | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 1006 KB | -119.01523400000 | 35.48748200000 | Fr SE cor 952N 1143W |
| 02975070 | 404 | A | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 1039 KB | -119.01521400000 | 35.48854500000 | Fr SE cor 1339N 1138W |
| 02975071 | 405 | A | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 1034 KB | -119.01519700000 | 35.48963300000 | Fr SE cor 1724N 1133W |
| 02975073 | 503 | A | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 1028 KB | -119.01633300000 | 35.48749800000 | Fr SE cor 957N 1469W |
| 02975074 | 504 | A | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 1031 KB | -119.01631700000 | 35.48836900000 | Fr SE cor 1272N 1464W |
| 02987357 | 603 | A | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 995 DF | -119.01740300000 | 35.48737900000 | Fr SE cor 907Nly 1782Wly |
| 02987360 | 604 | A | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 1018 DF | -119.01748400000 | 35.48826600000 | Fr SE cor 1228Nly 1811Wly |
| 02987714 | 116 | A | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 1057 DF | -119.01257400000 | 35.49052100000 | Fr SE cor 2068Nly 360Wly |
| 02987715 | 117 | A | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 1057 DF | -119.01240300000 | 35.49161500000 | Fr SE cor 2517Nly 315Wly |
| 02987717 | 702 | A | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 959 DF | -119.01858600000 | 35.48635800000 | Fr SE cor 530Nly 2130Wly |
| 02987718 | 703 | A | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 973 DF | -119.01853800000 | 35.48734500000 | Fr SE cor 890Nly 2120Wly |
| 02987719 | 704 | A | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 975 DF | -119.01854100000 | 35.48816900000 | Fr SE cor 1190Nly 2125Wly |
| 03009550 | 48 | A | Chevron U.S.A. Inc. | Chanslor | 24 | 28S | 27E | MD | 928 MAT | -119.01637000000 | 35.48320600000 | Fr NW cor 538S 3805E |
| 03009930 | 6 | A | Chevron U.S.A. Inc. | U.S.A. | 18 | 28S | 28E | MD | 1056 KB | -118.99930300000 | 35.48707900000 | Fr NW cor 4435S 3609E |
| 03010188 | 49 | A | Chevron U.S.A. Inc. | Chanslor | 24 | 28S | 27E | MD | 966 MAT | -119.01547600000 | 35.48446600000 | Fr NW cor 72S 4065E |
| 03010189 | 50 | A | Chevron U.S.A. Inc. | Chanslor | 24 | 28S | 27E | MD | 930 MAT | -119.01547200000 | 35.48332600000 | Fr NW cor 488S 4072E |
| 03010190 | 51 | A | Chevron U.S.A. Inc. | Chanslor | 24 | 28S | 27E | MD | 923 GL | -119.01648200000 | 35.48219900000 | Fr NW cor 904S 3778E |
| 03010224 | 25 | A | Chevron U.S.A. Inc. | Mitchell | 18 | 28S | 28E | MD | 1006 GL | -119.00701400000 | 35.49041500000 | Fr NW cor 3222S 1295E |
| 03010225 | 26 | A | Chevron U.S.A. Inc. | Mitchell | 18 | 28S | 28E | MD | 992 MAT | -119.00656700000 | 35.48934400000 | Fr NW cor 3611S 1433E |
| 03010226 | 27 | A | Chevron U.S.A. Inc. | Mitchell | 18 | 28S | 28E | MD | 977 MAT | -119.00660100000 | 35.48822600000 | Fr NW cor 4017S 1428E |
| 03010229 | 30 | A | Chevron U.S.A. Inc. | Mitchell | 18 | 28S | 28E | MD | 1011 MAT | -119.00486400000 | 35.49045700000 | Fr NW cor 3199S 1934E |
| 03010230 | 31 | A | Chevron U.S.A. Inc. | Mitchell | 18 | 28S | 28E | MD | 986 MAT | -119.00488400000 | 35.48824600000 | Fr NW cor 4010S 1945E |
| 03010232 | 33 | A | Chevron U.S.A. Inc. | Mitchell | 18 | 28S | 28E | MD | 955 MAT | -119.00353300000 | 35.48966300000 | Fr NW cor 3483S 2334E |
| 03010233 | 34 | A | Chevron U.S.A. Inc. | Mitchell | 18 | 28S | 28E | MD | 975 MAT | -119.00343400000 | 35.48811500000 | Fr NW cor 4004S 2364E |
| 03010567 | 901 | A | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 967 KB | -119.02006600000 | 35.48516200000 | Fr SE cor 2567W 88N |
| 03011118 | 509 | A | Chevron U.S.A. Inc. | Mitchell | 18 | 28S | 28E | MD | 1030 MAT | -119.00421000000 | 35.49005300000 | Fr NW cor 3332S 2122E |
| 03012891 | 53 | A | Chevron U.S.A. Inc. | Chanslor | 24 | 28S | 27E | MD | 988 KB | -119.01762000000 | 35.48324200000 | Fr NW cor 529S 3433E |
| 03036069 | 201 | A | Chevron U.S.A. Inc. | Government 3 | 18 | 28S | 28E | MD | 1069 GL | -118.99947647400 | 35.49304371280 | Fr NE cor 2268S 1511W |
| 03036070 | 202 | A | Chevron U.S.A. Inc. | Government 3 | 18 | 28S | 28E | MD | 1058 GL | -118.99674836600 | 35.49678226650 | Fr NE cor 926S 677 |
| 03036071 | 203H | A | Chevron U.S.A. Inc. | Government 3 | 18 | 28S | 28E | MD | 1060 GL | -119.00064811500 | 35.49323819360 | Fr NE cor 2190S 1865W |
| 03036072 | 204H | A | Chevron U.S.A. Inc. | Government 3 | 18 | 28S | 28E | MD | 1058 GL | -119.00063355100 | 35.49315103900 | Fr NE cor 2222S 1860W |
| 03036073 | 205H | A | Chevron U.S.A. Inc. | Government 3 | 18 | 28S | 28E | MD | 1057 GL | -119.00061991900 | 35.49307016470 | Fr NE cor 2254S 1856W |
| 03036194 | 702H | A | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 982 KB | -119.01900084000 | 35.48716580000 | Fr NW cor 4421Sly 3013Ely |
| 03036195 | 703H | A | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 990 KB | -119.01901416000 | 35.48806206000 | Fr NW cor 4096Sly 3006Ely |
| 03036196 | 710H | A | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 951 KB | -119.01914078000 | 35.48522962000 | Fr NW cor 5129Sly 2976Ely |
| 03036197 | 712H | A | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 984 KB | -119.01932078000 | 35.48718437000 | Fr NW cor 4417Sly 2916Ely |
| 03036198 | 713H | A | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 990 KB | -119.01945218000 | 35.48809077000 | Fr NW cor 4082S 2897E |
| 03036518 | 74H | A | Chevron U.S.A. Inc. | Chanslor | 24 | 28S | 27E | MD | 920 KB | -119.01849248000 | 35.48048943000 | Fr NW cor 1456S 3234E |
| 03036622 | 73H | A | Chevron U.S.A. Inc. | Chanslor | 24 | 28S | 27E | MD | 922 KB | -119.01811938000 | 35.48069744000 | Fr NW 1375S 3340E |
| 03036986 | 206 | A | Chevron U.S.A. Inc. | Government 3 | 18 | 28S | 28E | MD | 1064 GL | -118.99901857700 | 35.49500479240 | Fr NE cor 1558S 1364W |

# Table 1: Production Wells Outside 1982 Aquifer Exemption Boundary

| API No.[a] | Well ID | Well Status | Operator | Lease Name | Section | Township | Range | Base Meridian | Elevation[b] | Coordinates[c] | | Location Description[d] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | X | Y | |
| 03038232 | 701H | A | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 952 KB | -119.01912257100 | 35.48603192500 | Fr NW cor 4831Sly 2974Ely |
| 03038233 | 711H | A | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 963 KB | -119.01964368900 | 35.48603667700 | Fr NW cor 4831Sly 2819Ely |
| 03042522 | 83 | N | Chevron U.S.A. Inc. | Chanslor | 24 | 28S | 27E | MD | 984 KB | -119.01753930000 | 35.48440136000 | Fr NW cor 20Sly 3455Ely |
| 03042523 | 84 | N | Chevron U.S.A. Inc. | Chanslor | 24 | 28S | 27E | MD | 959 KB | -119.01634194800 | 35.48444510300 | Fr NW cor 175Sly 3798Ely |
| 03042553 | 904 | N | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 990 KB | -119.01921200000 | 35.48830900000 | Fr NW cor 4054Sly 2869Ely |
| 03042554 | 903 | N | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 990 KB | -119.01951500000 | 35.48755300000 | Fr NW cor 4328Sly 2776Ely |
| 03043930 | 13 | N | Chevron U.S.A. Inc. | U.S.A. | 18 | 28S | 28E | MD | 1089 GL | -119.00078720900 | 35.48809482100 | Fr NW cor 4044S 3161E |
| 03043931 | 14 | N | Chevron U.S.A. Inc. | U.S.A. | 18 | 28S | 28E | MD | 1054 GL | -118.99930910600 | 35.48809843200 | Fr NW cor 4037Sly 3601Ely |
| 03043932 | 15 | N | Chevron U.S.A. Inc. | U.S.A. | 18 | 28S | 28E | MD | 1067 GL | -118.99982108300 | 35.48810750900 | Fr NW cor 4073Sly 3556Ely |
| 03043933 | 16 | N | Chevron U.S.A. Inc. | U.S.A. | 18 | 28S | 28E | MD | 1119 GL | -118.99819854300 | 35.48709374600 | Fr NW cor 4375Sly 3626Ely |
| 03043934 | 17 | N | Chevron U.S.A. Inc. | U.S.A. | 18 | 28S | 28E | MD | 1116 GL | -118.99818619900 | 35.48605797900 | Fr NW cor 4824Sly 3596Ely |
| 03045314 | 526 | A | Chevron U.S.A. Inc. | Chanslor | 24 | 28S | 27E | MD | 947 KB | -119.01764826300 | 35.48219200000 | Fr NW cor 1002S 3400E |
| 03045774 | 167 | N | Chevron U.S.A. Inc. | Wilmar | 20 | 28S | 28E | MD | 1035 KB | -118.99306383000 | 35.48421746900 | |
| 03045775 | 168 | A | Chevron U.S.A. Inc. | Wilmar | 20 | 28S | 28E | MD | 1020 KB | -118.99356750400 | 35.48333442000 | |
| 03045777 | 170 | N | Chevron U.S.A. Inc. | Wilmar | 20 | 28S | 28E | MD | 1014 KB | -118.99196829400 | 35.48216434600 | |
| 03045778 | 171 | N | Chevron U.S.A. Inc. | Wilmar | 20 | 28S | 28E | MD | 1000 KB | -118.99207000000 | 35.48358900000 | |
| 03045779 | 172 | N | Chevron U.S.A. Inc. | Wilmar | 20 | 28S | 28E | MD | 1000 KB | -118.99210183800 | 35.48408998700 | |
| 03045780 | 173 | A | Chevron U.S.A. Inc. | Wilmar | 20 | 28S | 28E | MD | 1002 KB | -118.99138789900 | 35.48417077400 | |
| 03045781 | 174 | A | Chevron U.S.A. Inc. | Wilmar | 20 | 28S | 28E | MD | 1002 KB | -118.99135561400 | 35.48367154100 | |
| 03045782 | 175 | N | Chevron U.S.A. Inc. | Wilmar | 20 | 28S | 28E | MD | 1008 KB | -118.99135329000 | 35.48229446800 | |
| 03045783 | 176 | A | Chevron U.S.A. Inc. | Wilmar | 20 | 28S | 28E | MD | 1020 KB | -118.99390375200 | 35.48334005500 | |
| 03046076 | 19-282 | N | Chevron U.S.A. Inc. | U.S.A. | 19 | 28S | 28E | MD | 1005 KB | -118.99567056700 | 35.48409847400 | |
| 03046077 | 19-283 | N | Chevron U.S.A. Inc. | U.S.A. | 19 | 28S | 28E | MD | 1006 KB | -118.99562349900 | 35.48355962600 | |
| 03046080 | 19-287 | N | Chevron U.S.A. Inc. | U.S.A. | 19 | 28S | 28E | MD | 1001 KB | -118.99448182300 | 35.48440634200 | |
| 03049036 | 25-47R | A | Chevron U.S.A. Inc. | U.S.A. | 25 | 28S | 27E | MD | 792 KB | -119.02245136200 | 35.46307594100 | Fr NW cor 2610 S'LY & 2095 E'LY |
| 03049037 | 25-52R | A | Chevron U.S.A. Inc. | U.S.A. | 25 | 28S | 27E | MD | 810 KB | -119.02230313300 | 35.46185593900 | Fr NW cor 3054 S'LY & 2143 E'LY |
| 03049325 | 433 | N | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 1031 KB | -119.01612471300 | 35.48751409600 | Fr NW cor 4356 S'LY & 3792 E'LY |
| 03049326 | 444 | A | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 1042 KB | -119.01596200000 | 35.48822800000 | Fr NW cor 4093 S'LY & 3836 E'LY |
| 03049327 | 533 | A | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 1002 KB | -119.01755609800 | 35.48763675500 | |
| 03049328 | 544 | A | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 1036 KB | -119.01635270800 | 35.48816458800 | |
| 03049329 | 634 | A | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 1002 KB | -119.01774138800 | 35.48759438400 | |
| 03049330 | 644 | A | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 984 KB | -119.01844313400 | 35.48816664800 | Fr NW cor 4107 S'LY & 3095 E'LY |
| 03049831 | 333 | N | Chevron U.S.A. Inc. | Angus | 25 | 28S | 27E | MD | 10100 KB | -119.01464151000 | 35.48742794700 | |
| 03051464 | 101 | A | Chevron U.S.A. Inc. | Chanslor | 24 | 28S | 27E | MD | 978 | -119.01943014700 | 35.48445647600 | 171' S, 2881' E from NW corner |
| 03051465 | 102 | A | Chevron U.S.A. Inc. | Chanslor | 24 | 28S | 27E | MD | 908 | -119.01845824300 | 35.48446559900 | 171' S, 3171' E from NW corner |
| 03051467 | 104 | A | Chevron U.S.A. Inc. | Chanslor | 24 | 28S | 27E | MD | 908 | -119.01863203800 | 35.48326948400 | 605' S, 3109' E from NW corner |
| 03051469 | 106 | N | Chevron U.S.A. Inc. | Chanslor | 24 | 28S | 27E | MD | 966 KB | -119.01860145700 | 35.48215562800 | |
| 03051471 | 91H | A | Chevron U.S.A. Inc. | Chanslor | 24 | 28S | 27E | MD | 929 KB | -119.01858299900 | 35.48078907100 | |
| 03051472 | 92H | A | Chevron U.S.A. Inc. | Chanslor | 24 | 28S | 27E | MD | 929 KB | -119.01855573300 | 35.48092935600 | |
| 03052146 | 86 | N | Chevron U.S.A. Inc. | Chanslor | 24 | 28S | 27E | MD | 930 KB | -119.01764596500 | 35.48123351600 | |
| 03052557 | 26 | A | Chevron U.S.A. Inc. | Government 1 | 18 | 28S | 28E | MD | 1024 | -119.00217100000 | 35.49064600000 | 3128'S 2741'E fr NW cor |
| 03052682 | 534 | A | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 1034 KB | -119.01617950100 | 35.48802042200 | |
| 03052683 | 633 | A | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 981 KB | -119.01844280500 | 35.48787488100 | |
| 03052925 | 260 | N | Chevron U.S.A. Inc. | Angus | 13 | 28S | 27E | MD | 1044 KB | -119.01244300000 | 35.49132600000 | 2976'S 4895'E fr NW cor |
| 03053537 | 25H | N | Chevron U.S.A. Inc. | Hotchkiss | 10 | 29S | 28E | MD | 465 | -118.96644897000 | 35.42203636340 | |

**Notes:**
Source: California Department of Oil, Gas, and Geothermal Resources, Online Database
(a) American Petroleum Institute
(b) Datum Elevation in feet relative to Mean Sea Level.
(c) Coordinates in Longitude and Latitude.
(d) Location in feet from indicated Section corner.

**Key:**

| | | | |
|---|---|---|---|
| A | Active | KB | Kelly Bushing |
| DF | Derrick Floor | MAT | Rig Mat |
| GL | Ground Level | MD | Mount Diablo |
| I | Idle | N | New |

# Table 2: Oil Field Water Supply Well Information

| API[a] | Well ID | Type and Purpose | Owner | Coordinates[b] X | Coordinates[b] Y | Perforated Interval[c] | Elevation[d] | TD[e] | Comments |
|---|---|---|---|---|---|---|---|---|---|
| 03050972 | CAU 300 WW | Industrial - Cogeneration Cooling - Active | Chevron | 1696397 | 710435 | 649-768 | 668 | 908 | |
| 03050259 | WIN 200 | Industrial - Cogeneration Cooling - Active | Chevron | 1696019 | 706866 | 608-810 | 581 | 950 | |
| 03038798 | GRY WS-1 | Industrial - General Oilfield Operations - Active | Gray Development | 1717923 | 705380 | Chanac: 405-445; 485-525 | 497 | 565 | Confirmed water production w/ DOGGR through 7/2014; SWS core data; completed in the Chanac below base of oil; likely water is for lease use |
| 03041568 | GRY WS-2 | Industrial - General Oilfield Operations - Active | Gray Development | 1717623 | 702988 | Chanac: 450-706 | 508 | 706 | Confirmed water production w/ DOGGR through 7/2014 |
| 02992042 | PRD 106 WW | Industrial - General Oilfield Operations - Inactive | Chevron | 1697870 | 709174 | | 668 | 856 | Possible Active KR Water Source Well (D. Priddy/L Knauer); no data in DOGGR |
| NA | PRO 105 WW | Industrial - General Oilfield Operations - Inactive | Chevron | 1697857 | 708179 | | NA | NA | Possible Active KR Water Source Well (D. Priddy/L Knauer); no data in DOGGR |
| 03090001 | PRO 107 WW | Industrial - General Oilfield Operations - Inactive | Chevron | 1697597 | 708657 | | 629 | 848 | No data in DOGGR |
| 03090002 | RAS 1 WW | Industrial - General Oilfield Operations - Inactive | Chevron | 1711236 | 702802 | | 449 | 1117 | No data in DOGGR |
| 03090003 | RAS 2 WW | Industrial - General Oilfield Operations - Inactive | Chevron | 1711676 | 702844 | | 449 | 1094 | No data in DOGGR |
| 03090004 | RAS 3 WW | Industrial - General Oilfield Operations - Inactive | Chevron | 1711112 | 703090 | | 453 | 1111 | No data in DOGGR |
| 03090005 | RAS 5 WW | Industrial - General Oilfield Operations - Inactive | Chevron | 1711446 | 703088 | | 452 | 1094 | No data in DOGGR |
| 02930256 | SJ 101 | Industrial - General Oilfield Operations - Inactive | Chevron | 1702451 | 703218 | 825-1332 | 496 | 1955 | Possible Active KR Water Source Well (D. Priddy/L Knauer) |
| 03026757 | SJ 102R | Industrial - General Oilfield Operations - Inactive | Chevron | 1702722 | 703222 | 806-1388 | 504 | 1530 | Possible Active KR Water Source Well (D. Priddy/L Knauer) |
| 02991819 | SP 7 WW | Industrial - General Oilfield Operations - Inactive | Chevron | 1697728 | 700331 | | 470 | 1843 | |
| 02900079 | USA 1 | Industrial - General Oilfield Operations - Inactive | Chevron | 1701822 | 724277 | 1007-1128 | 1065 | 1192 | |
| | EH-345-91 | Industrial - General Oilfield Operations - Inactive | Chevron | 1700800 | 703051 | 590-750 | 496 | 750 | Former domestic well - previously owned by Gerald Lucas |
| 03007476 | 25 1001 | Water Interdiction Well - Active | Chevron | 1696064 | 714694 | 1370-1810 | 844 | 1870 | |
| 03039453 | JER1000 | Water Interdiction Well - Active | Chevron | 1700268 | 704941 | 1085-1775 | 526 | 2041 | |
| 02984447 | M1 D 1-5 | Water Interdiction Well - Active | Chevron | 1701488 | 705644 | 672-1735 | 576 | 2399 | |
| 03003310 | PRO 1000 | Water Interdiction Well - Active | Chevron | 1698010 | 709215 | 1169-1655 | 667 | 1655 | |
| 03038726 | PRO 1002 | Water Interdiction Well - Active | Chevron | 1697776 | 708259 | 1200-1791 | 623 | 1885 | |
| 03006661 | SJ 1002 | Water Interdiction Well - Active | Chevron | 1702995 | 702888 | 1060-1700 | 494 | 1700 | |
| 03035919 | SJ 1003 | Water Interdiction Well - Active | Chevron | 1701651 | 702939 | 1335-1611 | 504 | 1845 | |
| 03002969 | TEJ 1000 | Water Interdiction Well - Active | Chevron | 1697710 | 711015 | 1086-1628 | 699 | 1632 | |
| 03007170 | WIN 1000 | Water Interdiction Well - Active | Chevron | 1699031 | 706833 | 1037-1678 | 577 | 1690 | |
| 03035918 | CORTEZ 1000 | Water Interdiction Well - Inactive (shut in or abandoned) | Chevron | 1703248 | 704230 | 1364-1593 | 534 | 1686 | |
| 03038875 | FEB 1000 | Water Interdiction Well - Inactive (shut in or abandoned) | Chevron | 1700169 | 706781 | 830-1594 | 563 | 1758 | |
| 02983025 | FEB 2WD | Water Interdiction Well - Inactive (shut in or abandoned) | Chevron | 1700169 | 707603 | 654-1370 | 602 | 2549 | |
| 03006660 | SJ 1001 | Water Interdiction Well - Inactive (shut in or abandoned) | Chevron | 1701690 | 702899 | 1100-1740 | 504 | 1800 | |
| 03003311 | TEJ 1001 | Water Interdiction Well - Inactive (shut-in or abandoned) | Chevron | 1697734 | 712648 | 1142-1676 | 794 | 1680 | |
| 03006331 | TM 1001 | Water Interdiction Well - Inactive (shut in or abandoned) | Chevron | 1704178 | 701118 | 1170-1540 | 466 | 1565 | |

**Notes:**

(a) API = American Petroleum Institute
(b) Coordinates are northings and eastings in feet.
(c) Perforated Interval in feet below ground surface.
(d) Elevation in feet relative to Mean Sea Level.
(e) TD = Total Depth in feet below ground surface

## Table 3: Water Supply Well Summary

| Map ID | Well ID | Township | Range | Section | State Well ID | Owner | Well Type | Well Completion Depth[a] | Ground Surface Elevation (TVDSS)[b] | Well Bottom Elevation (TVDSS) | Top of Oil Elevation (TVDSS) | Top of C Silt Elevation (TVDSS) | Well Bottom Above (+) or Below (-) Top of Oil | Well Bottom Above (+) or Below (-) Top of C Silt |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Wells Inside Proposed Aquifer Exemption Boundary** | | | | | | | | | | | | | | |
| 5 | T29S/R28E-06C | 29S | 28E | 6 | | Dexzel Inc. | Domestic | 750 | 592 | -158 | -495 | -143 | 337 | -15 |
| 6 | T29S/R28E-02F1 | 29S | 28E | 2 | 29S28E02F001M | John Wilson | Domestic | 273 | 484 | 250 | 434 | Not present | -184 | |
| 7 | T29S/R28E-02F2 | 29S | 28E | 2 | | Roger Hatch | Domestic | 170 | 493 | 313 | 443 | Not present | -130 | |
| 8 | T29S/R28E-02G3 | 29S | 28E | 2 | | Francis B. Perry | Domestic | 200 | 482 | 282 | 307 | Not present | -25 | |
| 9 | T29S/R28E-02L | 29S | 28E | 2 | | Terry DeLaMater | Domestic | 220 | 461 | 241 | 356 | Not present | -115 | |
| 10 | T29S/R28E-02L | 29S | 28E | 2 | | Dwight Bowers | Domestic | 175 | 465 | 290 | 372 | Not present | -82 | |
| 11 | T29S/R28E-08F2 | 29S | 28E | 8 | | Alon Asphalt Bakersfield Inc. | Domestic | | 468 | 468 | -141 | 10 | | 458 |
| 12 | T29S/R28E-08F1 | 29S | 28E | 8 | | Alon Asphalt Bakersfield Inc. | Domestic | | 474 | 474 | -53 | 10 | | 464 |
| 13 | T29S/R28E-08K | 29S | 28E | 8 | | John Hershey | Irrigation | 1001 | 435 | -568 | -574 | -168 | 6 | -400 |
| 14 | T29S/R28E-08L01 | 29S | 28E | 8 | | River Ranch HOA | Municipal | 970 | 445 | -505 | -547 | -108 | 42 | -397 |
| **Wells Outside Proposed Aquifer Exemption Boundary** | | | | | | | | | | | | | | |
| 1 | T28S/R28E-07Q1 | 28S | 28E | 7 | | | Unknown | | 1122 | | 286 | 668 | | |
| 2 | T28S/R27E-24K1 | 28S | 27E | 24 | | Dwight Grimes | Domestic | 800 | 924 | 124 | 12 | 230 | 112 | -106 |
| 3 | T28S/R27E-36N | 28S | 27E | 36 | | Oildale Mutual Water Company | Municipal | 970 | 608 | -362 | -882 | -154 | 520 | -208 |
| 4 | T29S/R27E-01K1 | 29S | 27E | 1 | | Vincent Antogiovanni | Irrigation | 450 | 538 | 88 | -1225 | -300 | 1313 | 388 |
| 15 | T29S/R28E-10M | 29S | 28E | 10 | WWDR 381241 | Derrel's Mini Storage | Domestic | 460 | 474 | 14 | -200 | 284 | 214 | -270 |
| 16 | 1503392-001 | 29S | 28E | 10 | | Rep. Kevin Flem (420 Club) | Domestic | 420 | 483 | 63 | -60 | 384 | 123 | -321 |
| 17 | T29S/R28E-10K1 | 29S | 28E | 10 | | Terry J. Easton | Domestic | 248 | 505 | 255 | -46 | 415 | 300 | -160 |
| 18 | T29S/R28E-10K2 | 29S | 28E | 10 | | Tom & Donna Chisum | Domestic | 300 | 513 | 213 | -43 | 418 | 256 | -205 |
| 19 | T29S/R28E-10K | 29S | 28E | 10 | | Ace Stables | Domestic | 310 | 503 | 173 | -10 | 443 | 182 | -270 |
| 20 | T29S/R28E-07Q | 29S | 28E | 7 | | Val Butler | Domestic | 250 | 424 | 174 | -1368 | -338 | 1542 | 511 |
| 21 | T29S/R28E-18B | 29S | 28E | 18 | | Irma Roberston | Irrigation | 415 | 419 | 4 | -1521 | -357 | 1525 | 361 |
| 22 | T29S/R28E-18 | 29S | 28E | 18 | | Wm Robertson | Domestic | 300 | 419 | 119 | -1525 | -358 | 1645 | 477 |
| 23 | T29S/R28E-18 | 29S | 28E | 18 | | Priscilla Mueller | Domestic | 300 | 423 | 123 | -1345 | -326 | 1467 | 449 |
| 24 | T29S/R28E-18A | 29S | 28E | 18 | | Riviera Stables | Irrigation | 300 | 422 | 122 | -1465 | -343 | 1587 | 465 |
| 25 | T29S/R28E-18A | 29S | 28E | 18 | | Rancho Not So Grande | Domestic | 50 | 422 | 372 | -1366 | -329 | 1739 | 702 |
| 26 | 1503310-001 | 29S | 28E | 17 | | Ranchos Rio Equestrian Center | Unknown | | 645 | | -1085 | -349 | | |
| 27 | T29S/R28E-18G | 29S | 28E | 18 | | Bill Norman | Domestic | 250 | 419 | 169 | -1722 | -356 | 1891 | 524 |
| 28 | 1500553-003 | 29S | 28E | 17 | | Ranchos Del Rio Mutual Water Company | Municipal | 382 | 433 | 51 | -1638 | -357 | 1689 | 408 |
| 29 | T29S/R28E-18 | 29S | 28E | 18 | | Ranchos Del Rio Mutual Water Company | Municipal | 420 | 435 | 35 | -1638 | -357 | 1673 | 392 |
| 30 | T29S/R28E-17H1 | 29S | 28E | 17 | | Greenlawn Memorial Park | Irrigation | 390 | 616 | 226 | -1237 | -335 | 1463 | 561 |

**Notes:**

(a) Completion depth in feet below ground surface, bottom of screen where available, otherwise total depth.

(b) Elevations are in feet relative to Mean Sea Level.

Blank cells in table indicate data not available.

## Table 4: Water Quality Data Summary for Water Sources Identified in Proximity to Proposed Aquifer Exemption Boundary

| Well GIS_ID3 | Within 500 ft. | Well[a] ID | Sampling Date | Ca[b] mg/l[j] | Mg[c] mg/l | Na[d] mg/l | K[e] mg/l | Iron µg/l[k] | Mn[f] µg/l | Bicarbonate Alkalinity mg/l | Chloride mg/l | Nitrate ($NO_3$) mg/l | Sulfate mg/l | As[g] µg/l | Boron mg/l | EC[h] umhos/cm[l] | TDS[i] mg/l |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | 1 | T28S/R27E-24K01 | 4/30/2003 | 1.4 | 0.06 | 60 | 0.6 | <100[m] | <20 | 83 | 27 | <2.0 | 2.1 | <2.0 | <0.1 | 320 | 230 |
| 6 | - | 29S28E02F001M | 11/16/1955 | NA | 2 | NA | 3 | NA | NA | NA | 16 | 0.1 | 48 | NA | 0.2 | 378 | NA |
| 12 | 1 | 29S28E08F001M | 12/6/1955 | NA | 8 | NA | 3 | NA | NA | NA | 55 | 0 | 45 | NA | 0.15 | 530 | NA |
| 14 | 0 | 29S/28E-08L01 (RRHOA) | 10/28/2013 | 20 | 3 | 29 | 2 | <100 | <20 | 77 | 17 | 6 | 20 | <2.0 | NA[n] | 270 | 170 |
| 14 | 0 | 29S/28E-08L01 (RRHOA) | 12/19/2014 | 19 | 3 | 30 | 2 | 65 | 58 | 100 | 12 | 6 | 20 | 0.76J | 0 | 270 | 170 |
| 26 | 0 | 1503310-001 | 7/9/1997 | NA | NA | NA | NA | NA | 101 | NA | NA | 0 | NA | NA | NA | NA | NA |
| 26 | 0 | 1503310-001 | 4/15/1998 | NA | NA | NA | NA | NA | NA | NA | NA | 1 | NA | NA | NA | NA | NA |
| 26 | 0 | 1503310-001 | 3/29/2000 | NA | NA | NA | NA | NA | NA | NA | NA | 1 | NA | NA | NA | NA | NA |
| 26 | 0 | 1503310-001 | 9/23/2005 | NA | NA | NA | NA | NA | NA | NA | NA | 1 | NA | NA | NA | NA | NA |
| 26 | 0 | 1503310-001 | 6/22/2006 | NA | NA | NA | NA | NA | NA | NA | NA | 2 | NA | NA | NA | NA | NA |
| 26 | 0 | 1503310-001 | 5/8/2008 | NA | NA | NA | NA | NA | NA | NA | NA | < 0 | NA | NA | NA | NA | NA |
| 26 | 0 | 1503310-001 | 5/21/2010 | NA | NA | NA | NA | NA | NA | NA | NA | < 0 | NA | NA | NA | NA | NA |
| 26 | 0 | 1503310-001 | 5/5/2011 | NA | NA | NA | NA | NA | NA | NA | NA | < 0.44 | NA | NA | NA | NA | NA |
| 26 | 0 | 1503310-001 | 5/24/2012 | NA | NA | NA | NA | NA | NA | NA | NA | < 0.44 | NA | NA | NA | NA | NA |
| 26 | 0 | 1503310-001 | 12/17/2013 | NA | NA | NA | NA | NA | NA | NA | NA | 1 | NA | NA | NA | NA | NA |
| 26 | 0 | 1503310-001 | 12/11/2014 | NA | NA | NA | NA | NA | NA | NA | NA | < 0.44 | NA | NA | NA | NA | NA |
| 28 | 0 | 1500553-003 | 3/18/2002 | NA | NA | NA | NA | NA | 48 | 0 | 5 | < 0.4 | 13 | < 1 | NA | 210 | 135 |
| 28 | 0 | 1500553-003 | 12/8/2005 | NA | NA | NA | NA | NA | 71 | 0 | 5 | < 0.44 | 12 | < 2 | NA | 190 | 120 |
| 28 | 0 | 1500553-003 | 6/11/2008 | NA | NA | NA | NA | NA | 44 | 0 | 6 | < 0.44 | 15 | < 2 | NA | 204 | 140 |
| 28 | 0 | 1500553-003 | 12/8/2014 | NA | NA | NA | NA | NA | 52 | 0 | 5 | 1 | 14 | < 2 | NA | 211 | 140 |
| Station 36 Influent | | | | 30.8 | 5.3 | 125 | 5.5 | 3.9 | 0.1 | 254 | 123.8 | ND | 34.1 | NA | NA | 1100 | 583 |
| Station 36 Effluent | | | | 27.4 | 5.6 | 113 | 5.8 | 3.5 | 0.1 | | 112 | NA | 1.7 | NA | NA | 7181 | 614 |

**Statistics**

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Count | 3 | 5 | 3 | 5 | 1 | 6 | 7 | 9 | 11 | 9 | 0 | 3 | 9 | 7 |
| | | | Average | 13 | 3.29 | 40 | 2.02 | 65 | 62 | 37 | 16 | 1.63 | 21 | 0 | 0.12 | 287 | 158 |
| | | | Maximum | 20.0 | 8 | 60 | 3 | 65 | 101 | 100 | 55 | 6.1 | 48 | 0 | 0.2 | 530 | 230 |
| | | | Minimum | 1.4 | 0.06 | 29 | 0.6 | 65 | 44 | 0.034 | 4.5 | 0 | 2.1 | 0 | 0 | 190 | 120 |

**Notes:**

(a) Well identification number as provided in Table 3
(b) Ca = Calcium
(c) Mg = Magnesium
(d) Na = Sodium
(e) K = Potassium
(f) Mn = Manganese
(g) As = Arsenic
(h) EC = Electrical Conductivity
(i) TDS = Total Dissolved Solids
(j) mg/l = milligrams per liter
(k) ug/l = micrograms per liter
(l) umhos/cm = micromhos per centimeter
(m) "<" indicates analyte not detected above listed reporting limit.
(n) "NA" indicates not available or not analyzed.

# Table 5: Water Quality Data Summary for River Ranch Home Owner's Association Well

| Well[a] ID | Sampling Date | Ca[b] mg/l[j] | Mg[c] mg/l | Na[d] mg/l | K[e] mg/l | Iron µg/l[k] | Mn[f] µg/l | Bicarbonate Alkalinity mg/l | Chloride mg/l | Nitrate ($NO_3$) mg/l | Sulfate mg/l | As[g] µg/l | Boron mg/l | EC[h] umhos/cm[l] | TDS[i] mg/l |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 29S/28E-08L01 | 10/28/2013 | 20 | 3.4 | 29 | 1.5 | <100[m] | <20 | 77 | 17 | 6.1 | 20 | <2.0 | NA[n] | 270 | 170 |
| 29S/28E-08L01 | 12/19/2014 | 19 | 3.0 | 30 | 1.7 | 65 | 58 | 100 | 12 | 5.5 | 20 | 0.76J | 0.15 | 270 | 170 |

**Notes:**
(a) Well identification number as provided in Table 3
(b) Ca = Calcium
(c) Mg = Magnesium
(d) Na = Sodium
(e) K = Potassium
(f) Mn = Manganese
(g) As = Arsenic
(h) EC = Electrical Conductivity
(i) TDS = Total Dissolved Solids
(j) mg/l = Milligrams per liter
(k) ug/l = micrograms per liter
(l) umhos/cm = micromhos per centimeter
(m) "<" indicates analyte not detected above listed reporting limit.
(n) "NA" indicates not available.

# Table 6: Water Quality Data Summary for Water Wells within 1982-Approved Aquifer Exemption Boundary

| Well GIS_ID3 | Within 500 ft. | Well[a] Number | Sampling Date | Ca[b] mg/l[j] | Mg[c] mg/l | Na[d] mg/l | K[e] mg/l | Iron µg/l[k] | Mn[f] µg/l | Bicarbonate Alkalinity mg/l | Chloride mg/l | Nitrate ($NO_3$) mg/l | Sulfate mg/l | As[g] µg/l | Boron mg/l | EC[h] umhos/cm[l] | TDS[i] mg/l |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Well Screened Within Oil-bearing Zone** | | | | | | | | | | | | | | | | | |
| 6 | - | 29S28E02F001M | 11/16/1955 | NA | 2 | NA | 3 | NA | NA | NA | 16 | 0.1 | 48 | NA | 0.2 | 378 | NA |
| **Well Screened Above Oil-bearing Zone** | | | | | | | | | | | | | | | | | |
| 12 | 1 | 29S28E08F001M | 12/6/1955 | NA | 8 | NA | 3 | NA | NA | NA | 55 | 0 | 45 | NA | 0.15 | 530 | NA |
| 14 | 0 | 29S/28E-08L01 (RRHOA) | 10/28/2013 | 20 | 3 | 29 | 2 | <100[m] | <20 | 77 | 17 | 6 | 20 | <2.0 | NA[n] | 270 | 170 |
| 14 | 0 | 29S/28E-08L01 (RRHOA) | 12/19/2014 | 19 | 3 | 30 | 2 | 65 | 58 | 100 | 12 | 6 | 20 | 0.76J | 0 | 270 | 170 |

**Statistics**

| | Ca | Mg | Na | K | Iron | Mn | Bicarbonate Alkalinity | Chloride | Nitrate | Sulfate | As | Boron | EC | TDS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Well Screened Within Oil-bearing Zone** | | | | | | | | | | | | | | |
| Count | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 |
| Average | 0.00 | 2.00 | 0.00 | 3.00 | 0.00 | 0.00 | 0.00 | 16 | 0.10 | 48 | 0 | 0.20 | 378 | 0.00 |
| Maximum | 0.0 | 2 | 0 | 3 | 0 | 0 | 0 | 16 | 0.1 | 48 | 0 | 0.2 | 378 | 0 |
| Minimum | 0.0 | 2 | 0 | 3 | 0 | 0 | 0 | 16 | 0.1 | 48 | 0 | 0.2 | 378 | 0 |
| **Well Screened Above Oil-bearing Zone** | | | | | | | | | | | | | | |
| Count | 2 | 3 | 2 | 3 | 1 | 1 | 2 | 3 | 3 | 3 | 0 | 2 | 3 | 2 |
| Average | 20 | 4.80 | 30 | 2.17 | 65 | 58 | 89 | 28 | 4.03 | 28 | 0 | 0.08 | 357 | 170 |
| Maximum | 20.0 | 8 | 30 | 3 | 65 | 58 | 100 | 55 | 6.1 | 45 | 0 | 0.15 | 530 | 170 |
| Minimum | 19.0 | 3 | 29 | 1.5 | 65 | 58 | 77 | 12 | 0 | 20 | 0 | 0 | 270 | 170 |
| **Comprehensive** | | | | | | | | | | | | | | |
| Count | 2 | 4 | 2 | 4 | 1 | 1 | 2 | 4 | 4 | 4 | 0 | 3 | 4 | 2 |
| Average | 20 | 4.10 | 30 | 2.38 | 65 | 58 | 89 | 25 | 3.05 | 33 | 0 | 0.12 | 362 | 170 |
| Maximum | 20.0 | 8 | 30 | 3 | 65 | 58 | 100 | 55 | 6.1 | 48 | 0 | 0.2 | 530 | 170 |
| Minimum | 19.0 | 2 | 29 | 1.5 | 65 | 58 | 77 | 12 | 0 | 20 | 0 | 0 | 270 | 170 |

**Notes:**

(a) Well identification number as provided in Table 3
(b) Ca = Calcium
(c) Mg = Magnesium
(d) Na = Sodium
(e) K = Potassium
(f) Mn = Manganese
(g) As = Arsenic
(h) EC = Electrical Conductivity
(i) TDS = Total Dissolved Solids
(j) mg/l = Milligrams per liter
(k) ug/l = micrograms per liter
(l) umhos/cm = micromhos per centimeter
(m) "<" indicates analyte not detected above listed reporting limit.
(n) "NA" indicates not available.

# Table 7: Water Quality Data Summary for Water Wells Completed Above or Outside Oil-Bearing Zone

| Well GIS_ID3 | Within 500 ft. | Well[a] Number | Sampling Date | Ca[b] mg/l[j] | Mg[c] mg/l | Na[d] mg/l | K[e] mg/l | Iron µg/l[k] | Mn[f] µg/l | Bicarbonate Alkalinity mg/l | Chloride mg/l | Nitrate ($NO_3$) mg/l | Sulfate mg/l | As[g] µg/l | Boron mg/l | EC[h] umhos/cm[l] | TDS[i] mg/l |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Wells Screened Above Oil-bearing Zone** | | | | | | | | | | | | | | | | | |
| 12 | 1 | 29S28E08F001M | 12/6/1955 | NA | 8 | NA | 3 | NA | NA | NA | 55 | 0 | 45 | NA | 0.15 | 530 | NA |
| 14 | 0 | 29S/28E-08L01 (RRHOA) | 10/28/2013 | 20 | 3 | 29 | 2 | <100 | <20 | 77 | 17 | 6 | 20 | <2.0 | NA[n] | 270 | 170 |
| 14 | 0 | 29S/28E-08L01 (RRHOA) | 12/19/2014 | 19 | 3 | 30 | 2 | 65 | 58 | 100 | 12 | 6 | 20 | 0.76J | 0 | 270 | 170 |
| **Wells Screened Outside Oil-bearing Zone** | | | | | | | | | | | | | | | | | |
| 2 | 1 | T28S/R27E-24K01 | 4/30/2003 | 1.4 | 0.06 | 60 | 0.6 | <100[m] | <20 | 83 | 27 | <2.0 | 2.1 | <2.0 | <0.1 | 320 | 230 |
| 26 | 0 | 1503310-001 | 7/9/1997 | NA | NA | NA | NA | NA | 101 | NA | NA | 0 | NA | NA | NA | NA | NA |
| 26 | 0 | 1503310-001 | 4/15/1998 | NA | NA | NA | NA | NA | NA | NA | NA | 1 | NA | NA | NA | NA | NA |
| 26 | 0 | 1503310-001 | 3/29/2000 | NA | NA | NA | NA | NA | NA | NA | NA | 1 | NA | NA | NA | NA | NA |
| 26 | 0 | 1503310-001 | 9/23/2005 | NA | NA | NA | NA | NA | NA | NA | NA | 1 | NA | NA | NA | NA | NA |
| 26 | 0 | 1503310-001 | 6/22/2006 | NA | NA | NA | NA | NA | NA | NA | NA | 2 | NA | NA | NA | NA | NA |
| 26 | 0 | 1503310-001 | 5/8/2008 | NA | NA | NA | NA | NA | NA | NA | NA | < 0 | NA | NA | NA | NA | NA |
| 26 | 0 | 1503310-001 | 5/21/2010 | NA | NA | NA | NA | NA | NA | NA | NA | < 0 | NA | NA | NA | NA | NA |
| 26 | 0 | 1503310-001 | 5/5/2011 | NA | NA | NA | NA | NA | NA | NA | NA | < 0.44 | NA | NA | NA | NA | NA |
| 26 | 0 | 1503310-001 | 5/24/2012 | NA | NA | NA | NA | NA | NA | NA | NA | < 0.44 | NA | NA | NA | NA | NA |
| 26 | 0 | 1503310-001 | 12/17/2013 | NA | NA | NA | NA | NA | NA | NA | NA | 1 | NA | NA | NA | NA | NA |
| 26 | 0 | 1503310-001 | 12/11/2014 | NA | NA | NA | NA | NA | NA | NA | NA | < 0.44 | NA | NA | NA | NA | NA |
| 28 | 0 | 1500553-003 | 3/18/2002 | NA | NA | NA | NA | NA | 48 | 0 | 5 | < 0.4 | 13 | < 1 | NA | 210 | 135 |
| 28 | 0 | 1500553-003 | 12/8/2005 | NA | NA | NA | NA | NA | 71 | 0 | 5 | < 0.44 | 12 | < 2 | NA | 190 | 120 |
| 28 | 0 | 1500553-003 | 6/11/2008 | NA | NA | NA | NA | NA | 44 | 0 | 6 | < 0.44 | 15 | < 2 | NA | 204 | 140 |
| 28 | 0 | 1500553-003 | 12/8/2014 | NA | NA | NA | NA | NA | 52 | 0 | 5 | 1 | 14 | < 2 | NA | 211 | 140 |

**Statistics**

| | Ca | Mg | Na | K | Iron | Mn | Bicarbonate Alkalinity | Chloride | Nitrate | Sulfate | As | Boron | EC | TDS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Wells Screened Above Oil-bearing Zone** | | | | | | | | | | | | | | |
| Count | 2 | 3 | 2 | 3 | 1 | 1 | 2 | 3 | 3 | 3 | 0 | 2 | 3 | 2 |
| Average | 0.00 | 4.80 | 0.00 | 2.17 | 0.00 | 0.00 | 0.00 | 28 | 4.03 | 28 | 0 | 0.08 | 357 | 0.00 |
| Maximum | 20.0 | 8 | 30 | 3 | 65 | 58 | 100 | 55 | 6.1 | 45 | 0 | 0.15 | 530 | 170 |
| Minimum | 19.0 | 3 | 29 | 1.5 | 65 | 58 | 77 | 12 | 0 | 20 | 0 | 0 | 270 | 170 |
| **Wells Screened Outside Oil-bearing Zone** | | | | | | | | | | | | | | |
| Count | 1 | 1 | 1 | 1 | 0 | 5 | 5 | 5 | 7 | 5 | 0 | 0 | 5 | 5 |
| Average | 1.40 | 0.06 | 60 | 0.60 | #DIV/0! | 63 | 17 | 9.44 | 0.82 | 11 | 0 | #DIV/0! | 227 | 153 |
| Maximum | 1.4 | 0.06 | 60 | 0.6 | 0 | 101 | 83 | 27 | 2 | 15 | 0 | 0 | 320 | 230 |
| Minimum | 1.4 | 0.06 | 60 | 0.6 | 0 | 44 | 0.034 | 4.5 | 0.4 | 2.1 | 0 | 0 | 190 | 120 |
| **Comprehensive** | | | | | | | | | | | | | | |
| Count | 3 | 4 | 3 | 4 | 1 | 6 | 7 | 8 | 10 | 8 | 0 | 2 | 8 | 7 |
| Average | 13 | 3.62 | 40 | 1.78 | 65 | 62 | 37 | 16 | 1.79 | 18 | 0 | 0.08 | 276 | 158 |
| Maximum | 20.0 | 8 | 60 | 3 | 65 | 101 | 100 | 55 | 6.1 | 45 | 0 | 0.15 | 530 | 230 |
| Minimum | 1.4 | 0.06 | 29 | 0.6 | 65 | 44 | 0.034 | 4.5 | 0 | 2.1 | 0 | 0 | 190 | 120 |

**Notes:**

(a) Well identification number as provided in Table 3
(b) Ca = Calcium
(c) Mg = Magnesium
(d) Na = Sodium
(e) K = Potassium
(f) Mn = Manganese
(g) As = Arsenic
(h) EC = Electrical Conductivity
(i) TDS = Total Dissolved Solids
(j) mg/l = Milligrams per liter
(k) ug/l = micrograms per liter
(l) umhos/cm = micromhos per centimeter
(m) "<" indicates analyte not detected above listed reporting limit.
(n) "NA" indicates not available.

# Table 8: Chevron Interdiction Well Water Quality Data Summary

| API[a] Number | Well/Sample ID | Ca[b] mg/l[m] | Mg[c] mg/l | Na[d] mg/l | K[e] mg/l | Iron mg/l | Mn[f] mg/l | $HCO_3$[g] mg/l | $CO_3$[h] mg/l | OH[i] mg/l | Chloride mg/l | Nitrate ($NO_3$) mg/l | Sulfate mg/l | As[j] mg/l | Boron mg/l | EC[k] umhos/cm[n] | TDS[l] mg/l |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | Cawelo Discharge | 23.2 | 3.7 | 147.0 | 6.3 | 0.6 | - | 320.7 | 0.2 | - | 122.0 | - | 9.9 | < 0.002 | 1.0 | 900.0 | 634.4 |
| 03035918 | Cortez 1000 | 3.0 | 0.2 | 59.2 | 0.9 | 0.6 | - | 119.4 | 0.2 | - | 25.0 | < 0.010 | 0.0 | < 0.300 | 0.1 | 303.5 | 208.3 |
| 03038875 | Fee B 1000 | 176 | 57 | 203 | 20 | 224 | - | 235 | 0 | - | 1285 | - | 2 | 0.209 | 2 | 3663 | 2084 |
| 02983025 | Fee B 2 WD | 6.5 | 0.2 | 172.3 | 1.2 | 0.6 | - | 117.3 | 2.4 | 0.0 | 230.9 | < 0.010 | 2.1 | 0.153 | 0.3 | 888.5 | 536.3 |
| 03090007 | Fee B, WSW 1 | 20.9 | 0.6 | 134.2 | 6.0 | - | - | 205.0 | 0.0 | - | 119.1 | 0.47 | 13.3 | - | - | - | 393.5 |
| 02984447 | MI-DI-5 | 30.3 | 3.3 | 109.5 | 5.5 | 0.4 | - | 329.1 | 0.2 | - | 131.6 | < 0.010 | 0.3 | < 0.005 | 0.5 | 955.0 | 610.7 |
| 03003310 | Producers 1000 | 29.0 | 7.2 | 114.7 | 2.2 | 0.3 | - | 339.2 | 0.1 | 0.0 | 81.7 | 0.14 | 0.2 | < 0.034 | 0.2 | 855.7 | 589.3 |
| 03038726 | Producers 1002 | 26.7 | 6.3 | 80.3 | 3.3 | 0.4 | - | 275.3 | 0.2 | - | 84.5 | < 0.010 | 0.4 | 5.379 | 0.1 | 700.4 | 480.6 |
| 03006660 | San Joaquin 1001/Reservoir B Outfall | 33.2 | 8.9 | 80.5 | 4.3 | 1.8 | - | 240.8 | 1.0 | 1.0 | 67.0 | 1.53 | 16.5 | - | - | 662.0 | 445.9 |
| 03006661 | San Joaquin 1002 | 5.9 | 0.6 | 42.0 | 0.7 | 0.1 | - | 79.9 | 0.2 | - | 41.1 | < 0.010 | 5.6 | < 0.201 | 0.1 | 258.3 | 176.1 |
| 03035919 | San Joaquin 1003 | 31.6 | 3.8 | 71.7 | 2.3 | 0.3 | - | 157.6 | 0.2 | - | 141.2 | < 0.010 | 0.4 | 0.123 | 0.2 | 623.7 | 409.1 |
| 02930257 | San Joaquin 102 | 270 | 9.8 | 150 | 5.8 | 4.3 | 0.31 | 369 | 6 | 3.3 | 245 | 0.40 | 459 | < 0.001 | - | 1940 | 1380 |
| 03003458 | Sec. 25 1000 | 5.2 | 0.4 | 126.0 | 0.9 | 0.0 | - | 146.2 | 0.6 | 0.0 | 115.5 | 0.00 | 0.1 | 0.000 | - | 633.5 | 407.9 |
| 03007478 | Sec. 25 1003 | 94.8 | 19.3 | 115.0 | 13.8 | 65.2 | - | 45.3 | 0.0 | 0.0 | 530.0 | 0.00 | 0.0 | 0.000 | - | 1750.0 | 941.6 |
| 03006331 | T&M 1001 | 6.5 | 0.8 | 38.4 | 0.5 | 0.0 | - | 79.3 | 0.0 | 0.0 | 25.8 | - | 3.6 | - | - | 226.0 | 186.6 |
| 03002969 | Tejon 1000 | 28.7 | 5.3 | 104.8 | 2.6 | 0.1 | - | 310.0 | 0.1 | 0.0 | 83.9 | < 0.008 | 0.0 | 0.193 | 0.4 | 779.5 | 543.3 |
| 03003311 | Tejon 1001 | 28.7 | 5.6 | 123.0 | 2.8 | 0.0 | - | 313.3 | 0.0 | 0.0 | 77.0 | - | 0.0 | - | - | 850.0 | 591.5 |
| 03007170 | Winspear 1000 | 37.8 | 9.9 | 96.0 | 3.1 | 0.5 | - | 353.1 | 0.1 | 0.0 | 54.2 | 0.03 | 0.3 | 0.147 | 0.3 | 765.2 | 555.6 |
| 02998807 | WW #2 Sec. 1 29S/27E | 2.3 | 1.0 | 82.0 | - | - | - | 117.4 | 10.7 | 0.0 | 50.4 | - | 2.6 | - | - | - | - |
| - | Total Interdiction Water (Comingled point) 24" Pipe | 23.5 | 7.0 | 135.0 | 1.8 | 1.0 | - | 334.1 | 0.2 | - | 81.4 | 0.01 | 0.5 | 0.100 | 0.1 | 850.0 | 583.3 |
| | **Median** | **26.7** | **3.8** | **114.7** | **2.7** | **0.4** | **0.3** | **234.9** | **0.2** | **0.0** | **84.5** | **0.0** | **0.5** | **0.1** | **0.3** | **779.5** | **539.8** |
| | **Minimum** | **2.3** | **0.2** | **38.4** | **0.5** | **0.0** | **0.3** | **45.3** | **0.0** | **0.0** | **25.0** | **0.0** | **0.0** | **0.0** | **0.1** | **226.0** | **176.1** |
| | **Maximum** | **270** | **57** | **203** | **20** | **224** | **0** | **369** | **11** | **3** | **1285** | **2** | **459** | **5** | **2** | **3663** | **2084** |

**Notes:**
All values are averages of available data collected from each well.
(a) API = American Petroleum Institute
(b) Ca = Calcium
(c) Mg = Magnesium
(d) Na = Sodium
(e) K = Potassium
(f) Mn = Manganese
(g) HCO3 = Bicarbonate
(h) CO3 = Carbonate
(i) OH = Hydroxide
(j) As = Arsenic
(k) EC = Electrical Conductivity
(l) TDS = Total Dissolved Solids
(m) mg/l = Milligrams per liter
(n) umhos/cm = micromhos per centimeter

# Figures

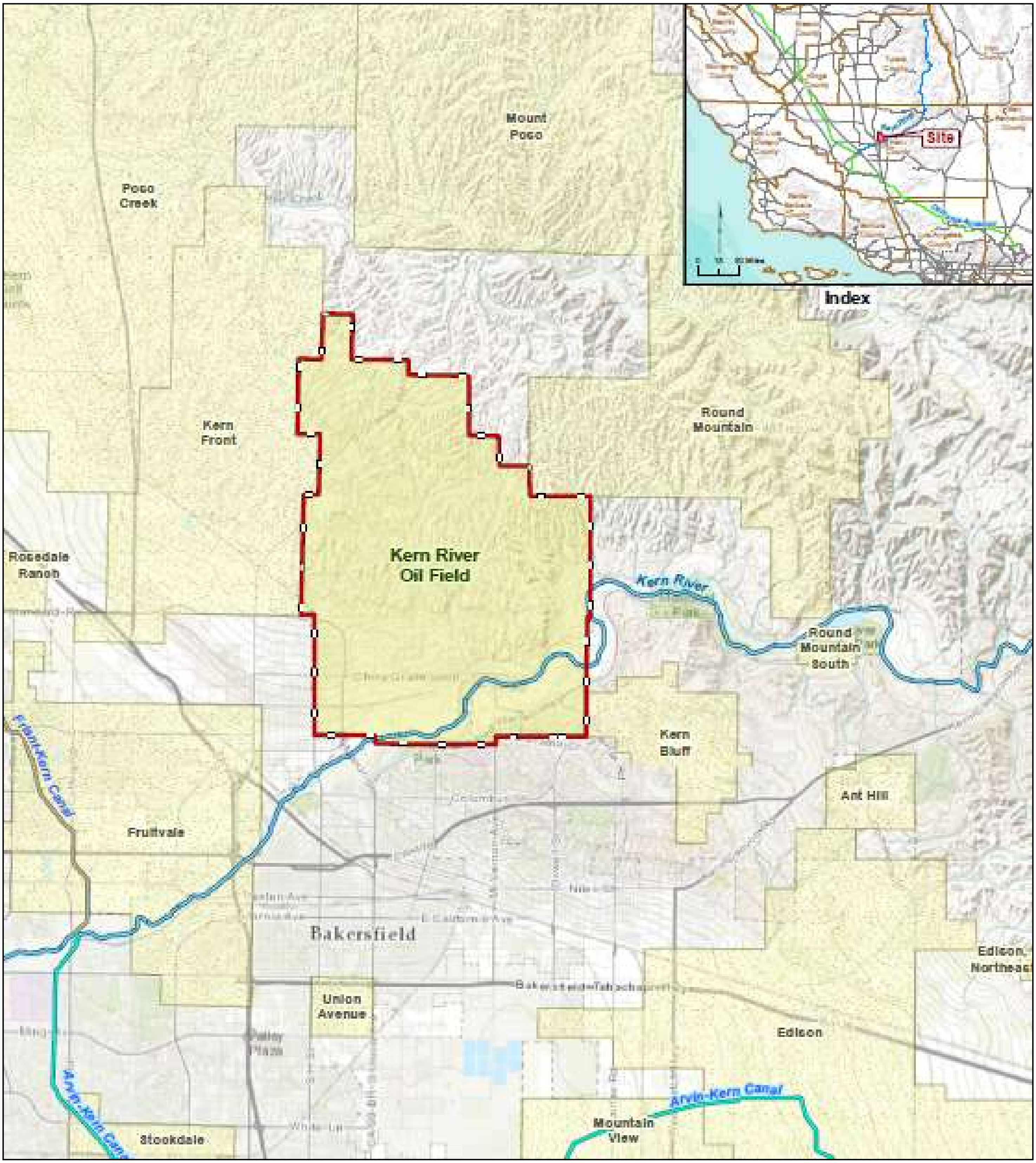



Figure 1 – Location Map

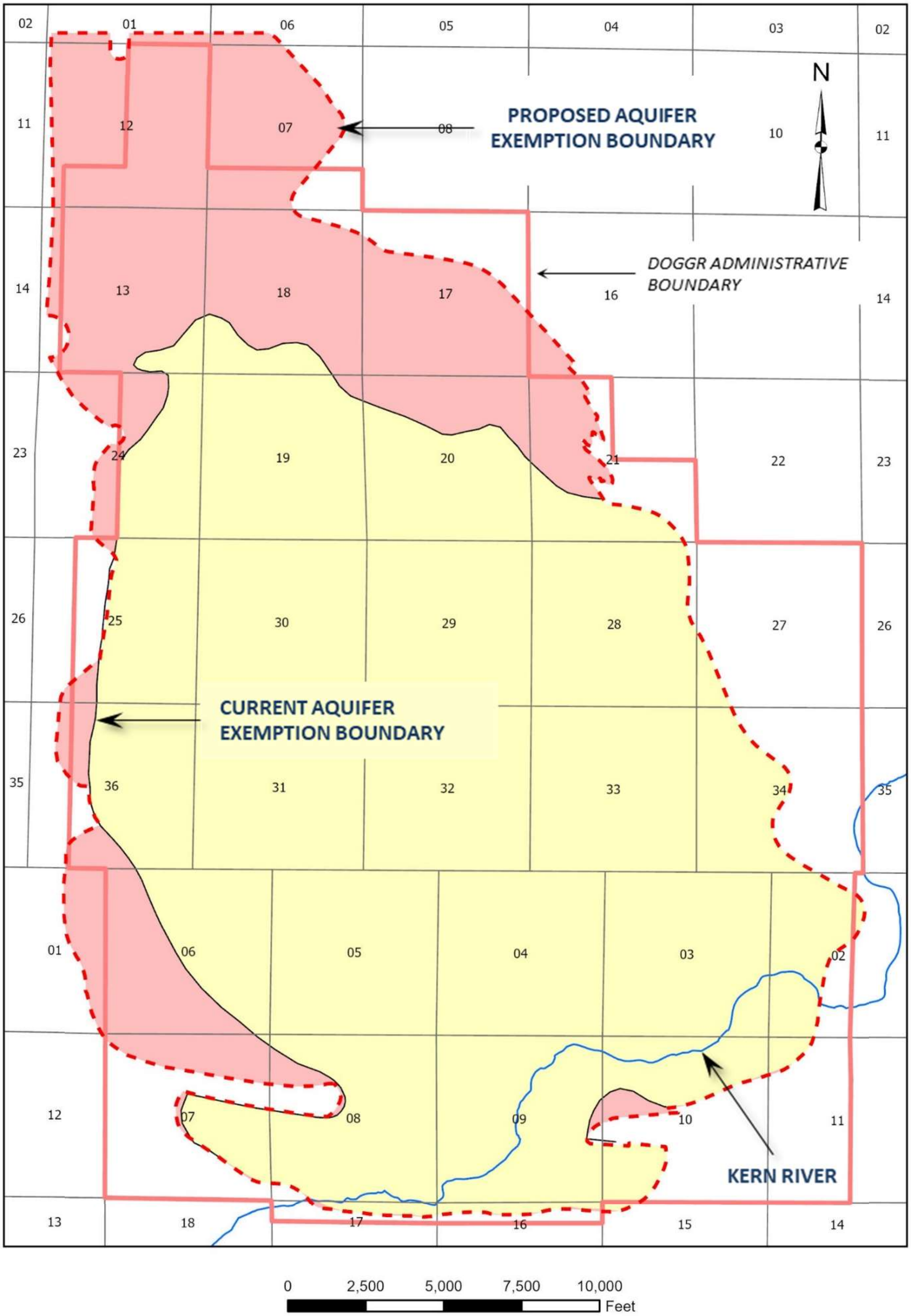



Figure 2 – Proposed Kern River Aquifer Exemption Boundary

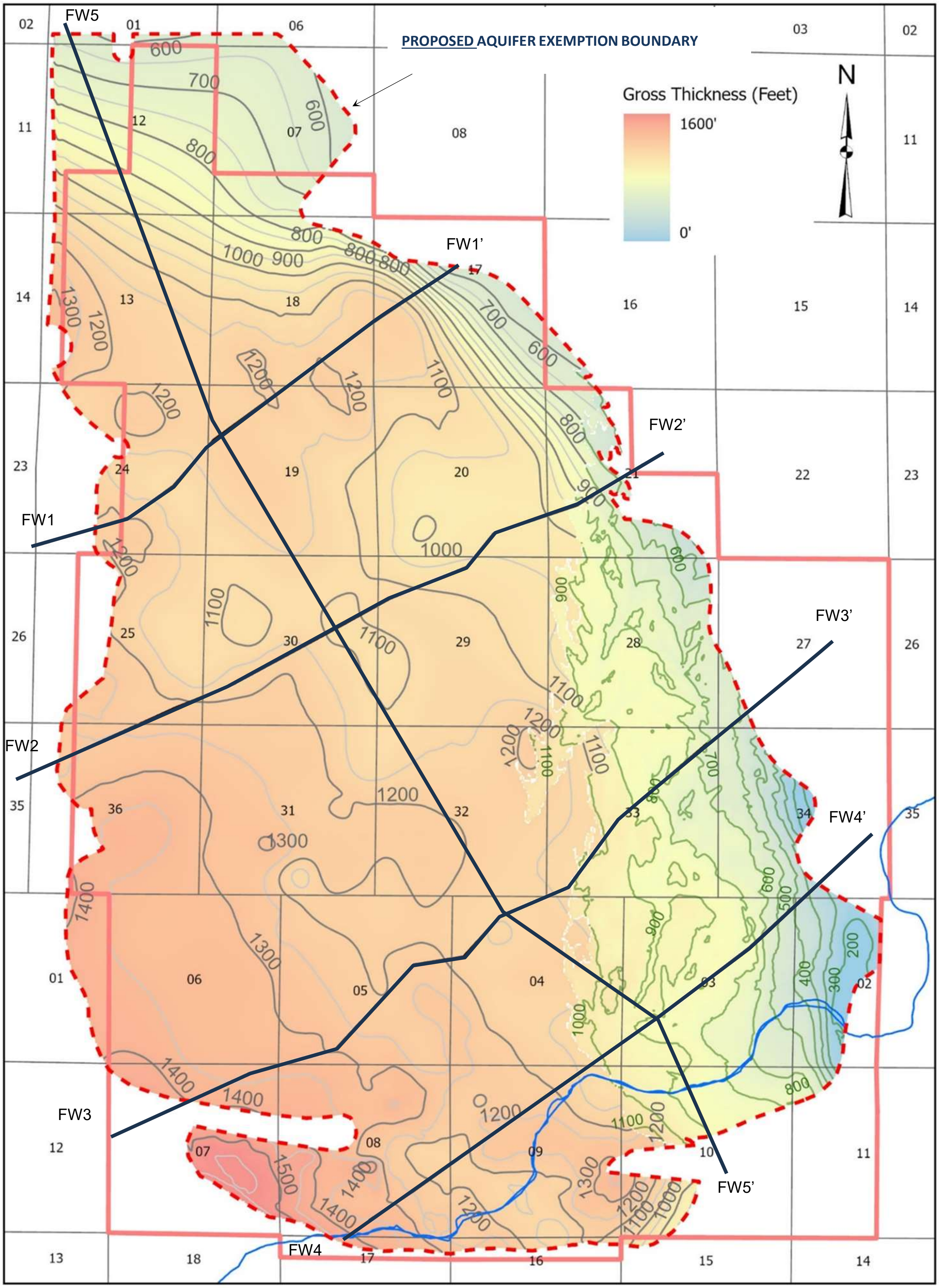
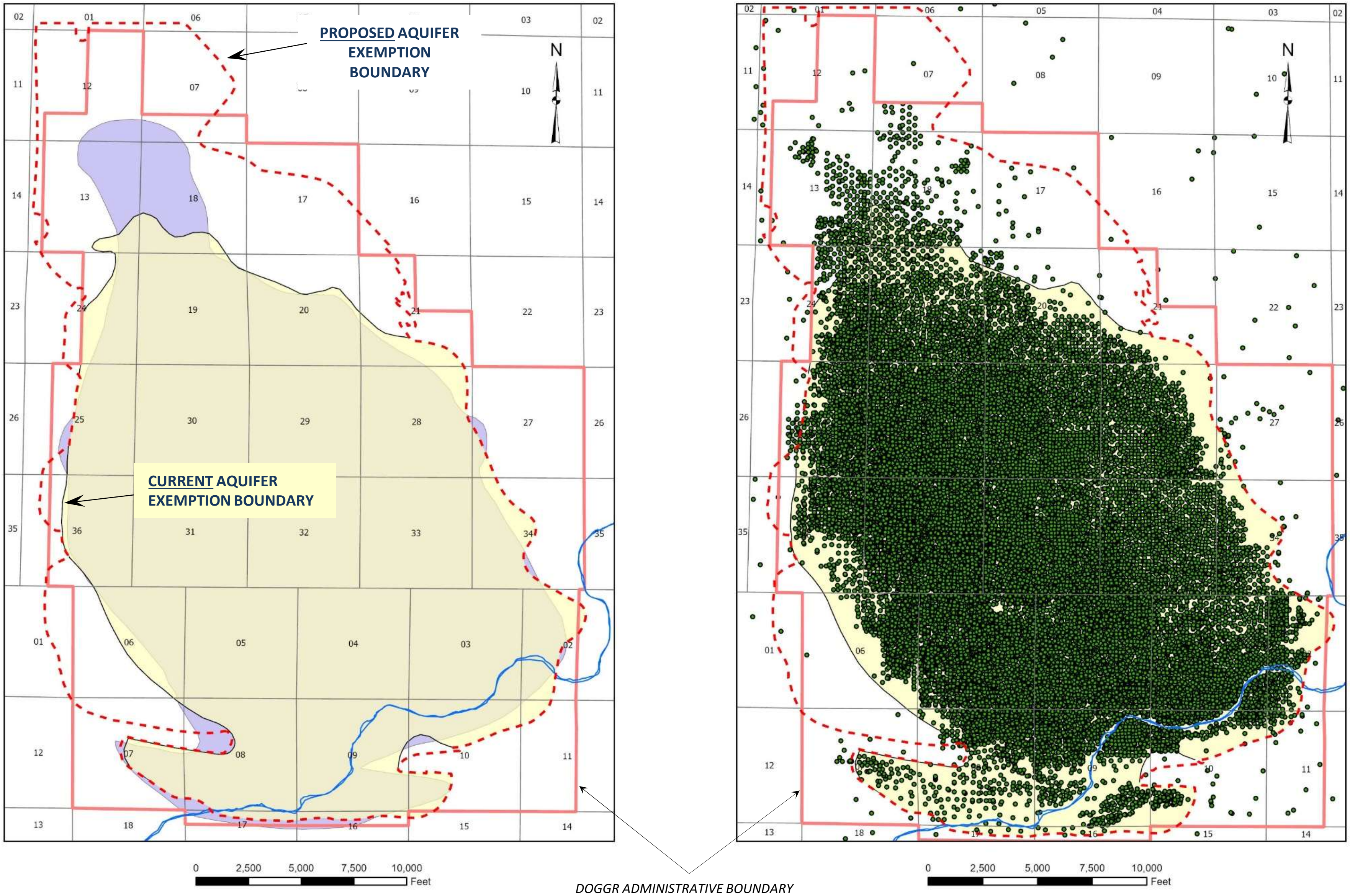



Figure 3 – Gross Interval Thickness Map of Proposed Aquifer Exemption Zone




1973-74 DOGGR Field Boundary: The Kern River field limit establishing the exempt aquifer boundary

1982 DOGGR Field Boundary: Boundary was modified to reflect field activity and expansion but the aquifer exemption limit was held at the previously established 1973-74 field boundary

Figure 4 – CalGEM Field Boundaries and Well Locations

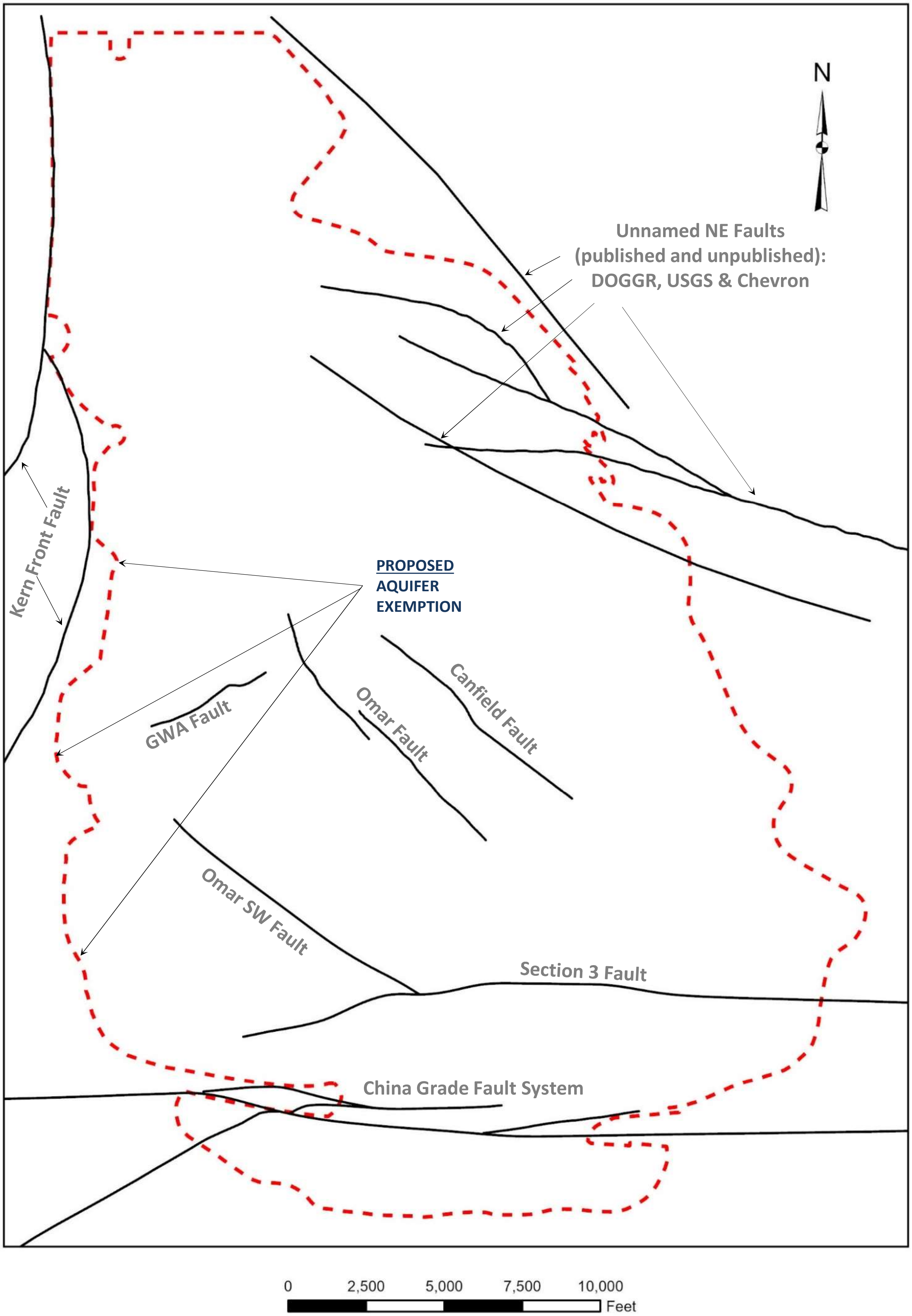



Figure 5 - Faults

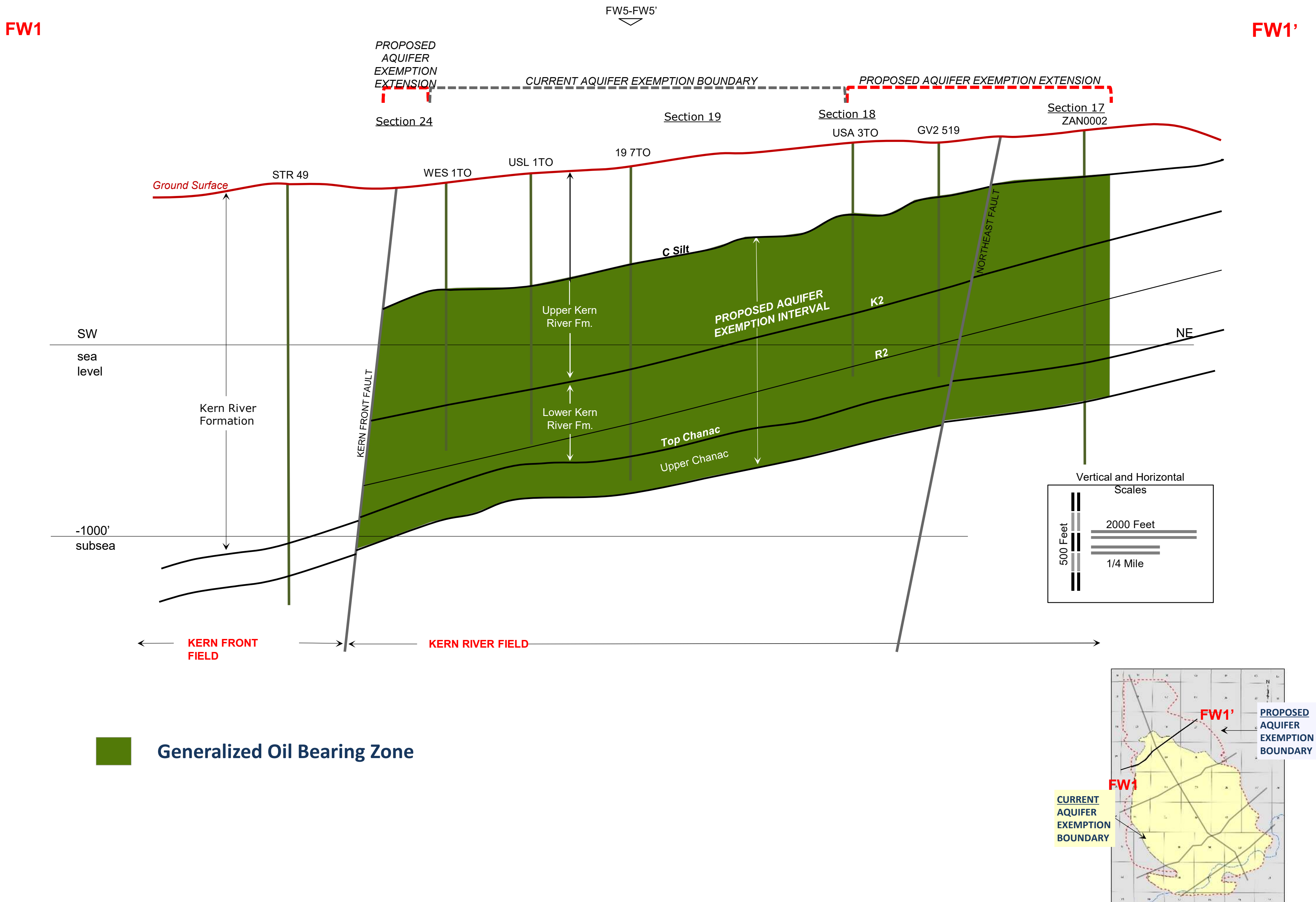



Figure 6 – Cross Section FW1-FW1' Proposed Aquifer Exemption Zone

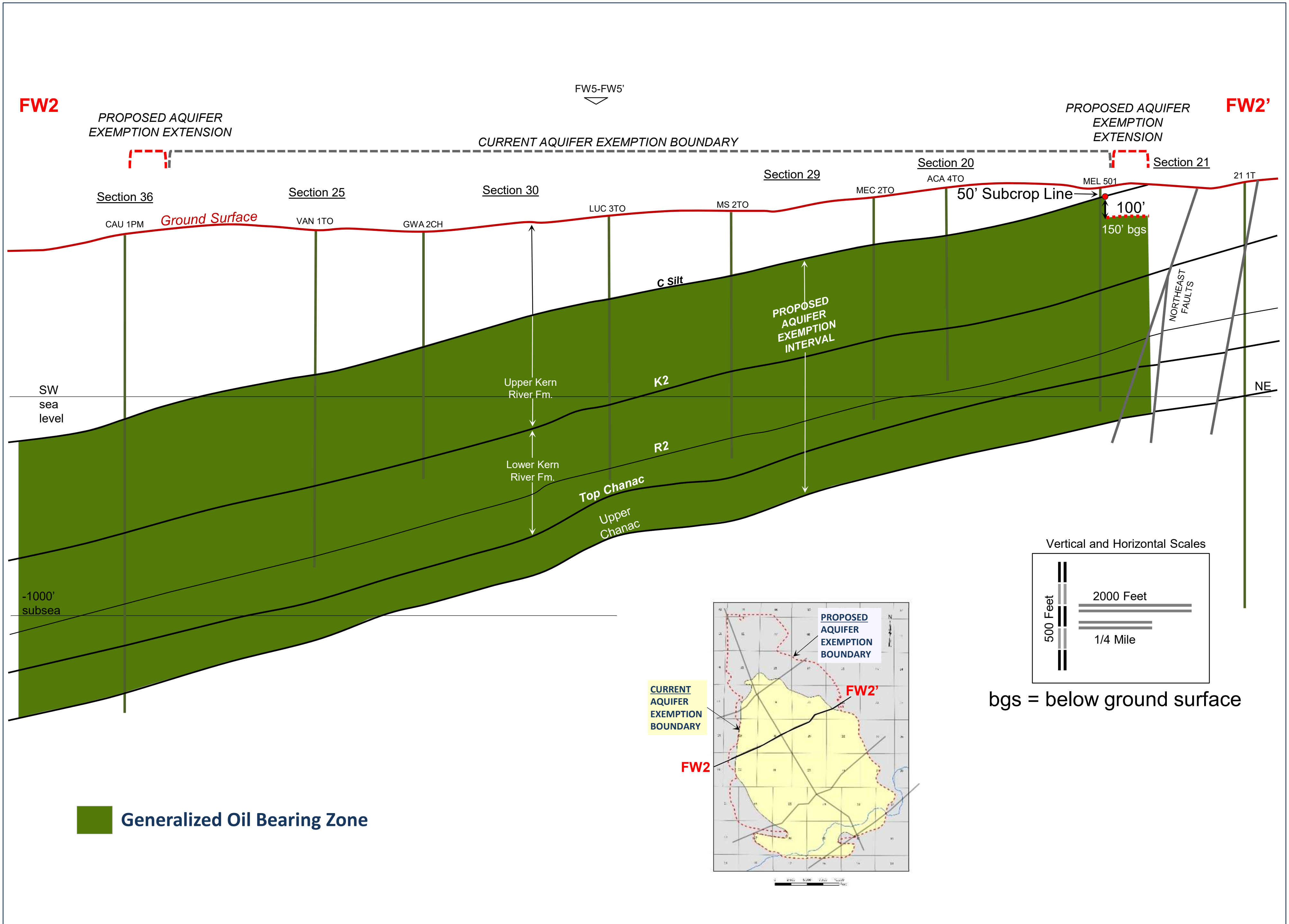



Figure 7 – Cross Section FW2-FW2' Proposed Aquifer Exemption Zone

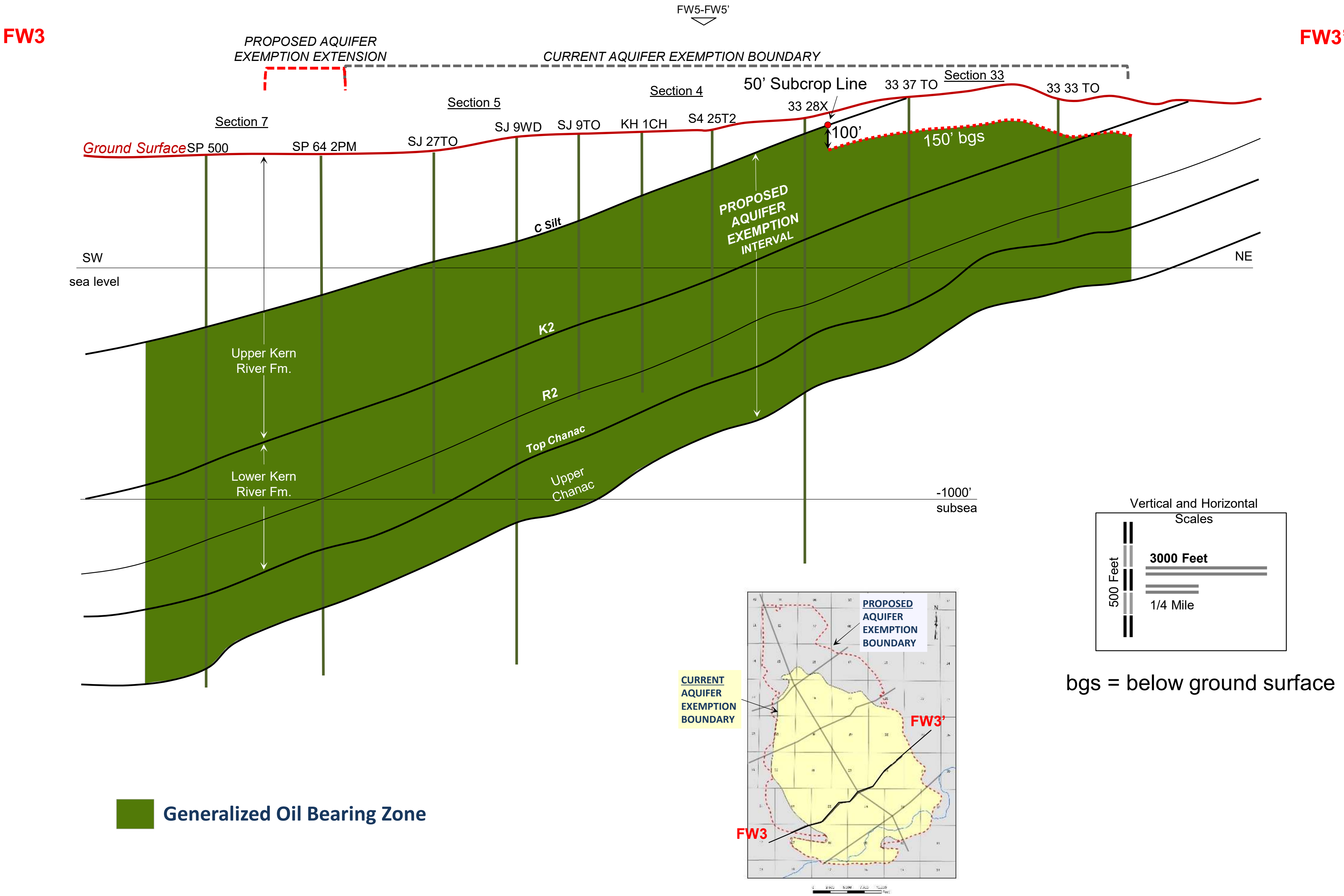



Figure 8 – Cross Section FW3-FW3' Proposed Aquifer Exemption Zone

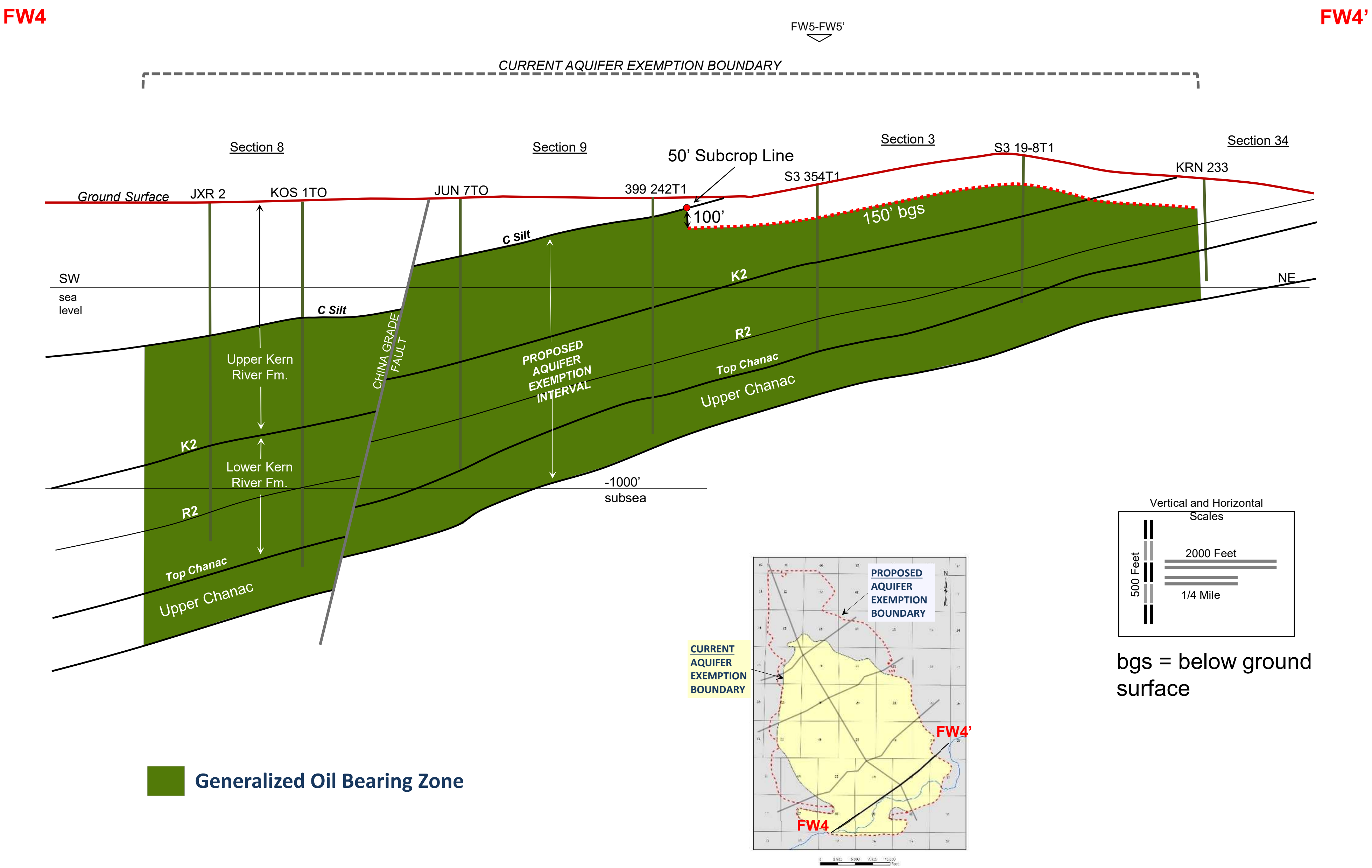



Figure 9 – Cross Section FW4-FW4' Proposed Aquifer Exemption Zone

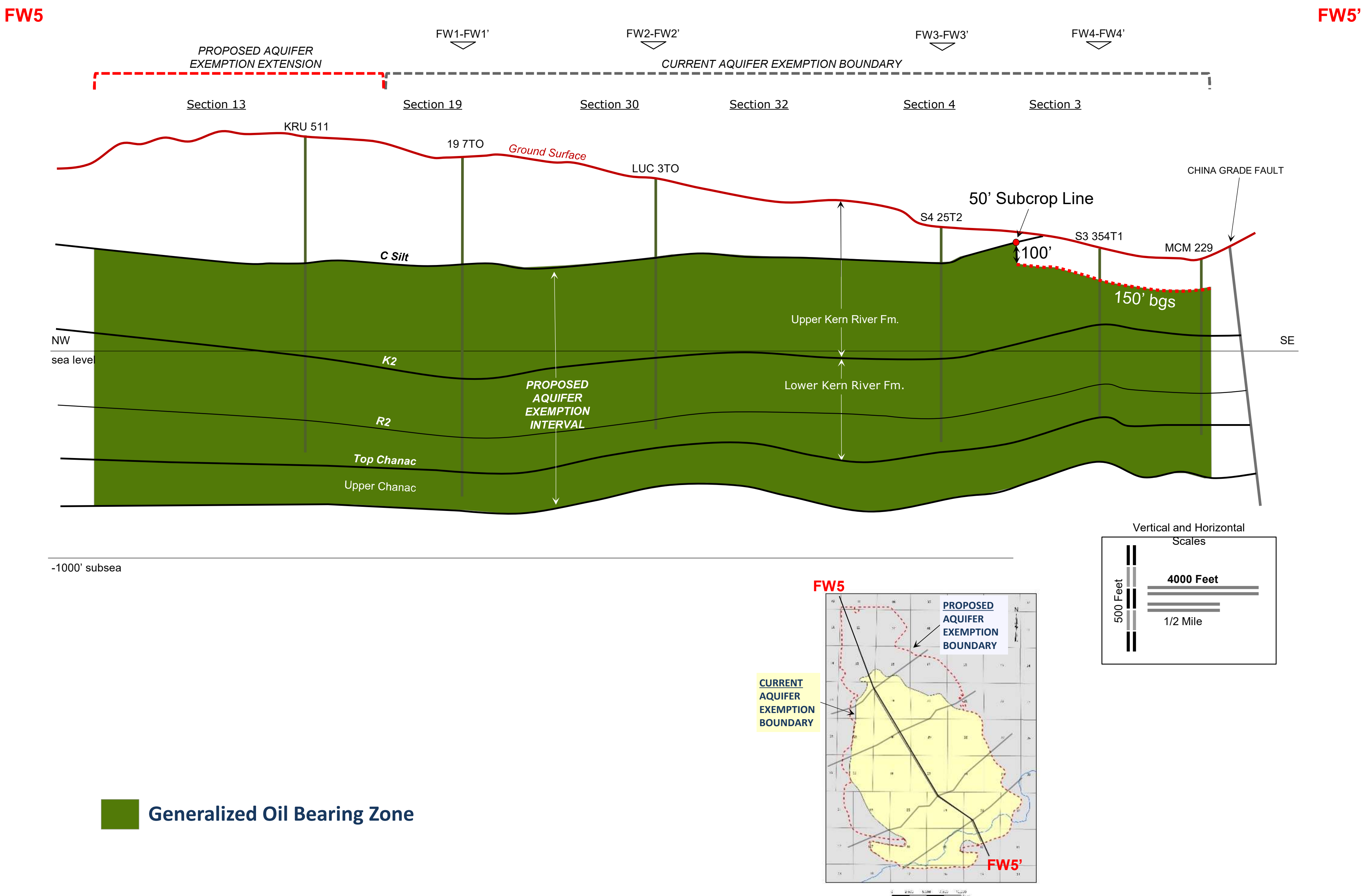



Figure 10 – Cross Section FW5-FW5' Proposed Aquifer Exemption Zone

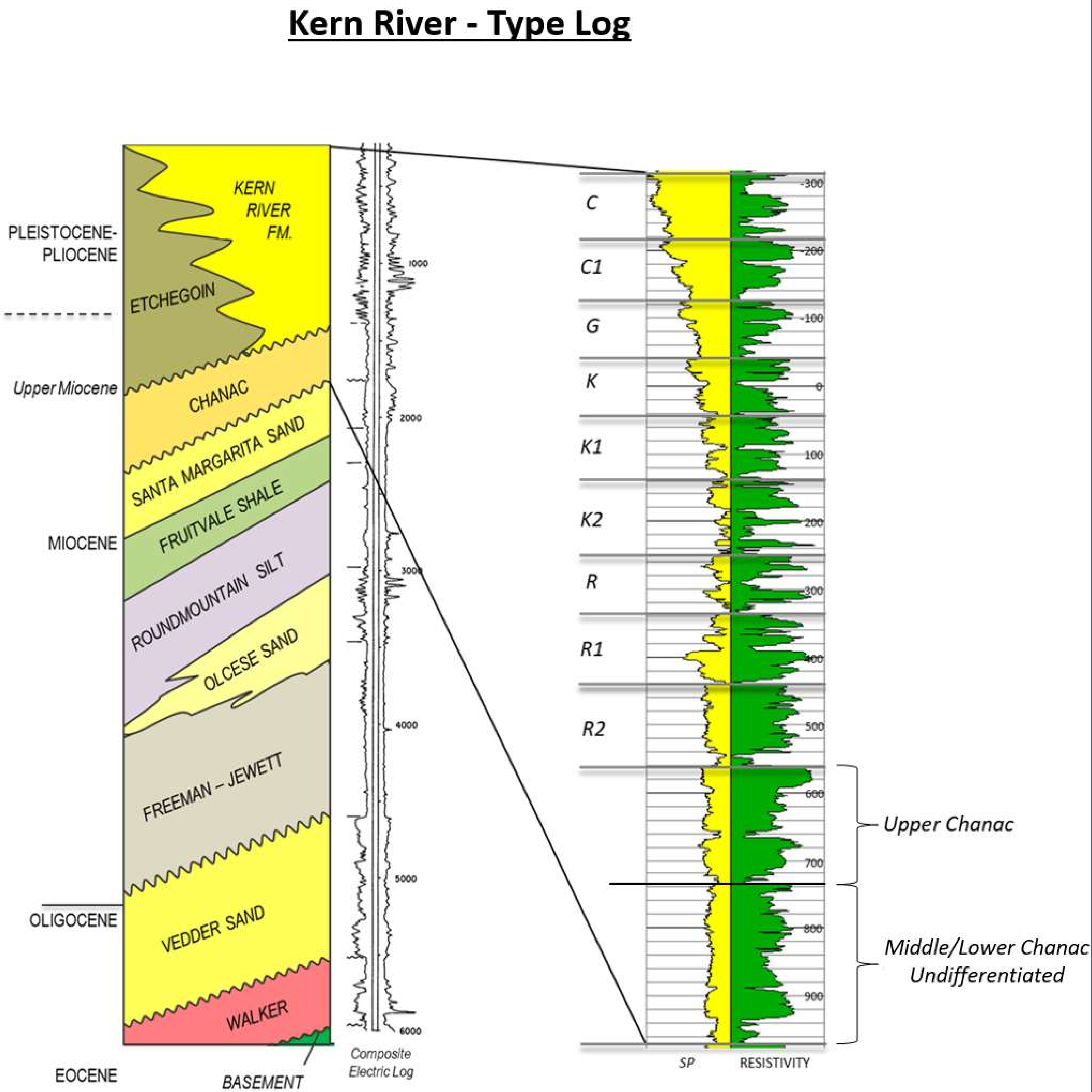
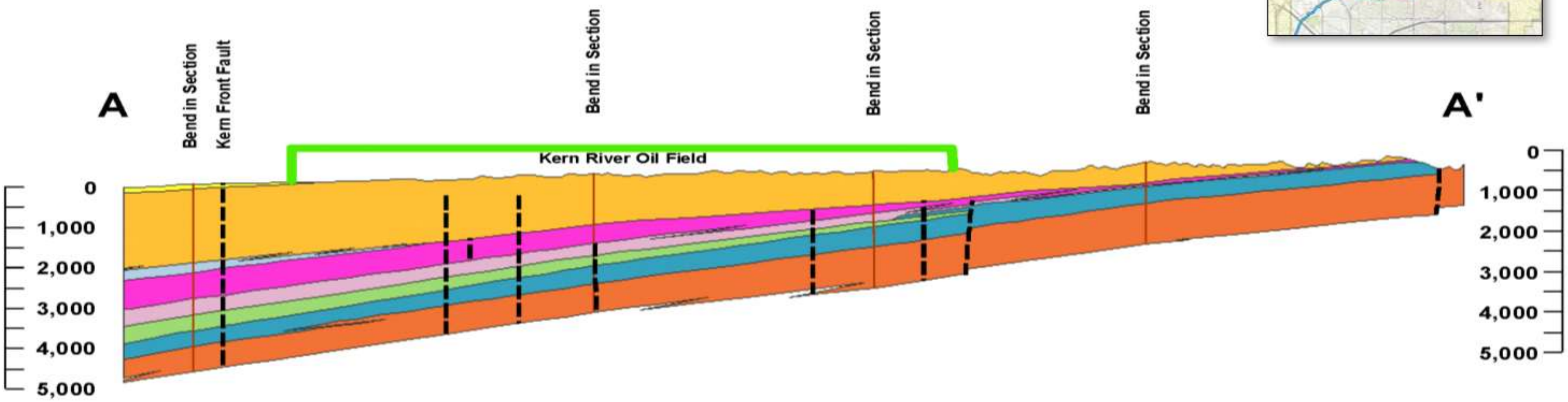



Figure 11 – Lithology and Stratigraphic Framework


Modified from Amec Foster Wheeler Environment & Infrastructure, Inc. 2015.
Technical Report: Injection Well Groundwater Sampling, Kern River Oil Field,
Kern County, California. Amec notes: Figure adapted from: Bartow, Alan, J. 1984,
Geologic Map and Cross Sections of The ShouthEastern Margin of The San Joaquin Valley, California,
United States Geological Survey, Miscellaneous Investigations Series Map I-496 Sheet 2 of 2.

**Explanation**

Field boundary for Kern River Oil Field

Bend in section line

**Geology**

Qoa2 — Older Alluvium (Pleistocene)

------------Unconformity------------

QTkr — Kern River formation (Pleistocene?, Pliocene, and Upper Miocene)

Te — Etchegoin Formation (Upper Miocene)

------------Unconformity------------

Tch — Chanac formation (Upper Miocene)

Tsm — Santa Margarita formation (Upper Miocene)

------------Unconformity------------

Tfv — Fruitvale Shale (Upper and Middle Miocene)

Trm — Round Mountain Silt (Middle and lower? Miocene)

To — Olcese (Lower Miocene)

Undifferentiated faults

Figure 12 – Generalized Stratigraphic Cross Section

## Contours on TOP of Proposed Exempt Aquifer

## Contours on BASE of Proposed Exempt Aquifer

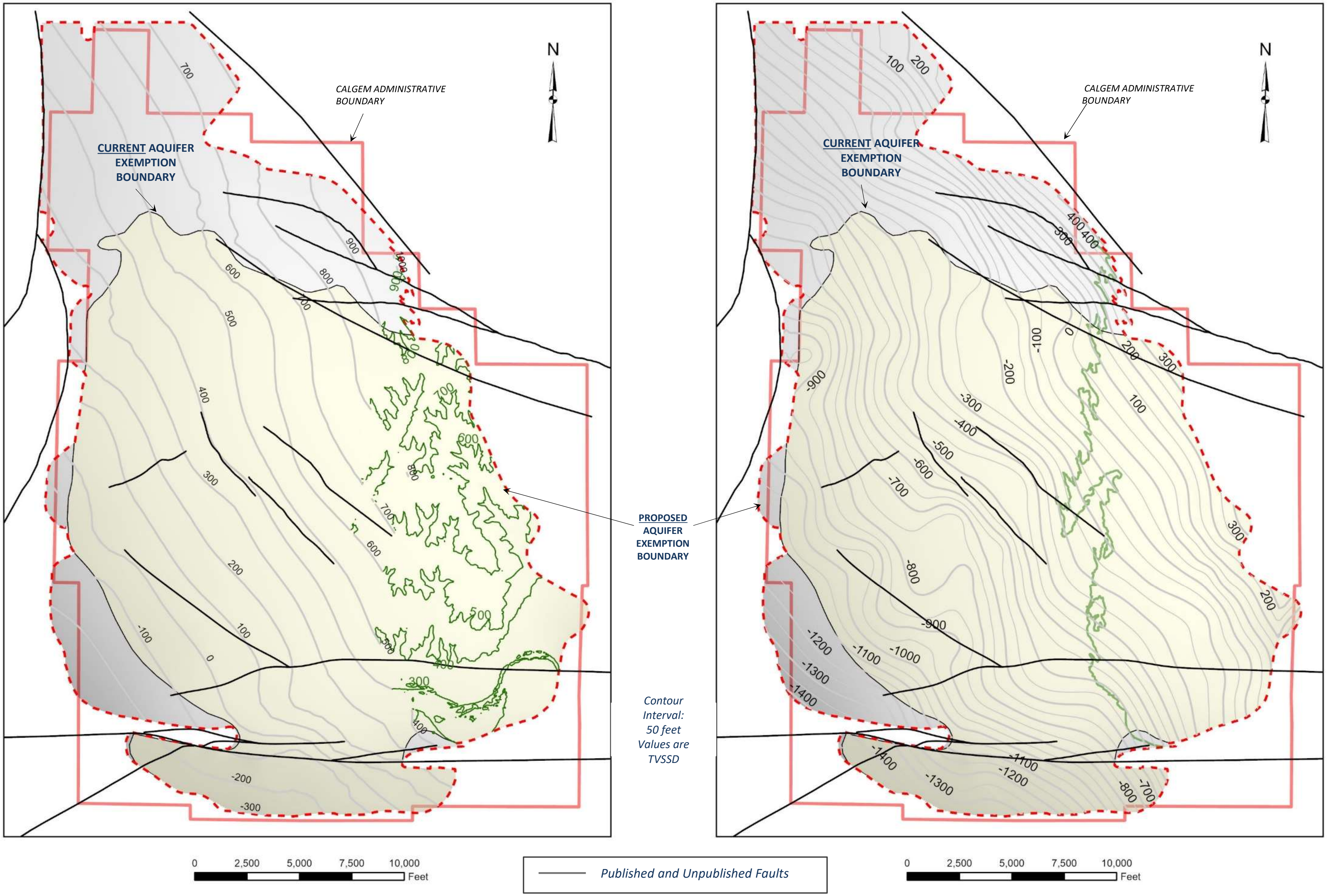



Figure 13 – Contour Maps on Top and Base of Proposed Aquifer Exemption Zone

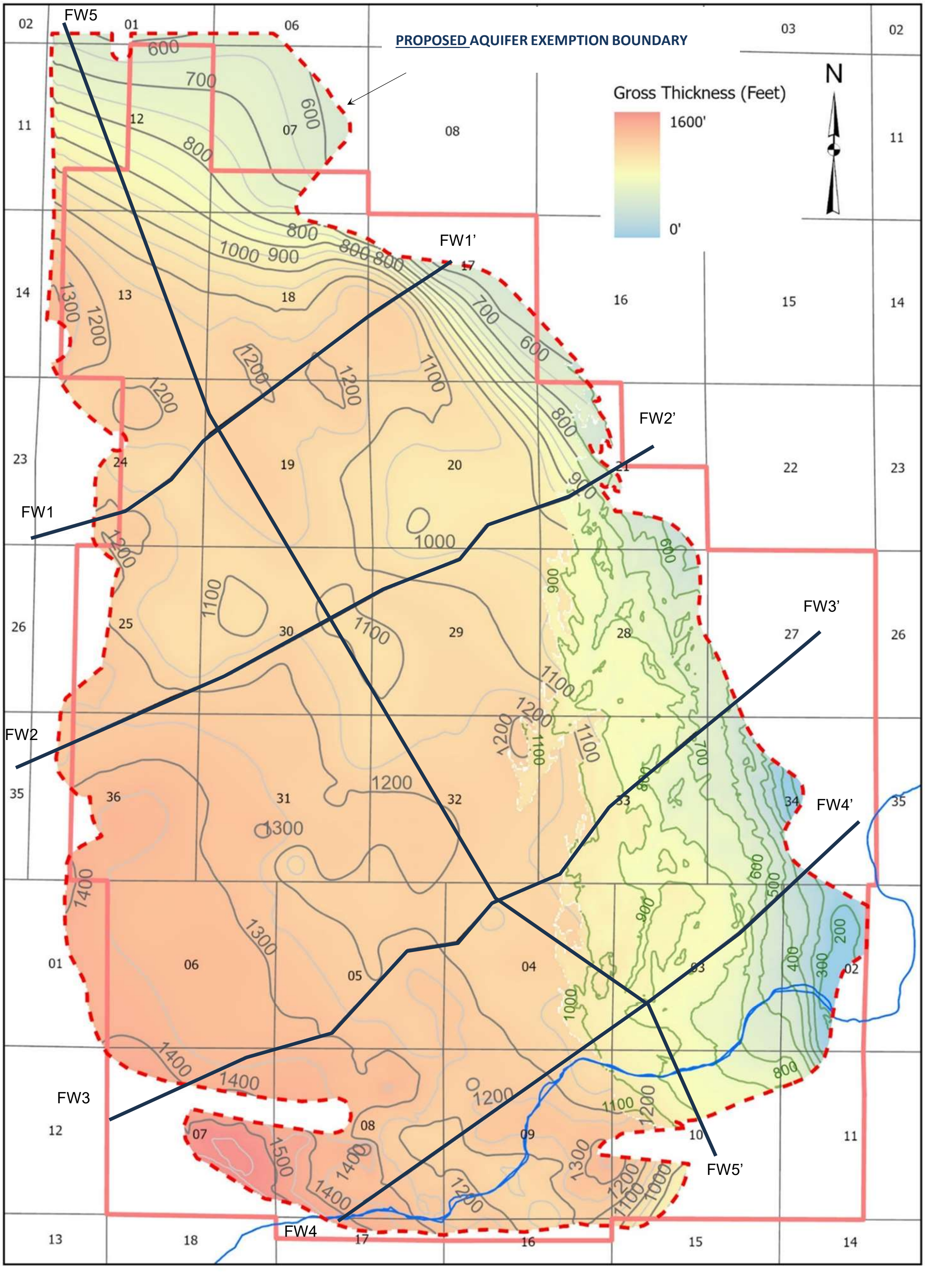



Figure 14 – Gross Interval Thickness Map

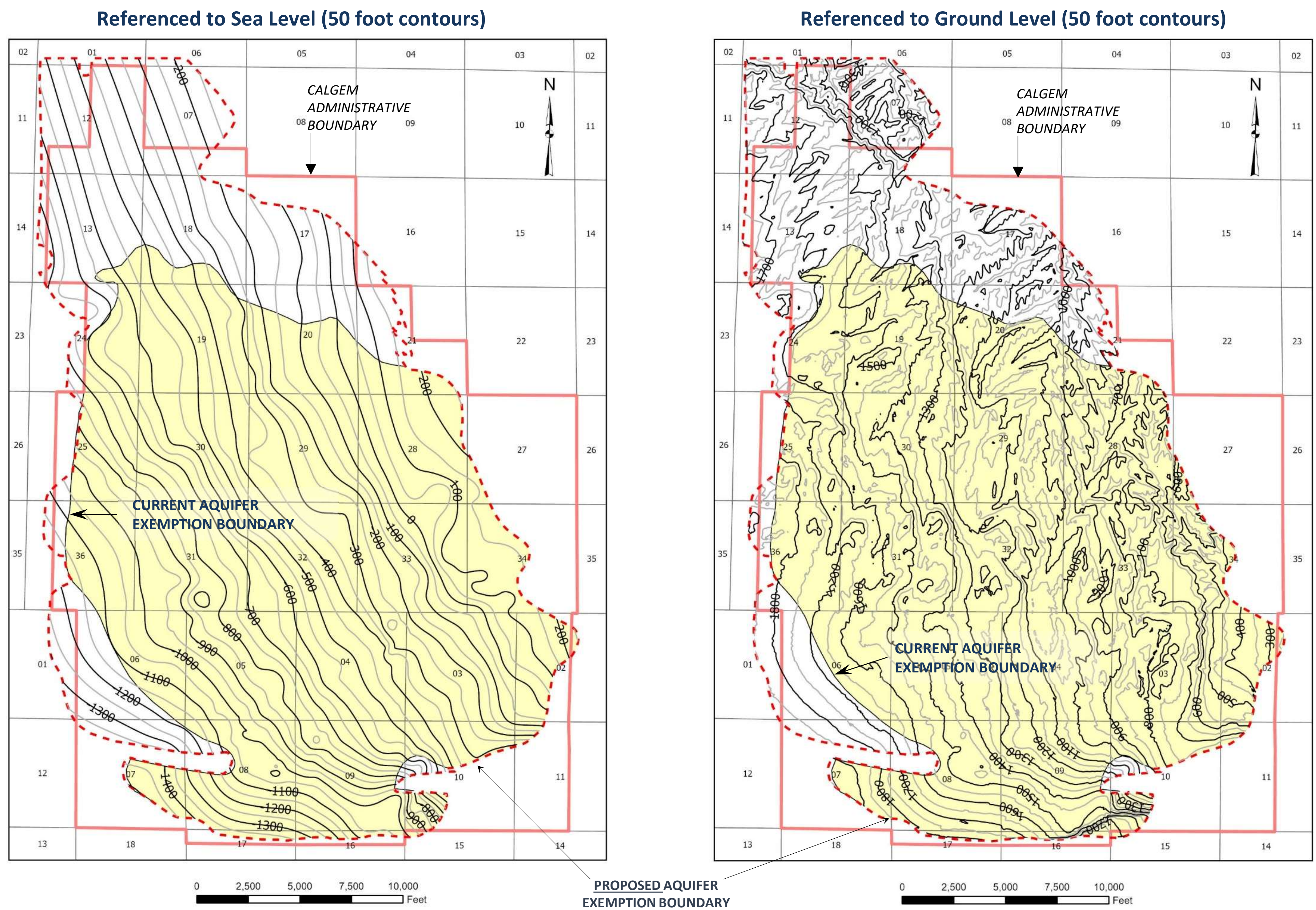



Figure 15 – Structure Map on Top of Chanac

Southern San Joaquin Basin: Bakersfield Arch

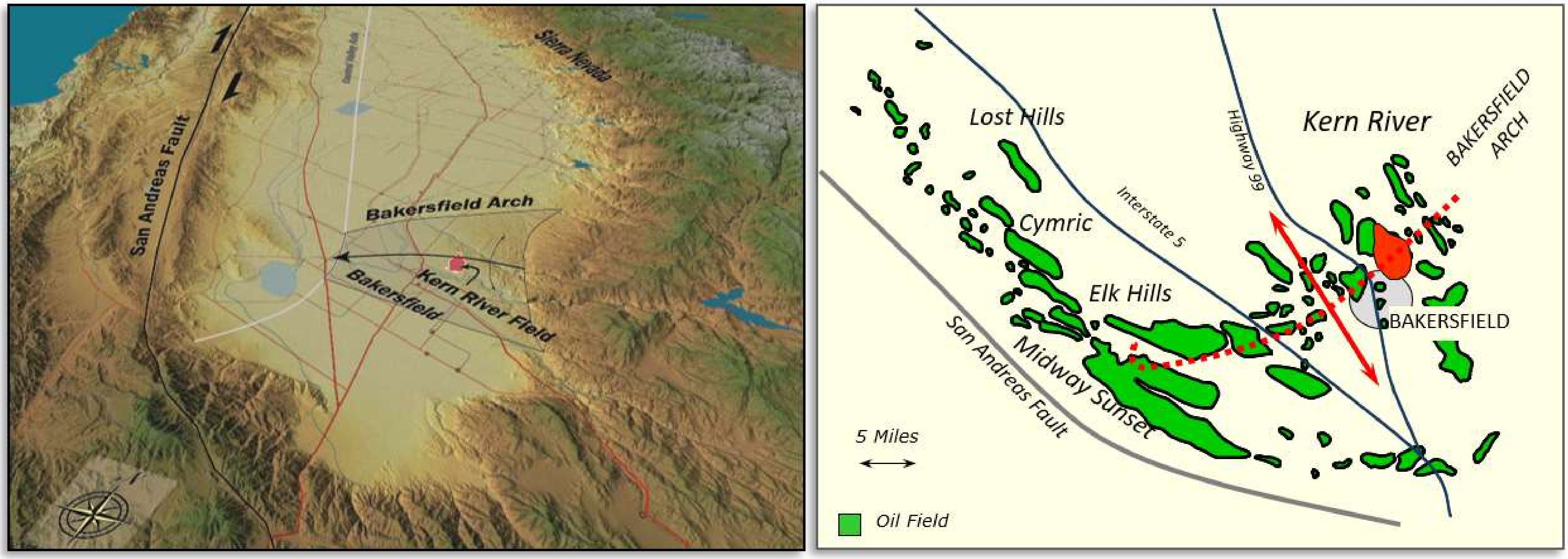



Figure 16 – Structural Setting

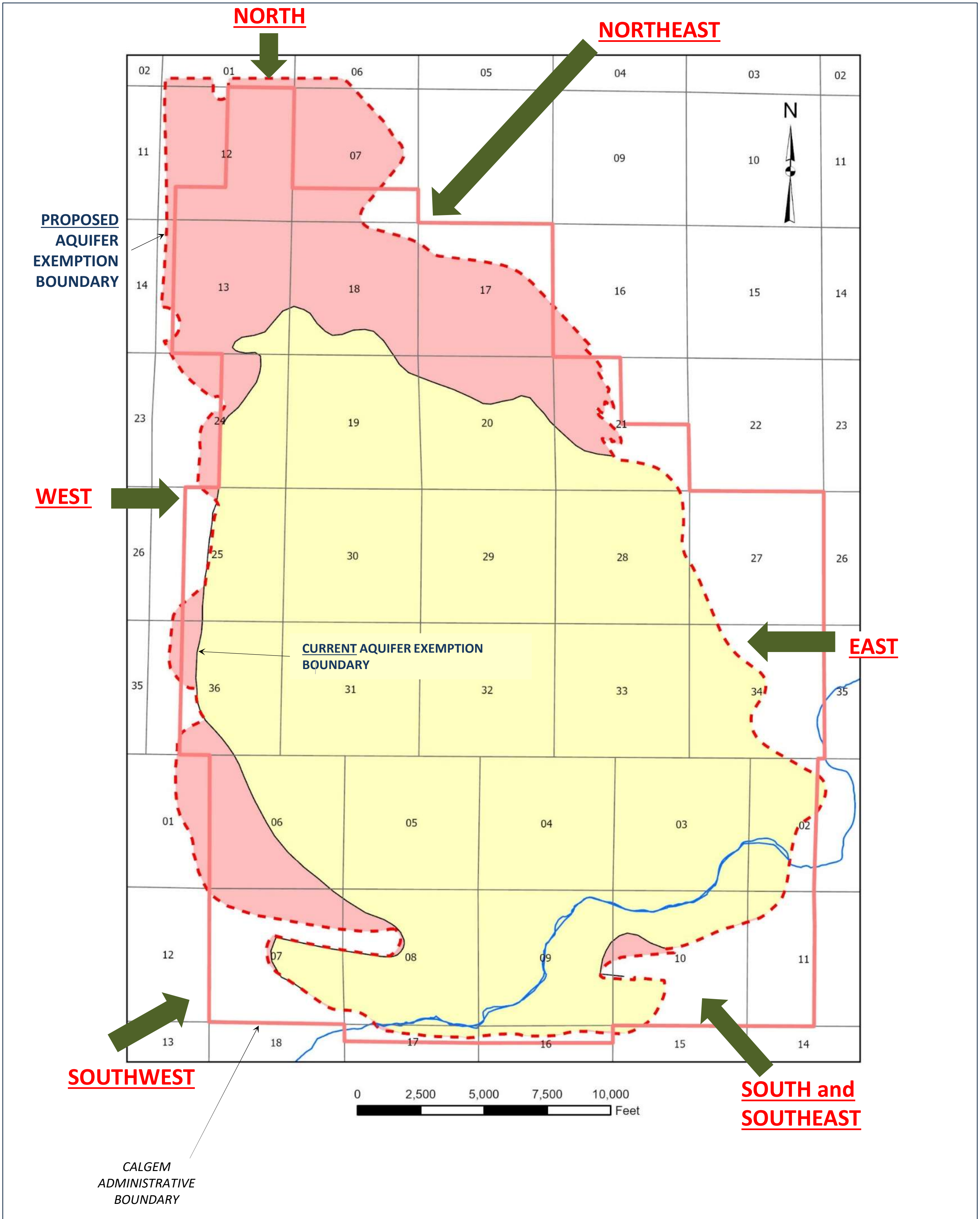



Figure 17 – Proposed Kern River Aquifer Exemption Boundary Lateral Extent

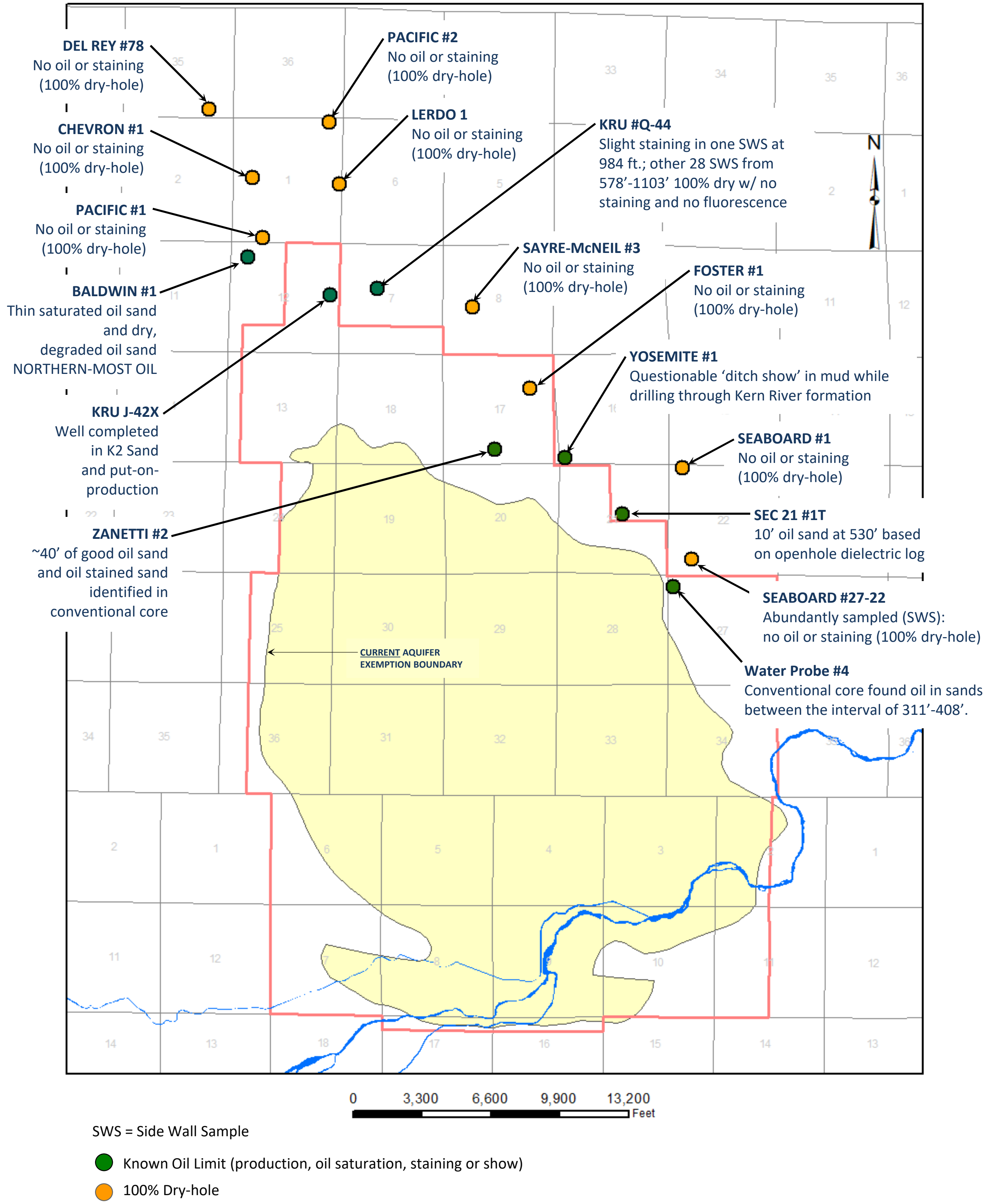



**Figure 18 - Known Oil Limit (KOL) on North and Northeast Margins of Field**

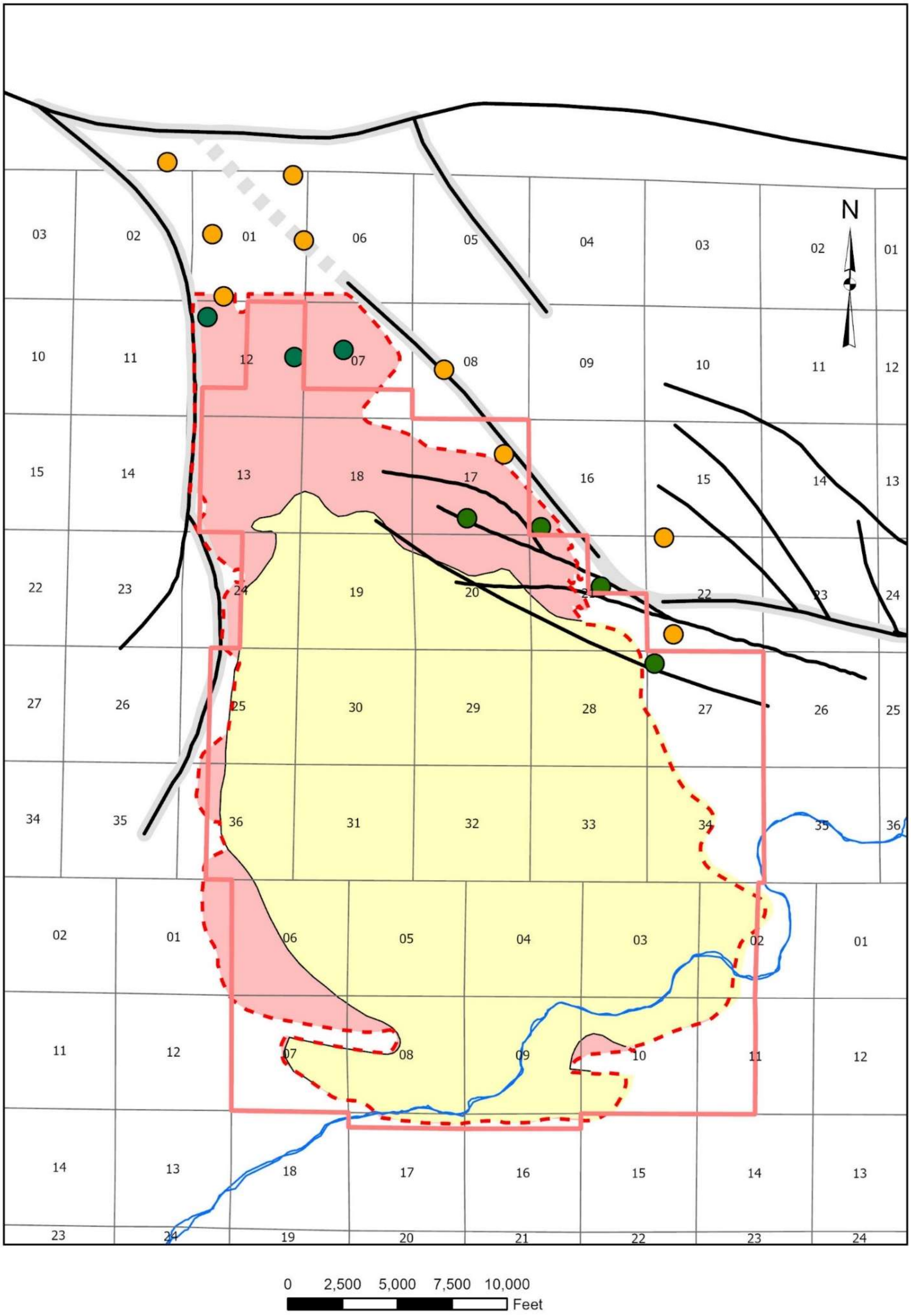



Figure 19 – Sealing Faults and Known Oil Limits on North and Northeast Margins of Field

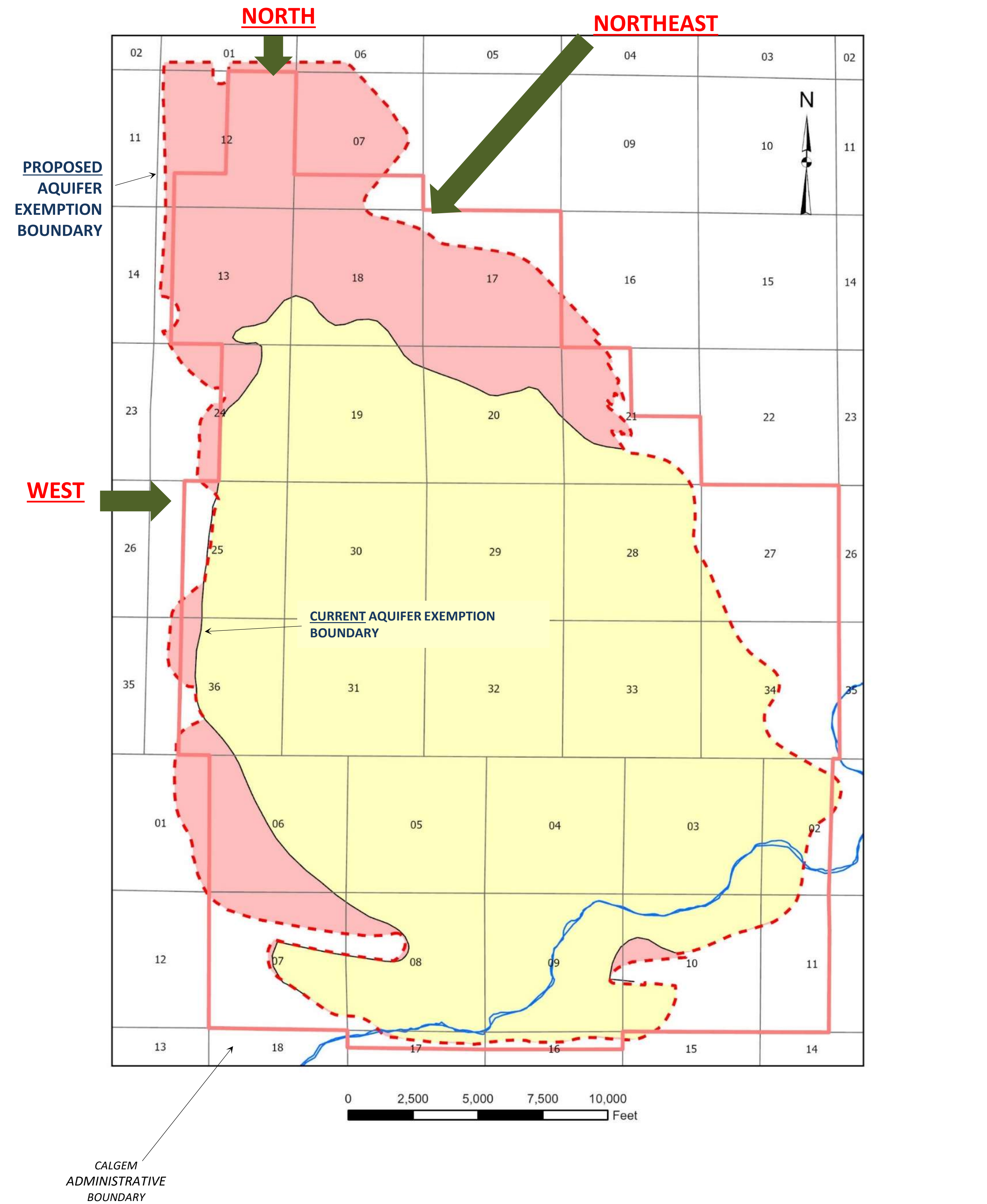



Figure 20 – Proposed Kern River Aquifer Exemption Boundary Lateral Extent

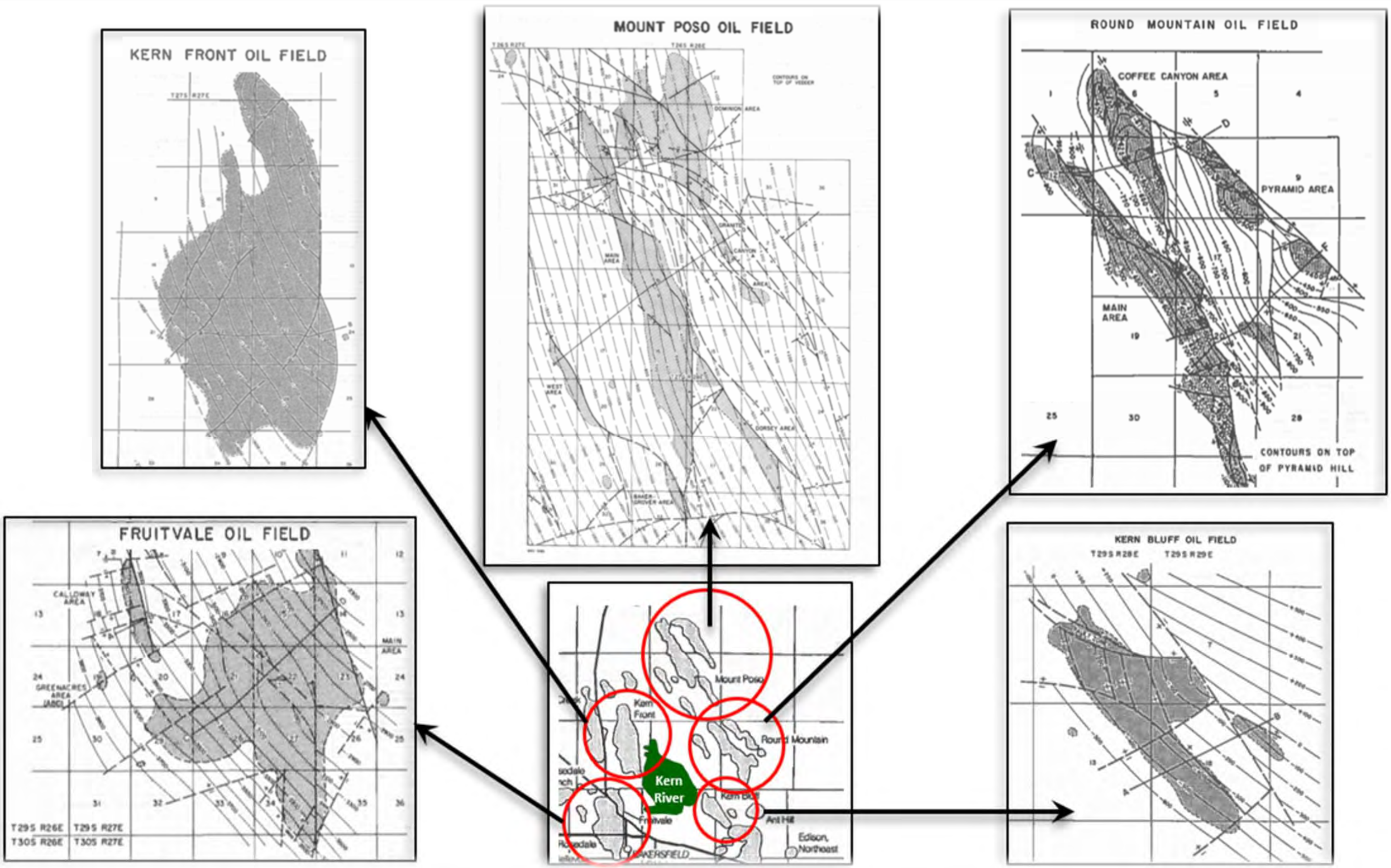
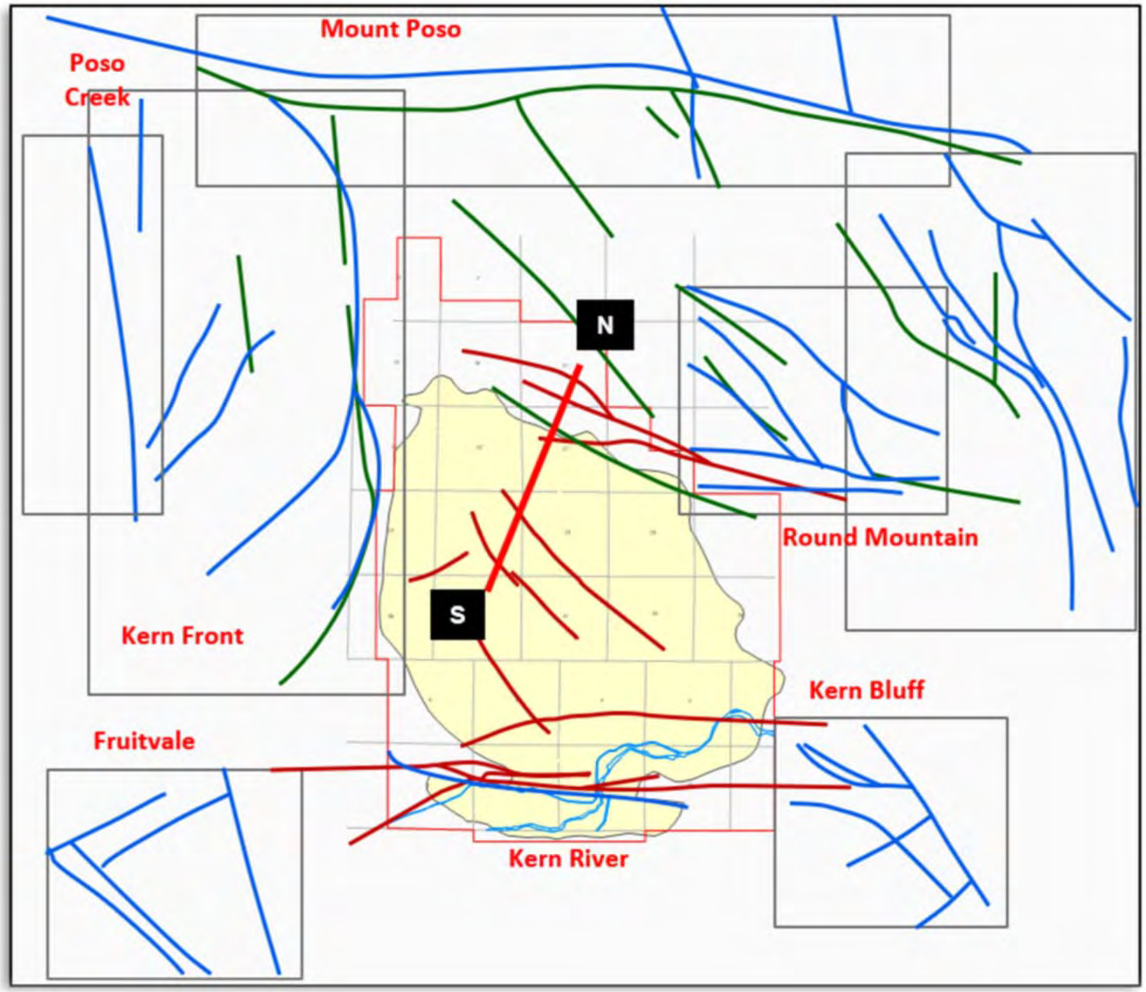
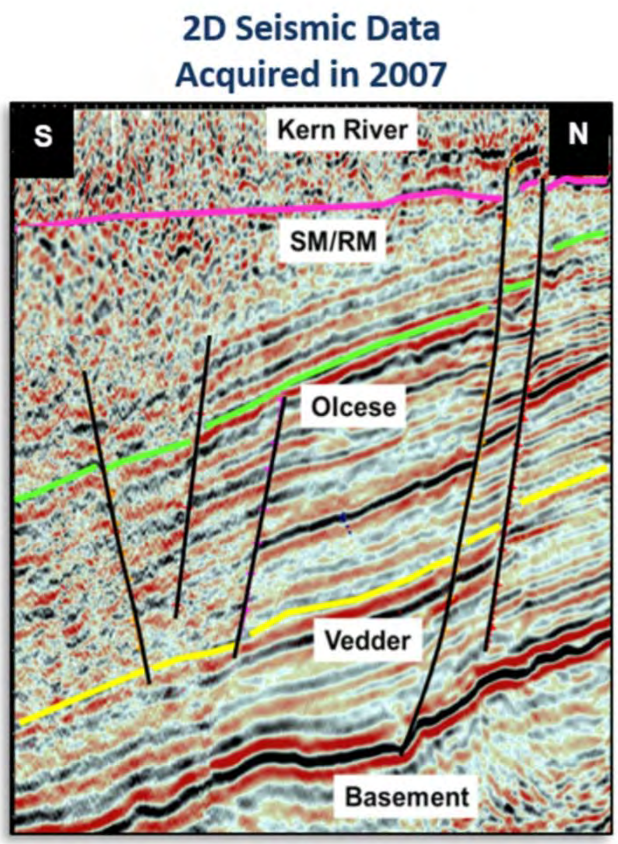


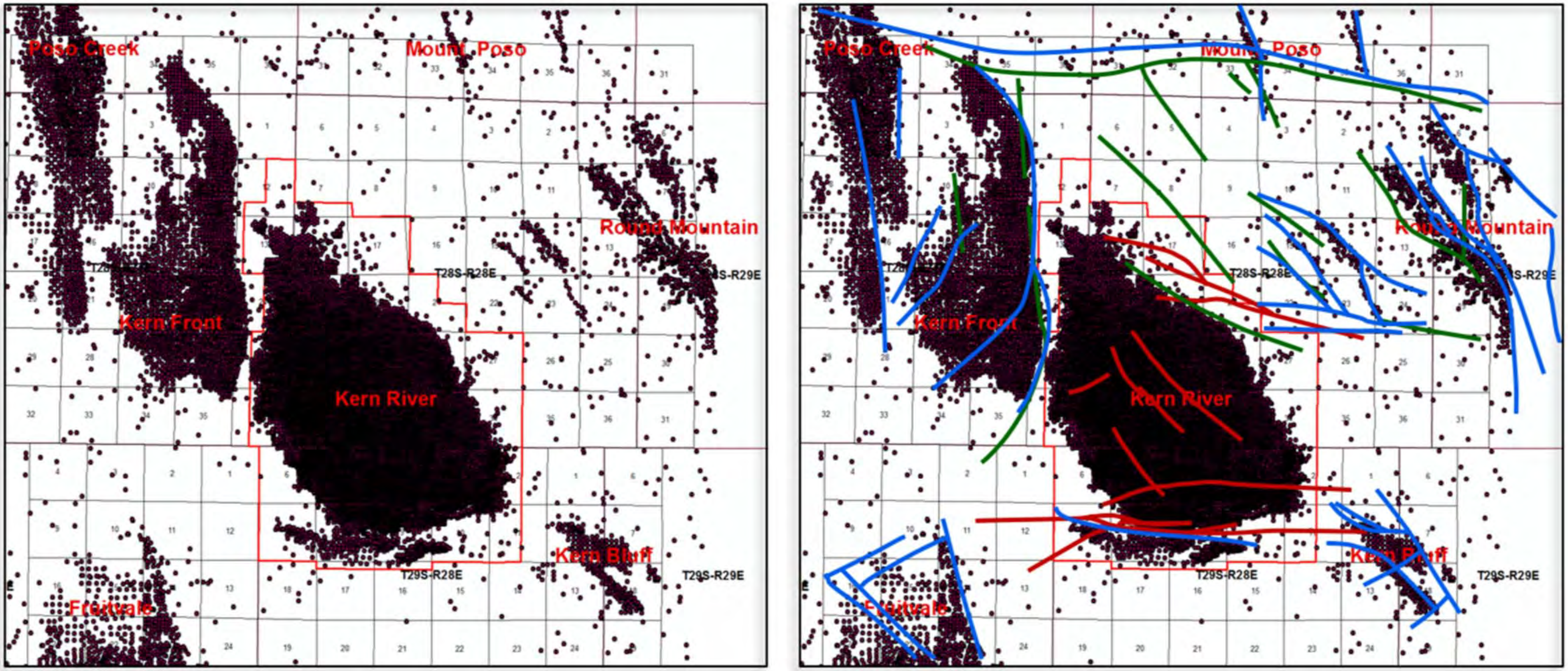

**Figure 21 - Regional Sealing Faults**




USGS Published Faults (Professional Paper 1245, Plate 1, 1983)
CALGEM Published Faults (DOGGR *California Oil and Gas Fields*, Volume 1, TR11, 1998)
Chevron Faults

**Figure 22 - Faulting in the Kern River and Surrounding Fields**




## Faulting in the Kern River and Surrounding Fields

- USGS Published Faults
- DOGGR Published Faults
  (DOGGR *California Oil and Gas Fields*, Volume 1, TR11, 1998)
- Chevron Faults

Data source: *California Division of Oil, Gas & Geothermal Resources*

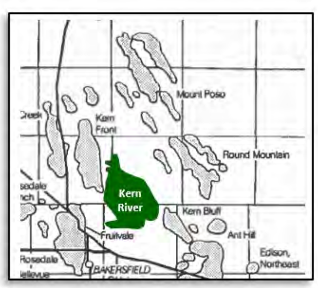



**Figure 23 - Oil Production and Fault Control: Kern River Field and Vicinity**

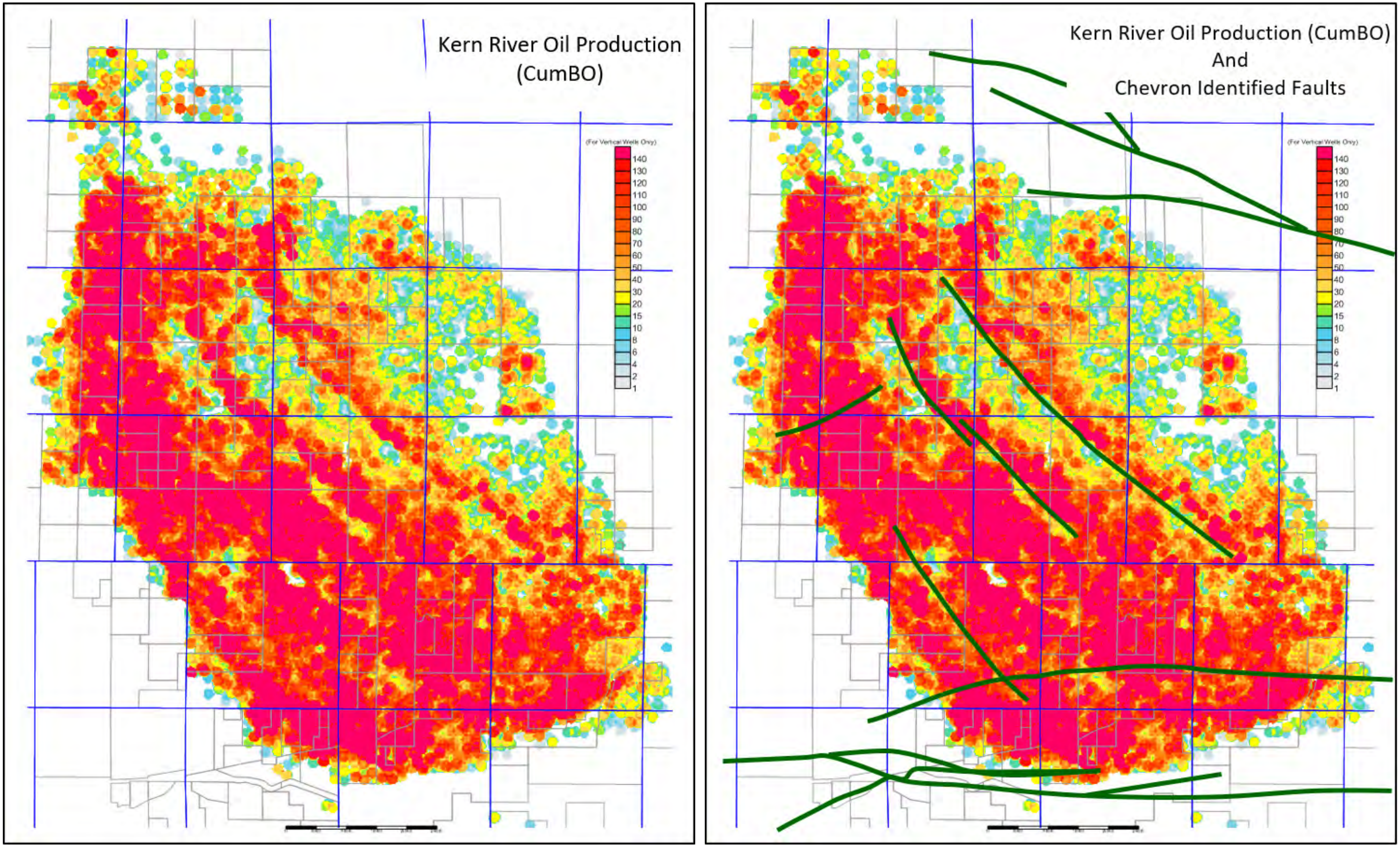



**Figure 24 - Oil Field Production In Relation to Fault Occurrence**

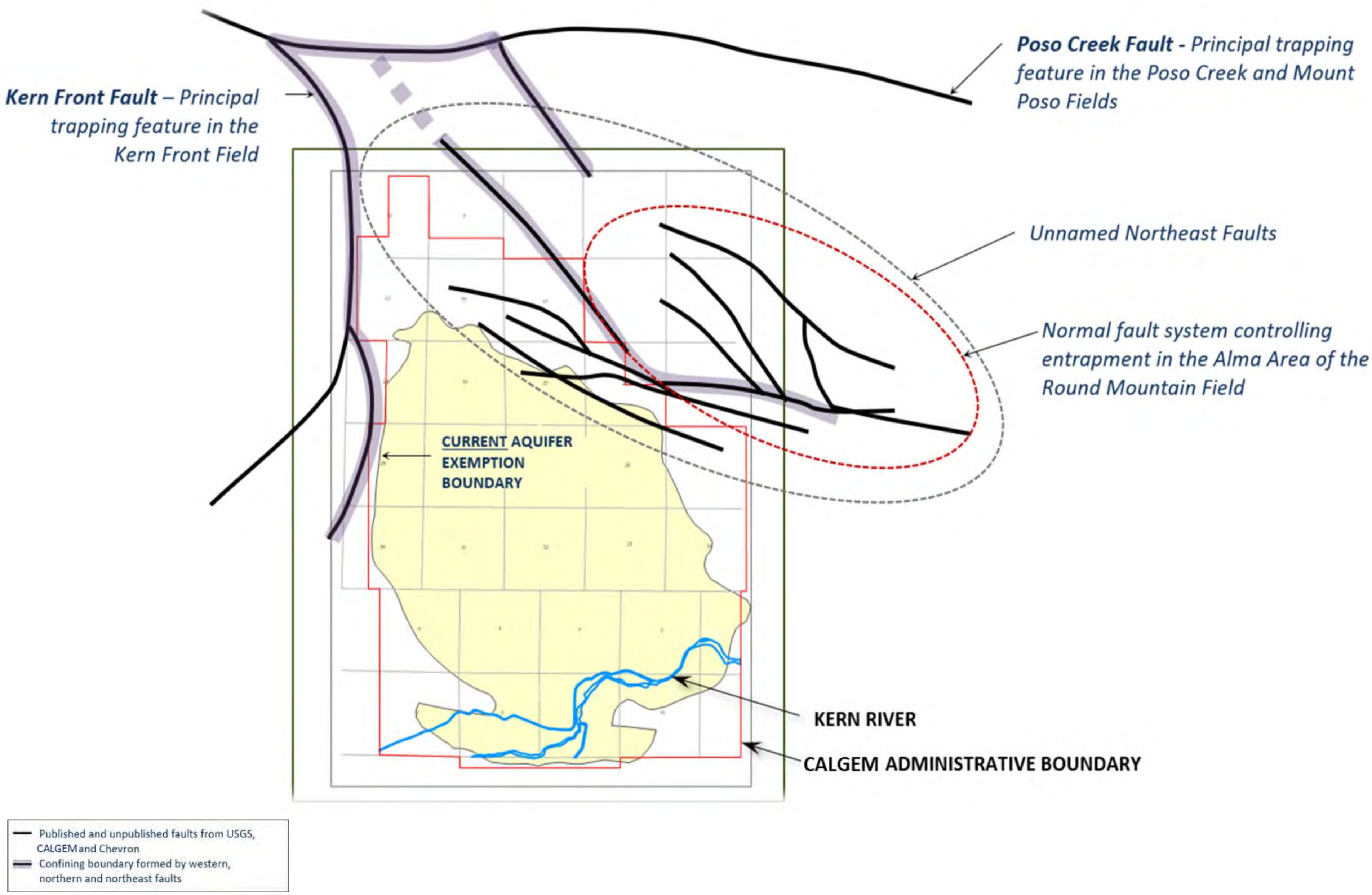



**Figure 25 - West, North and Northeast Sealing Faults**

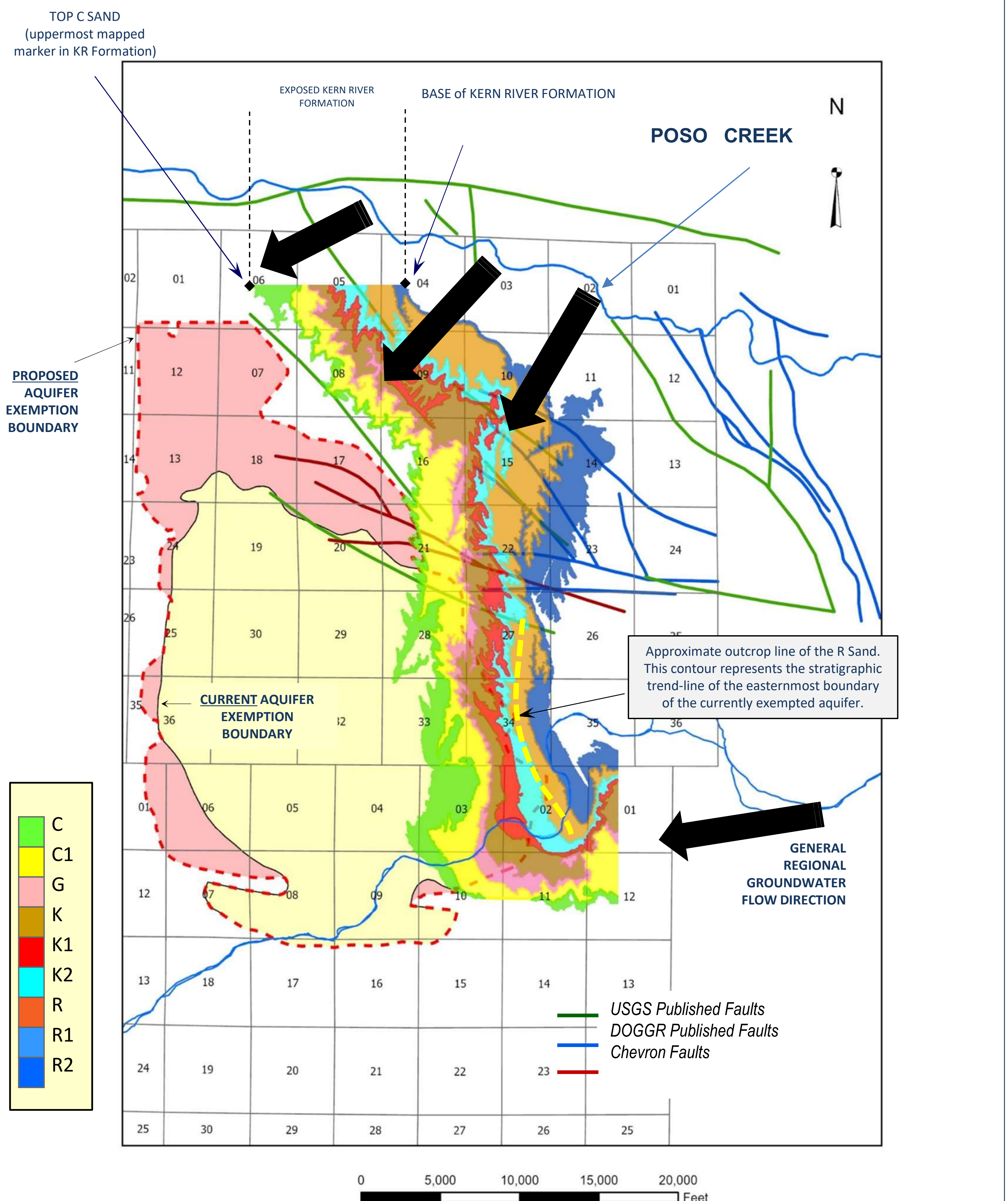



Figure 26 – Outcrop of the Kern River Formation Near the Kern River Field

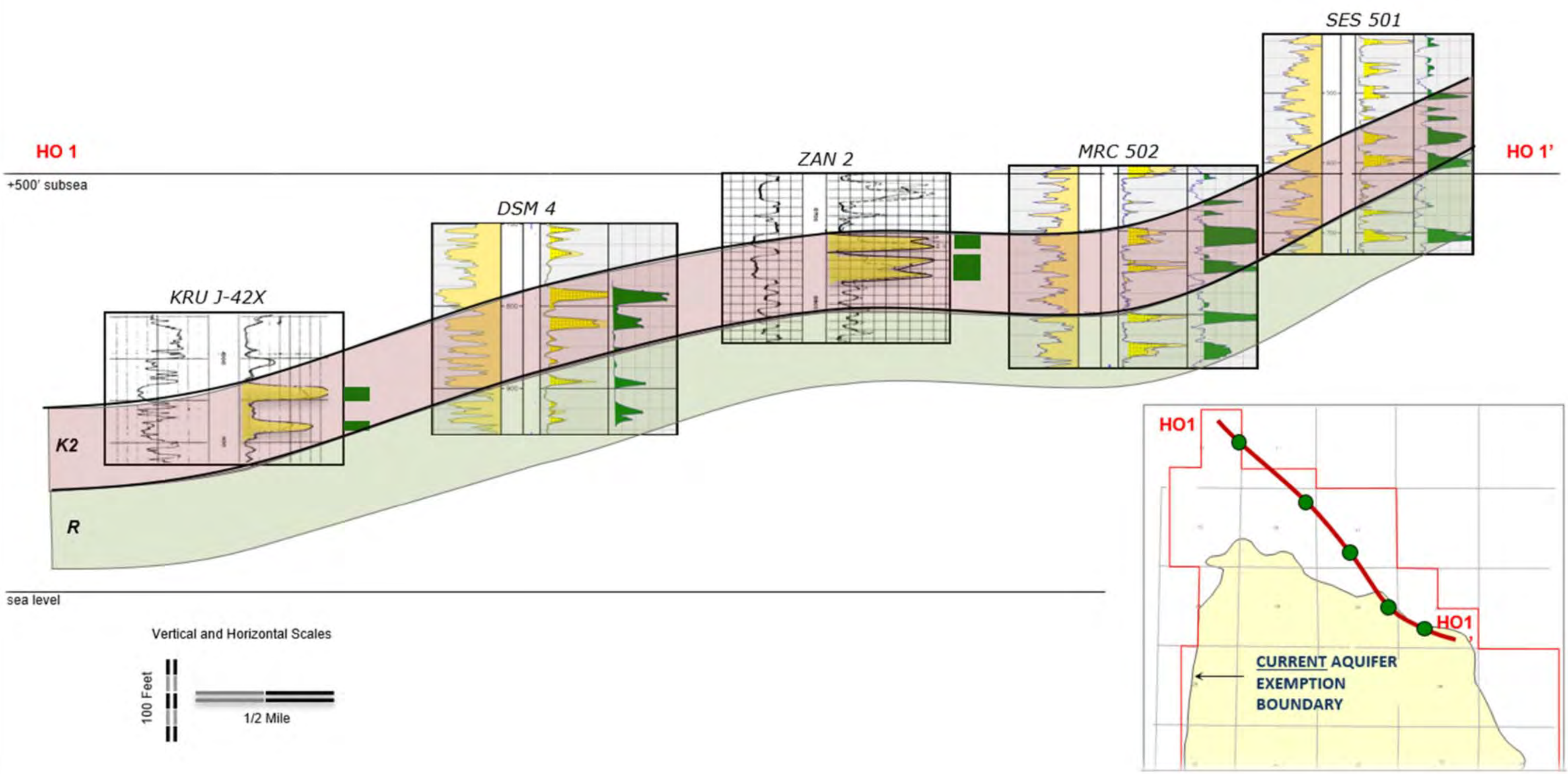



**Figure 27 - Known Oil Limit (KOL) on North and Northeast Margins of Field**

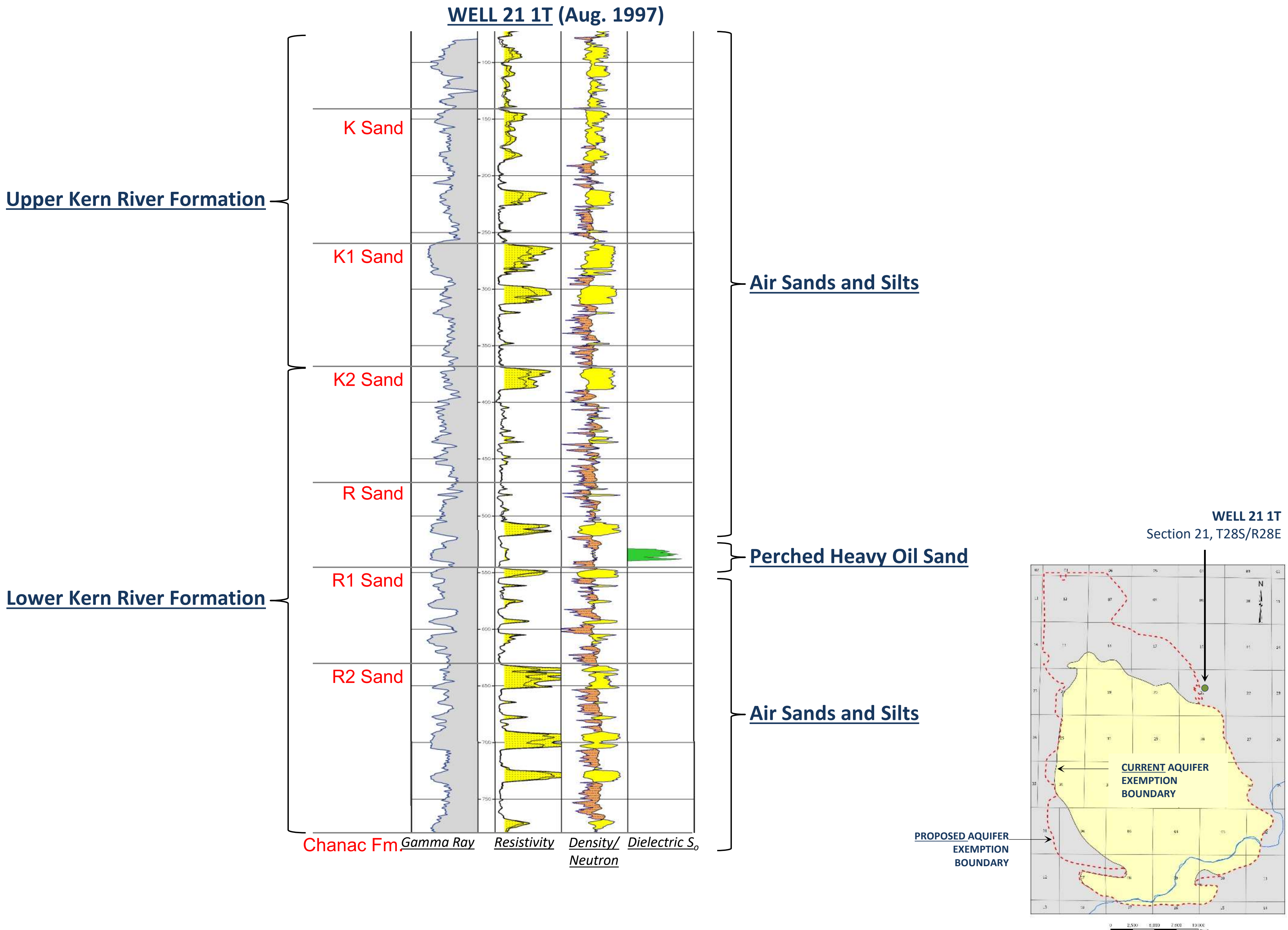



Figure 28 – Example of Updip Perched Oil and Air Sands with No Groundwater

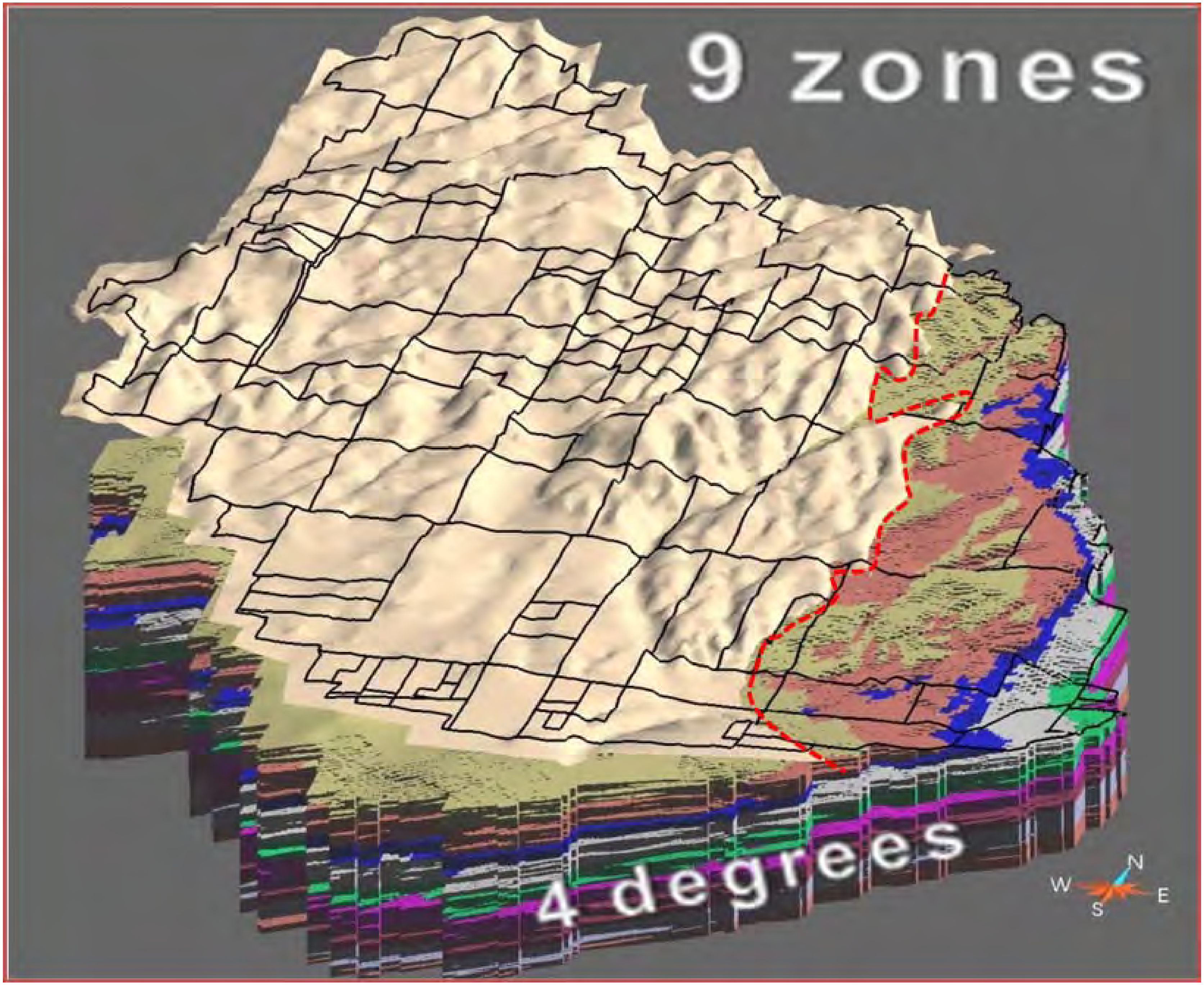



**Figure 29 - 3D Structure and Regional Outcrop Area of the Kern River Formation**

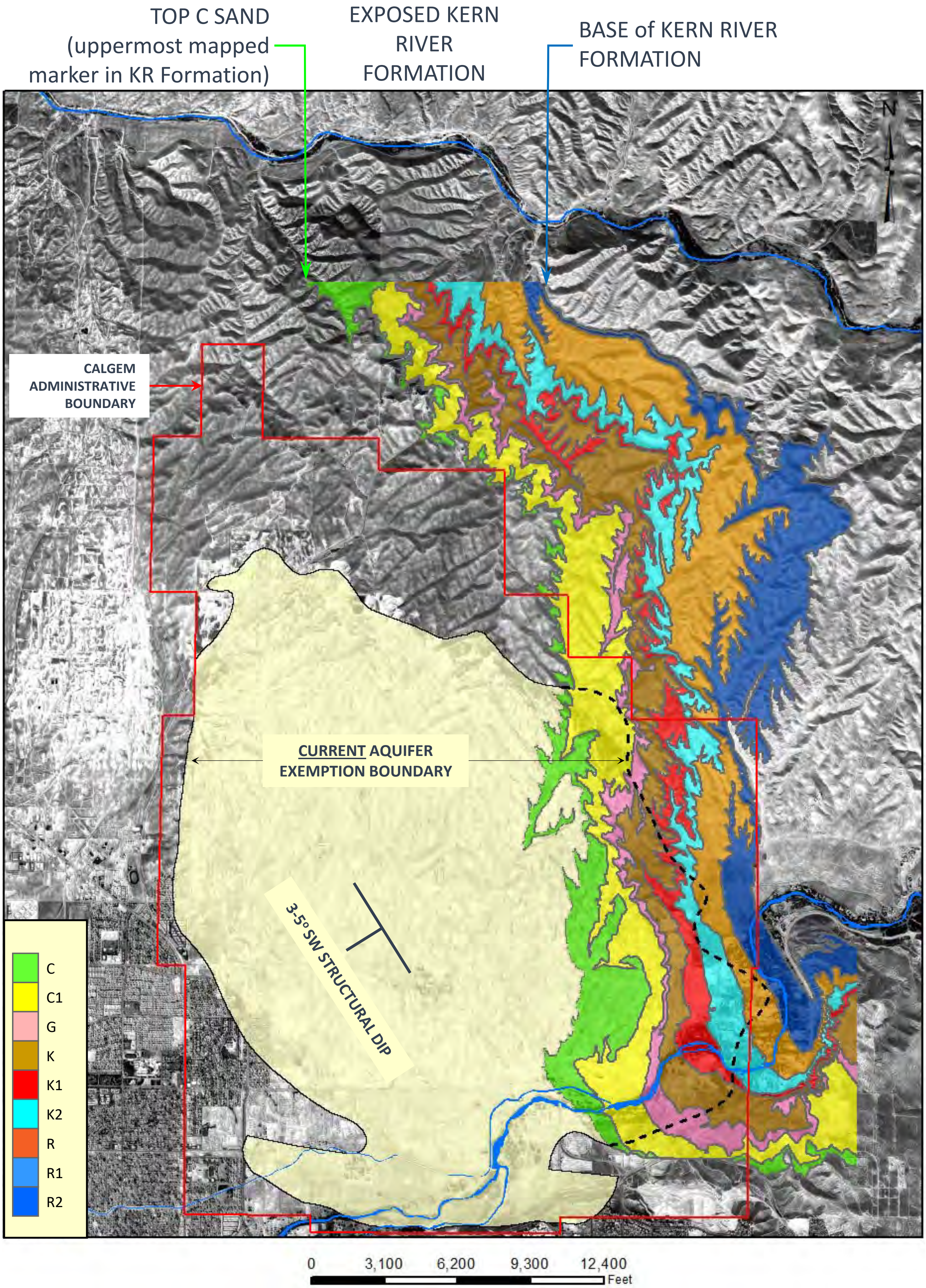



**Figure 30 - Regional Outcrop Area of the Kern River Formation**

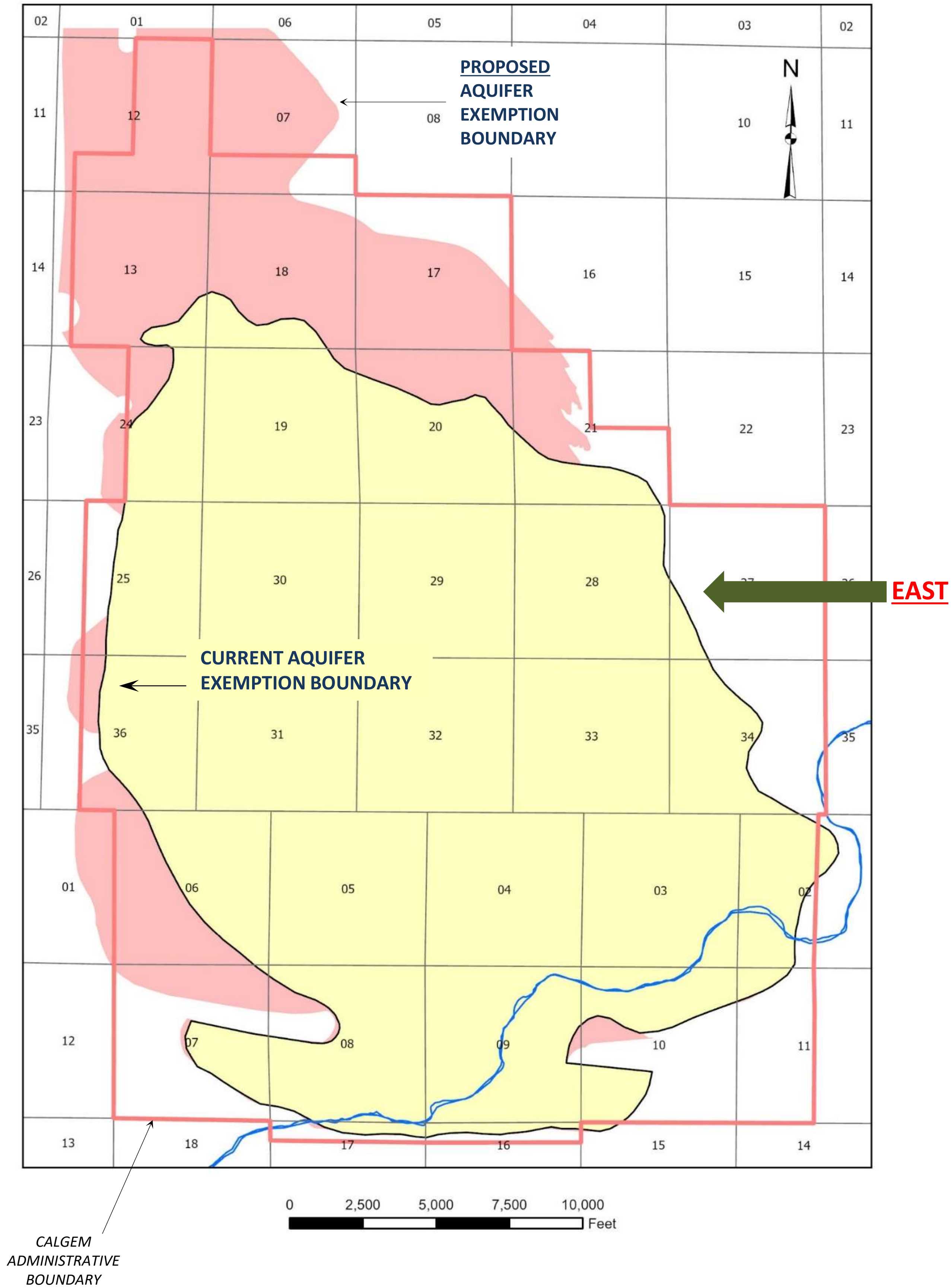



Figure 31 – Proposed Kern River Aquifer Exemption Boundary East Lateral Extent

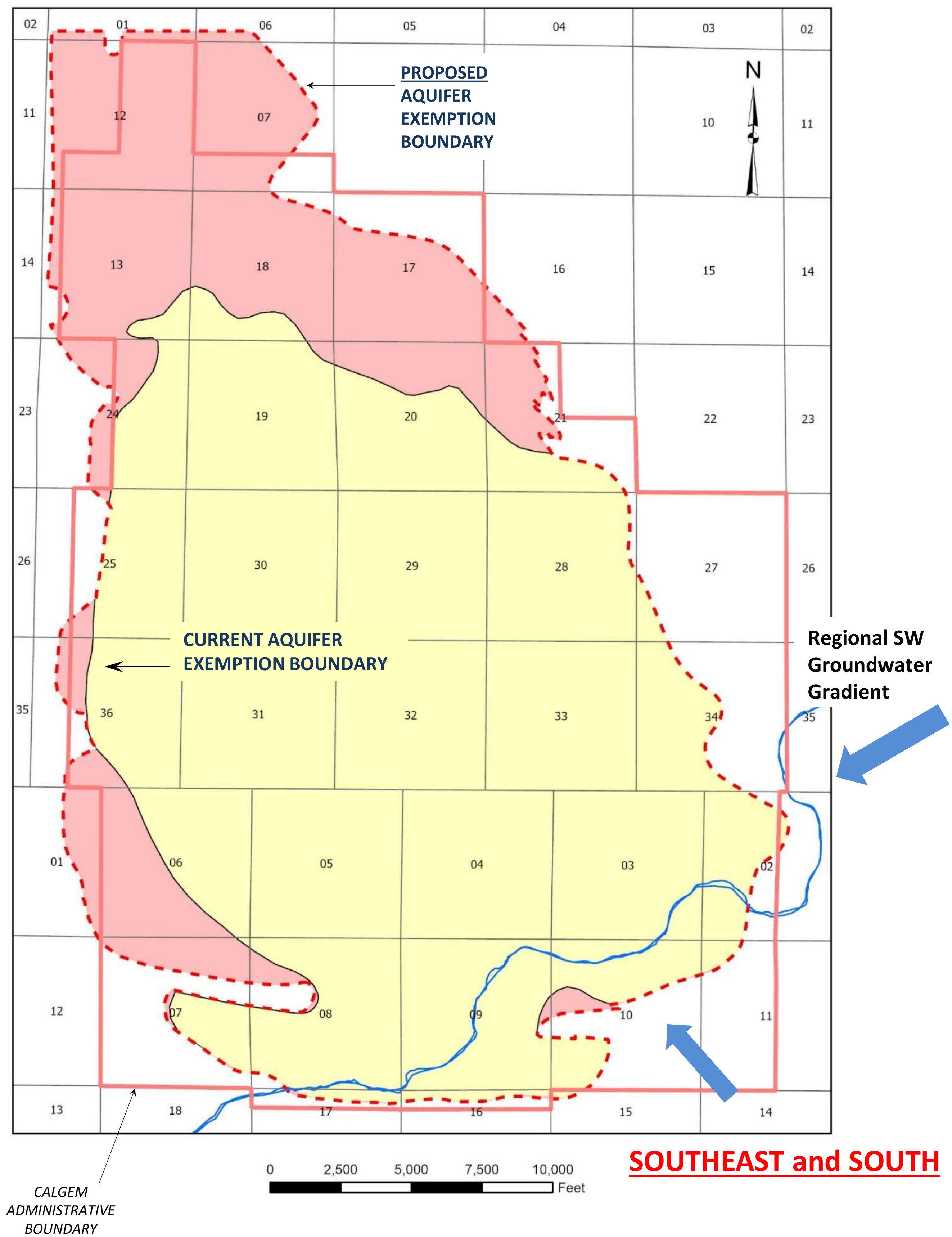



Figure 32 – Proposed Kern River Aquifer Exemption Boundary South and Southeast Lateral Extent

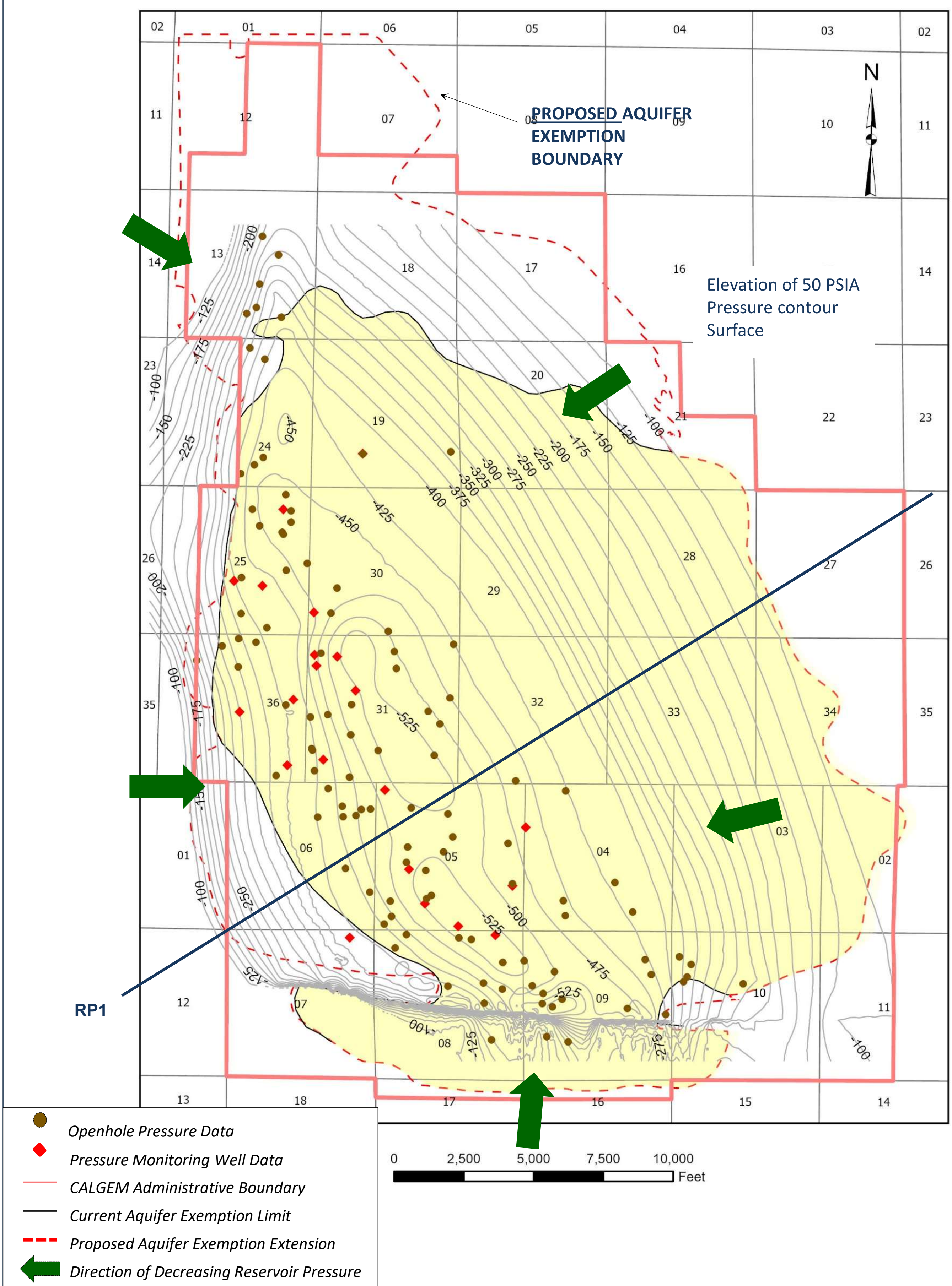



Figure 33 – Reservoir Pressure Monitoring and Mapping

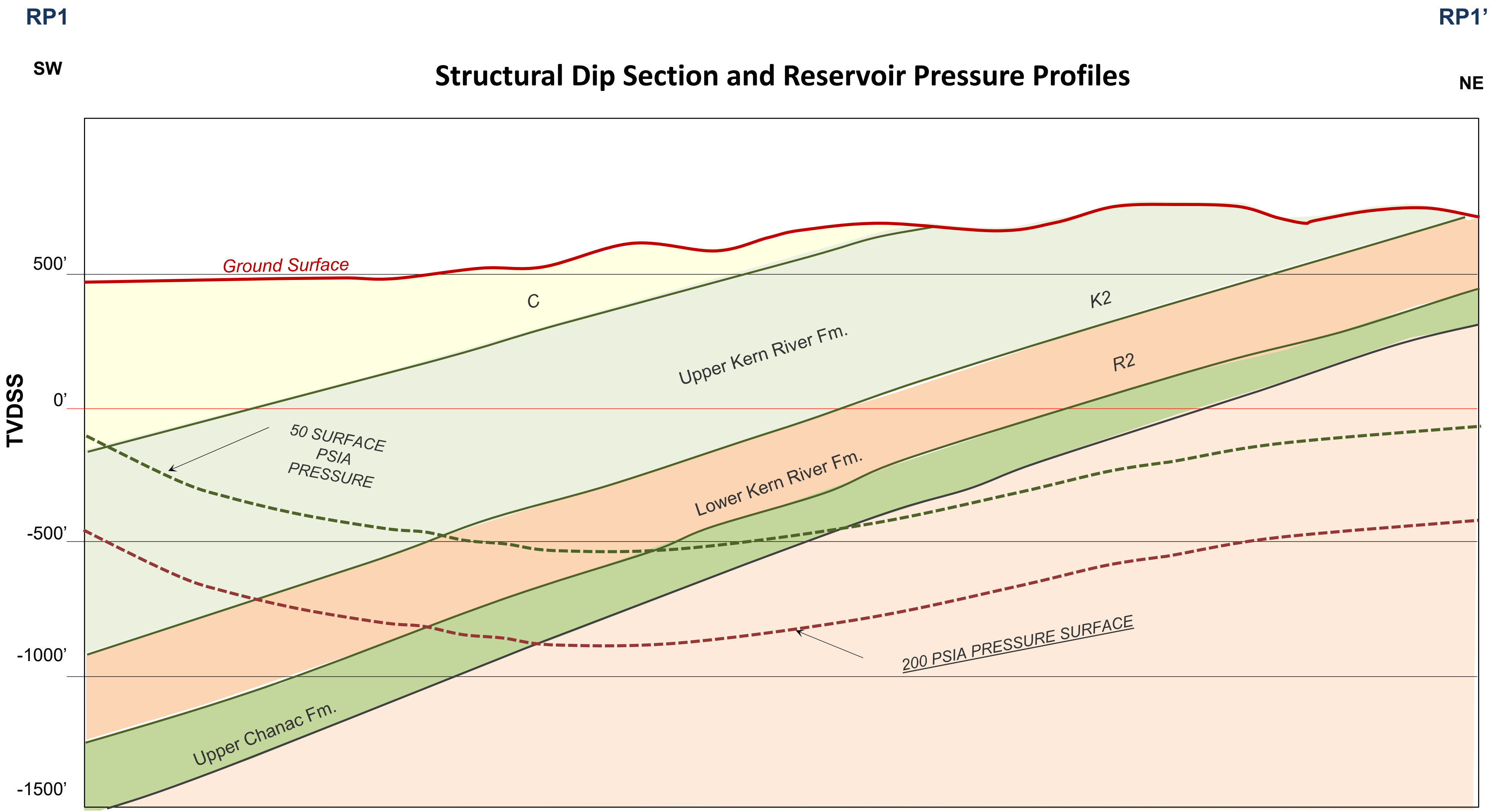



**Figure 34 - Reservoir Pressure Profile**

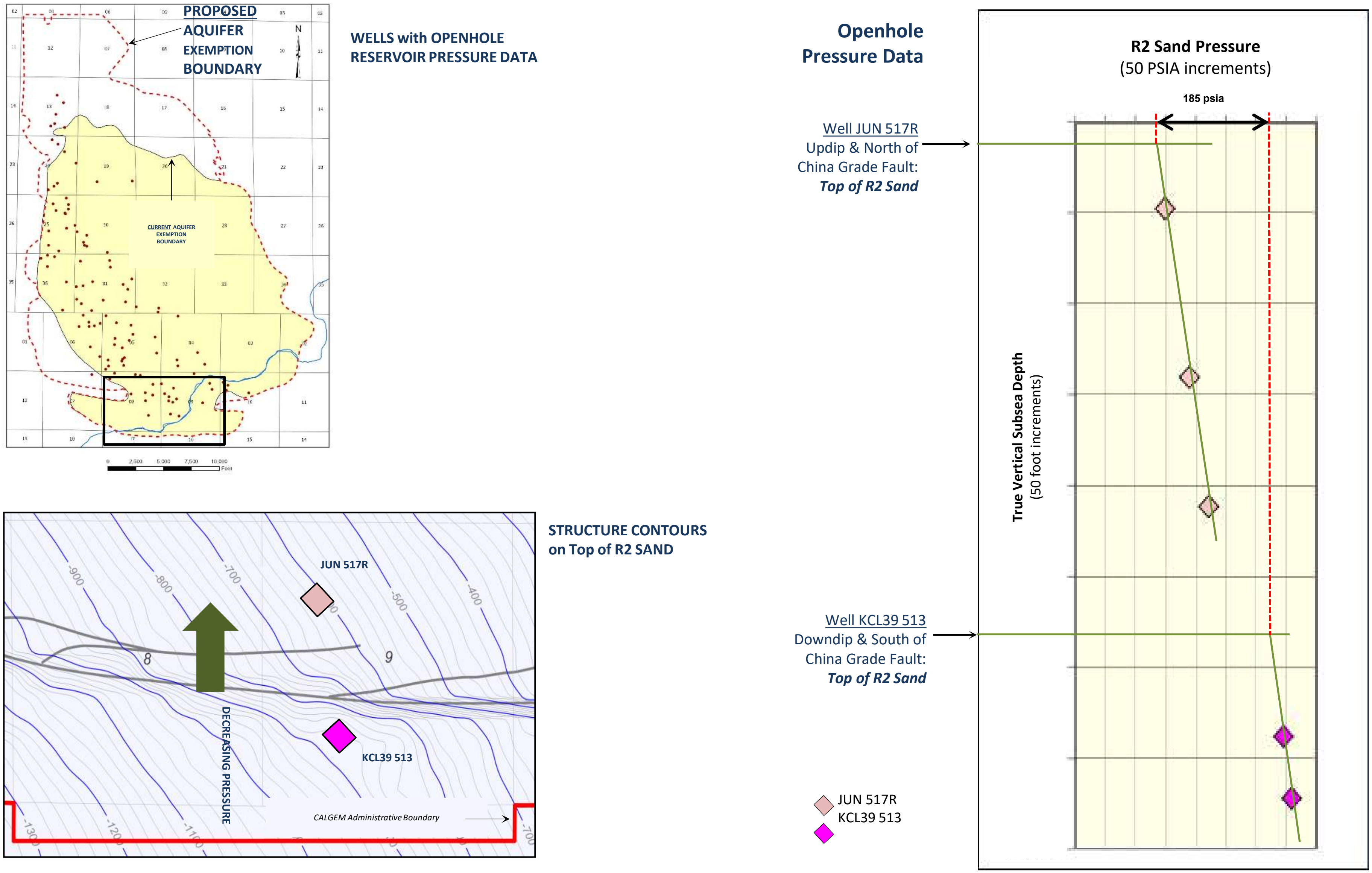



Figure 35 – Lateral Reservoir Pressure Gradient

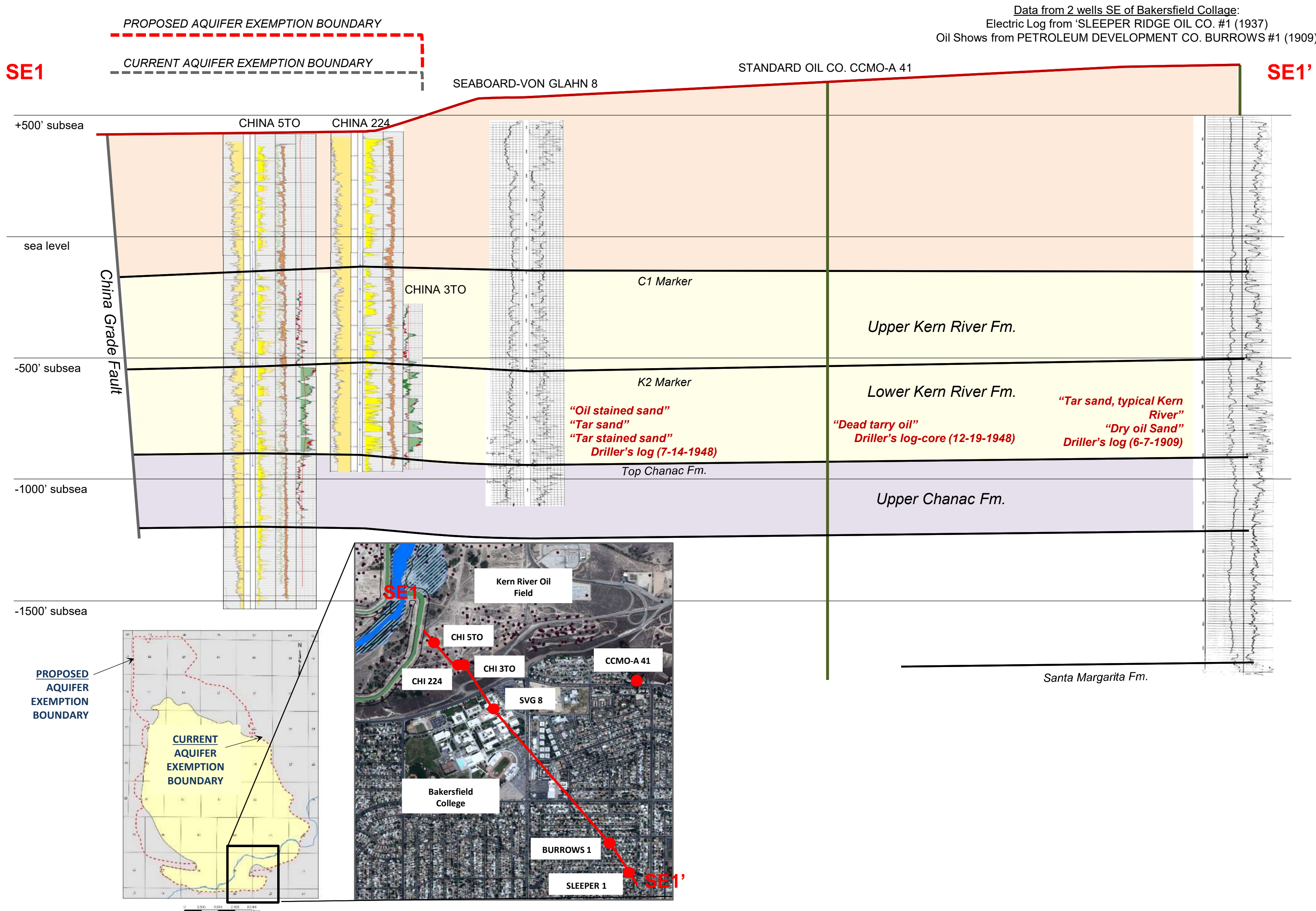



Figure 36 – Extension of Oil along Southeast Boundary of the Kern River Field

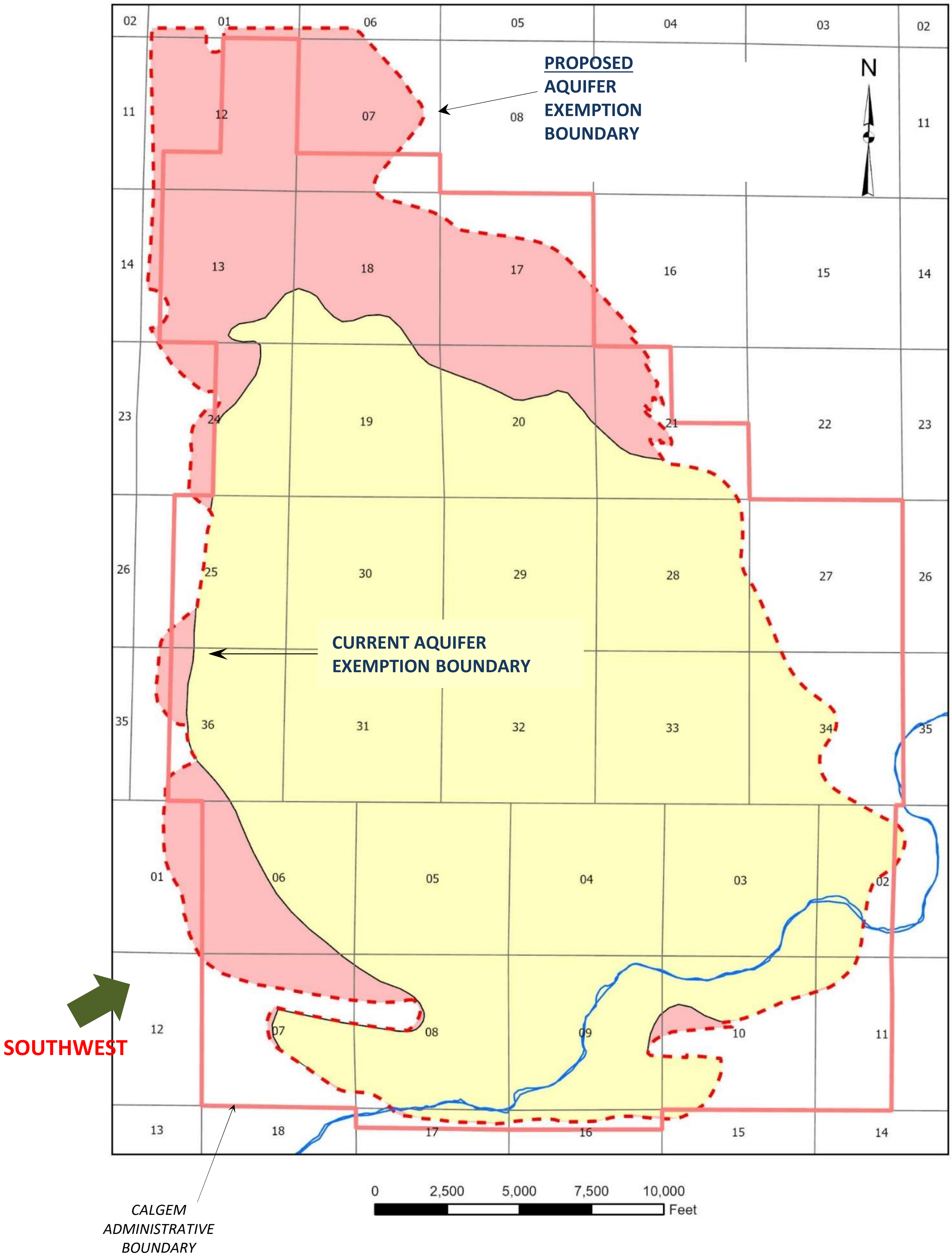
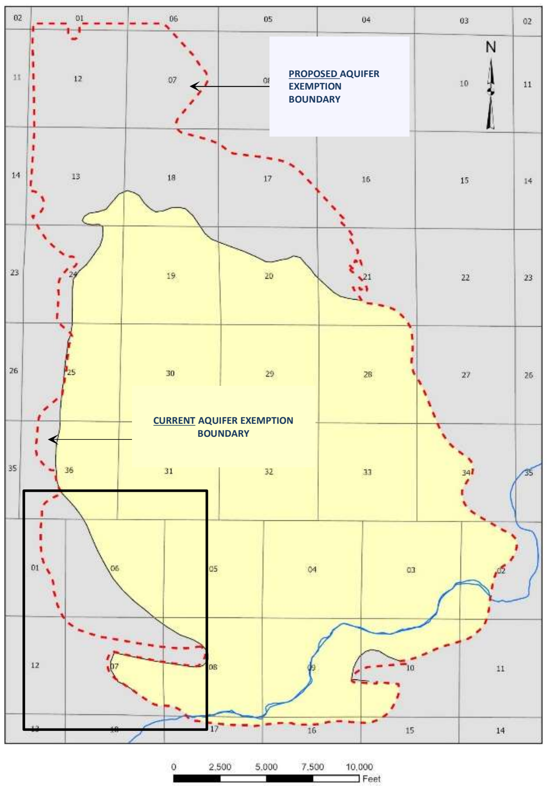



Figure 37 – Proposed Kern River Aquifer Exemption Boundary Southwest Lateral Extent



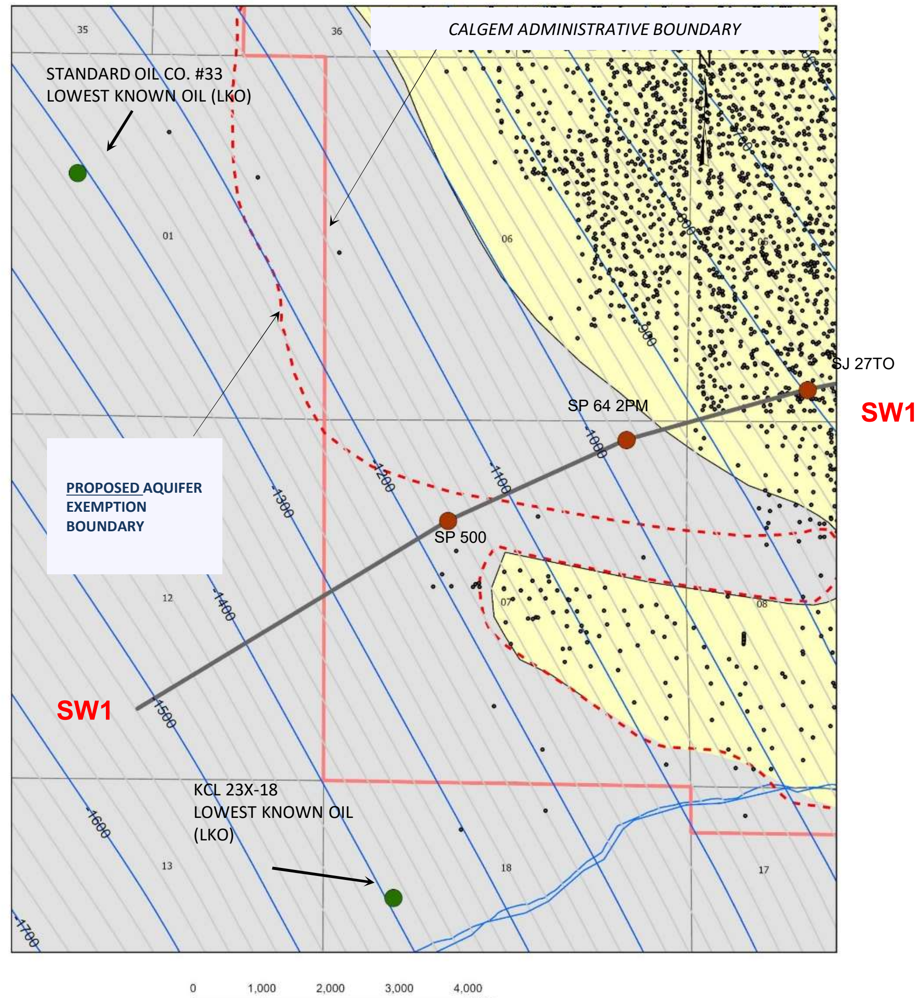




Figure 38 – Cross Section SW1-SW1' Location Lowest Known Oil

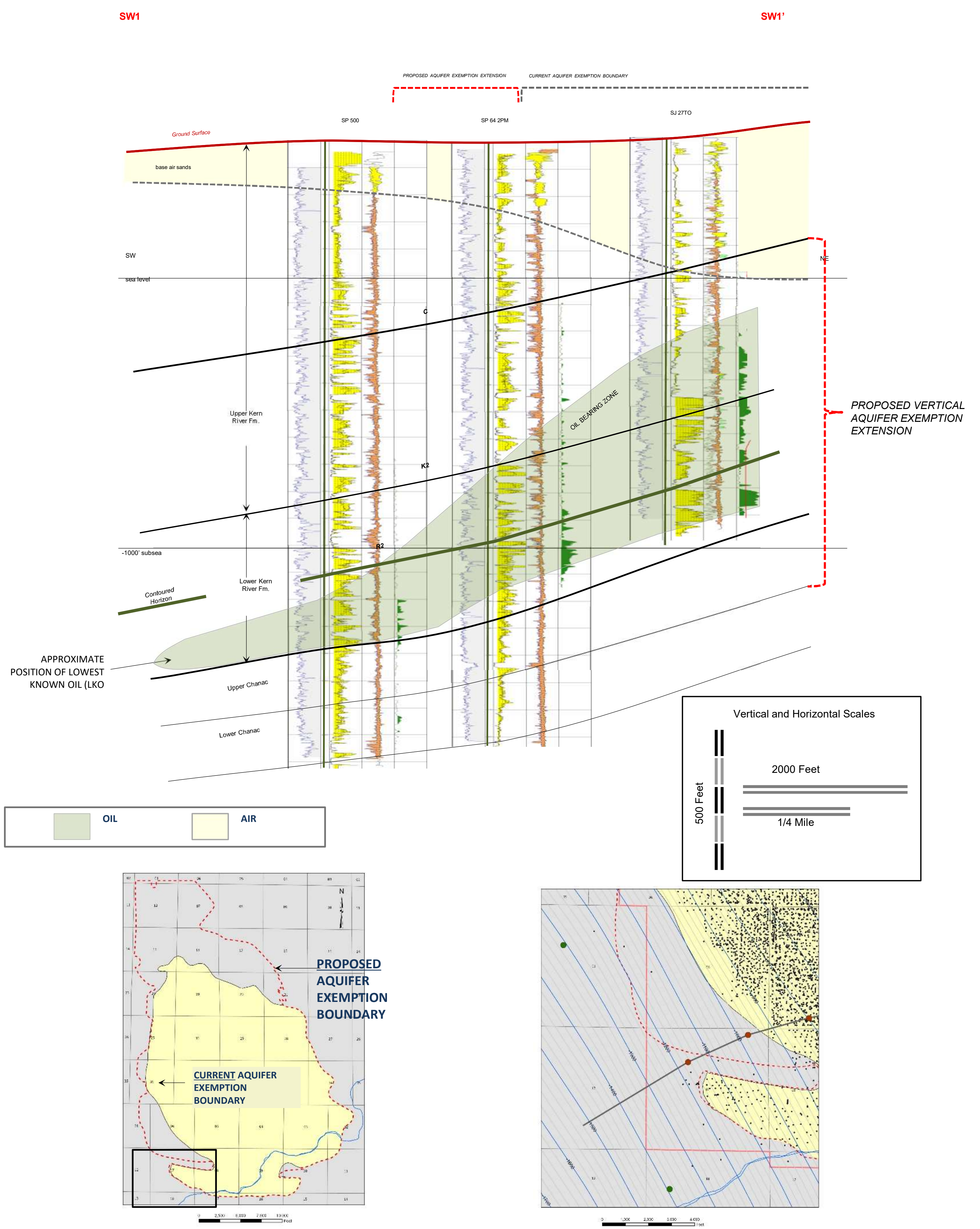



Figure 39 – Cross Section SW1-SW1' Lowest Known Oil

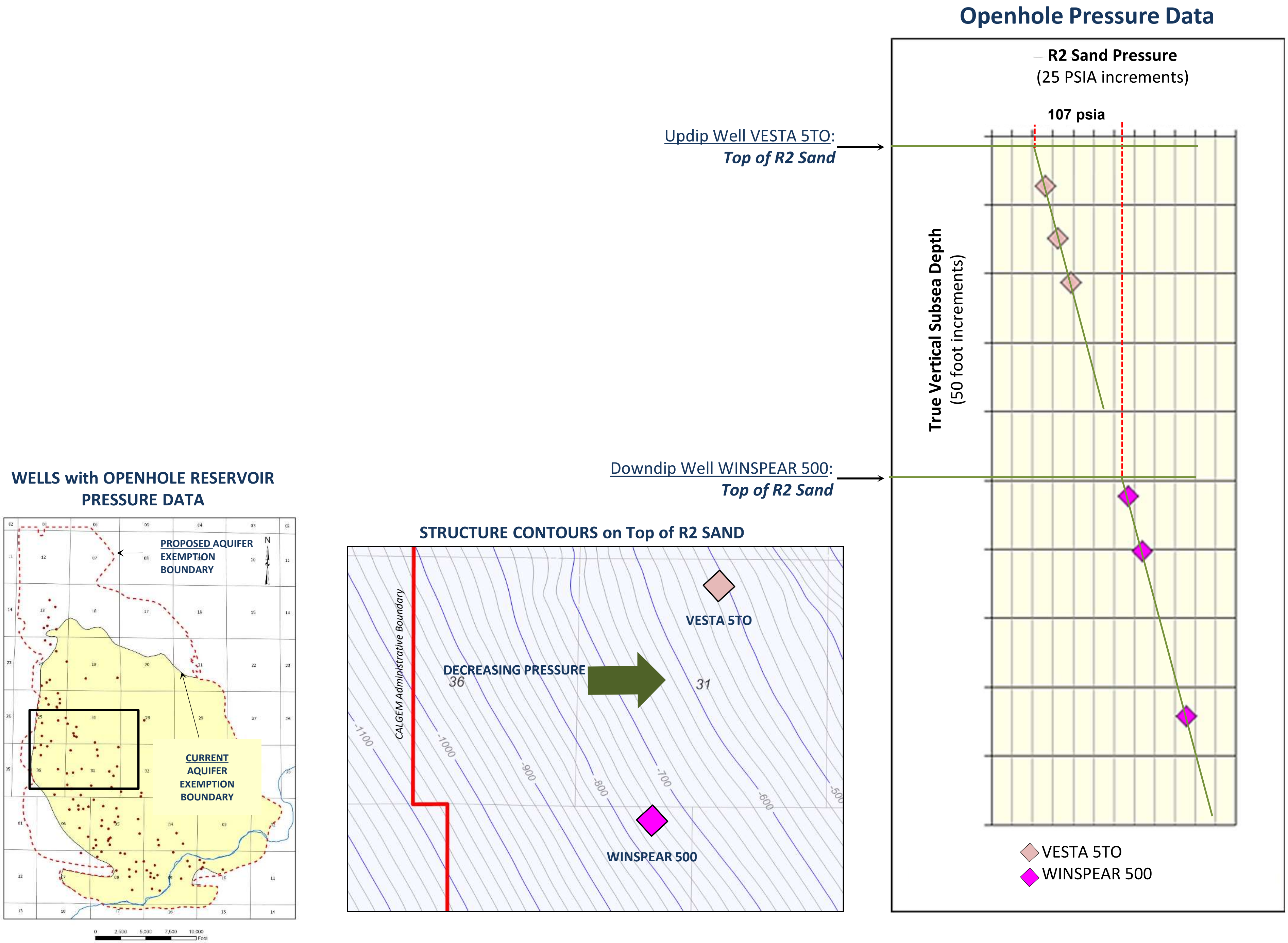



Figure 40 – Openhole Pressure Data

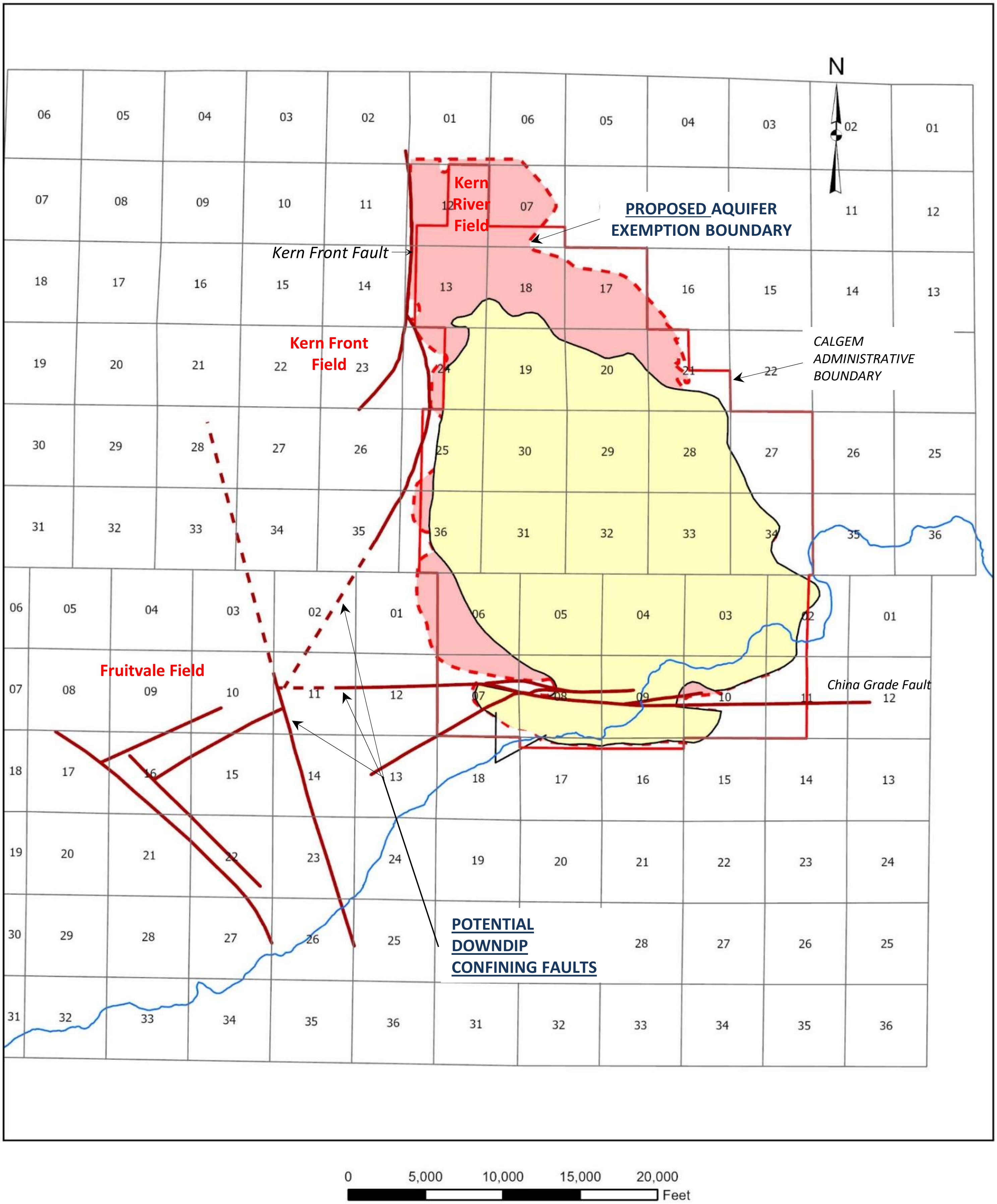
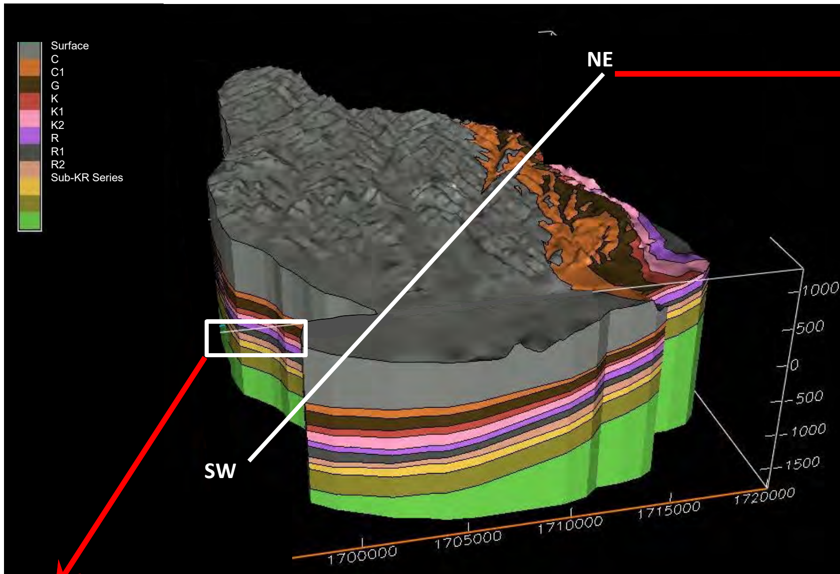
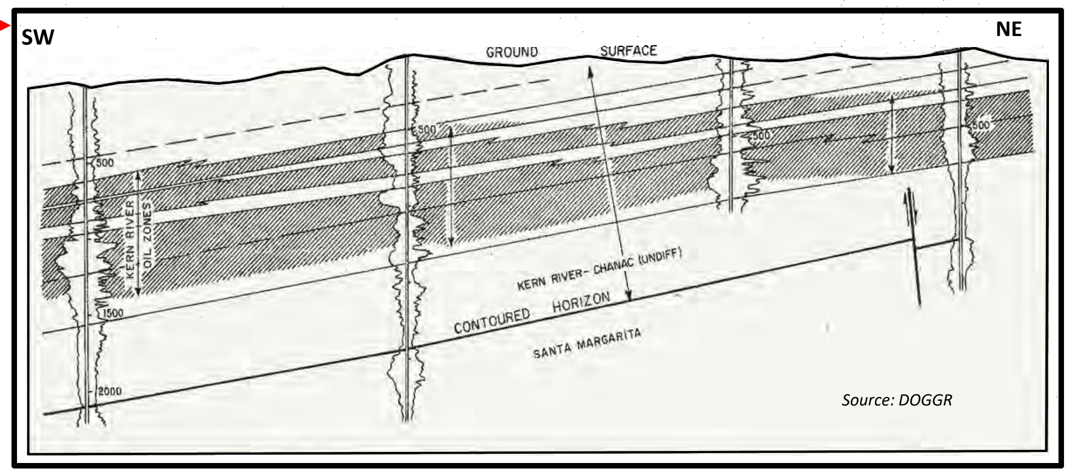


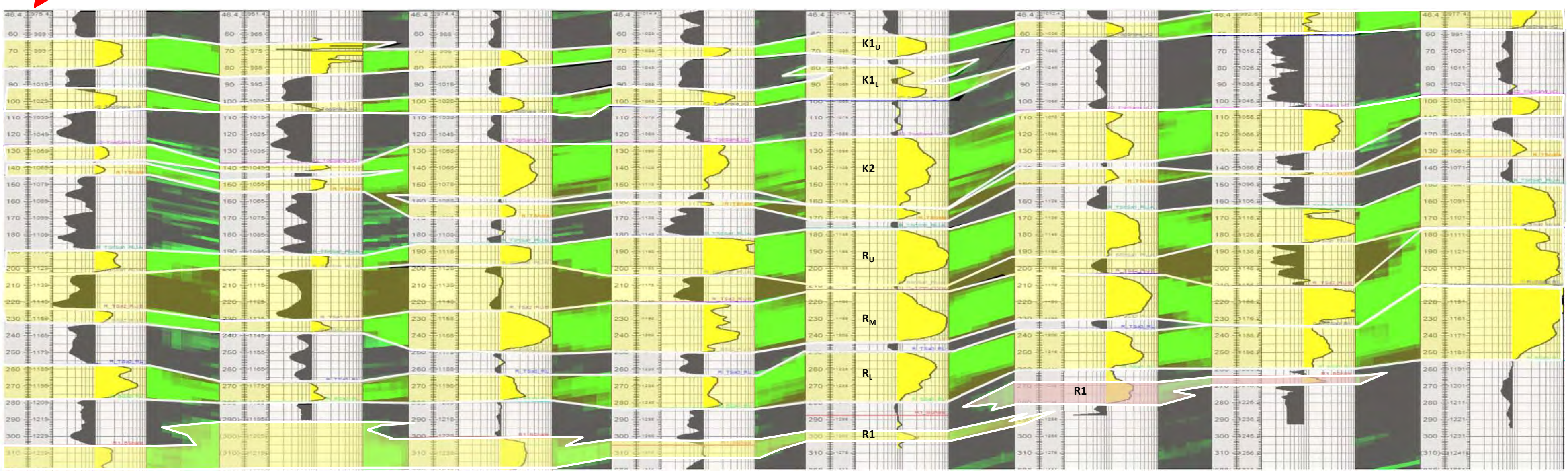

Figure 41 – Sealing Fault Extensions Southwest of Kern River Field



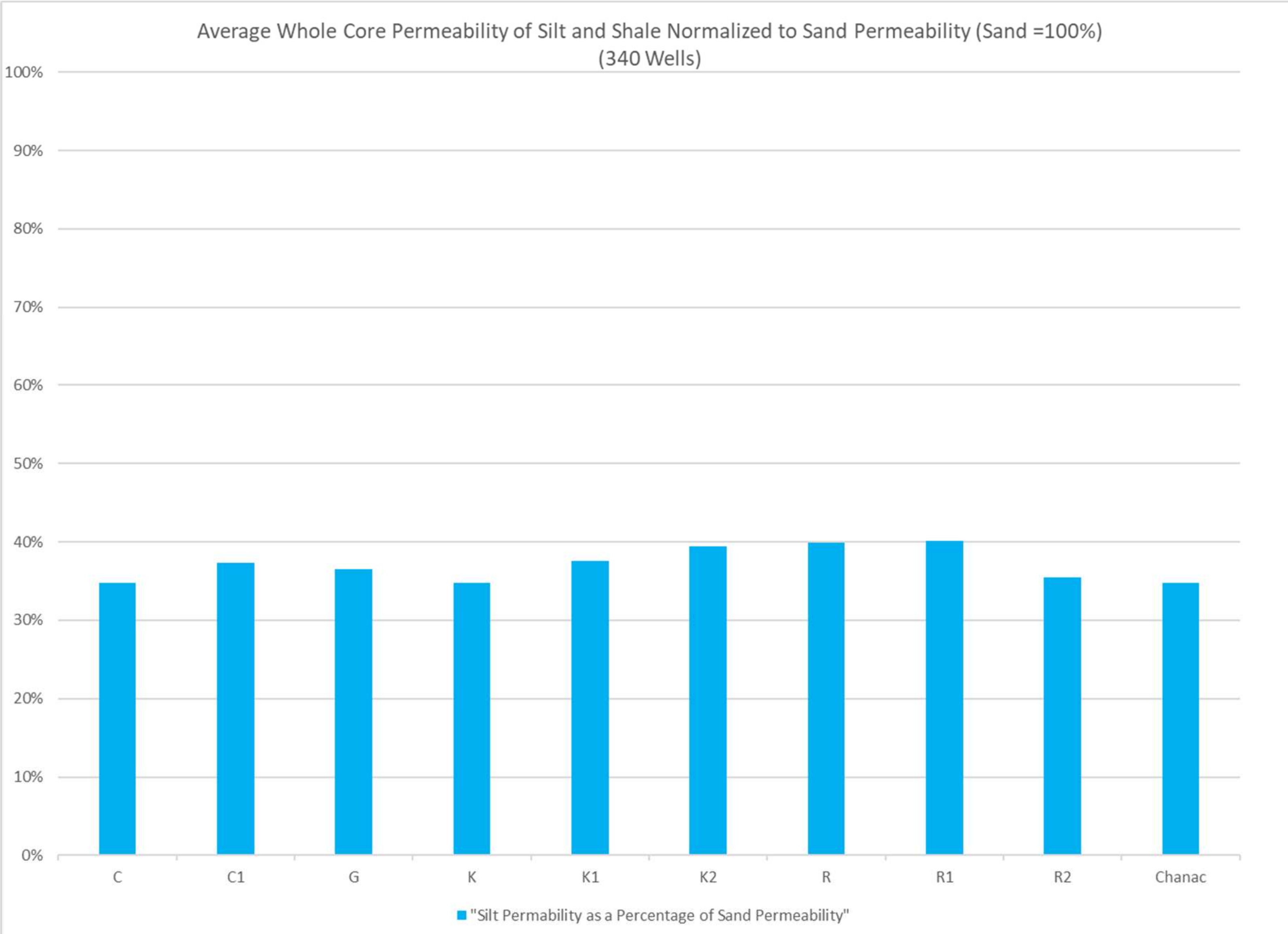

**Generalized Fieldwide Cross-Section**




**Detailed Stratigraphic Cross-Section**




## Figure 42 - Formation Architecture




Whole Core Wells

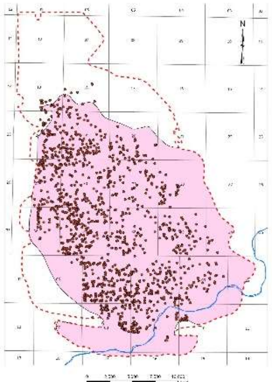


Figure 43 – Silt/Clay Effective Permeability Fraction – Kern River Formation

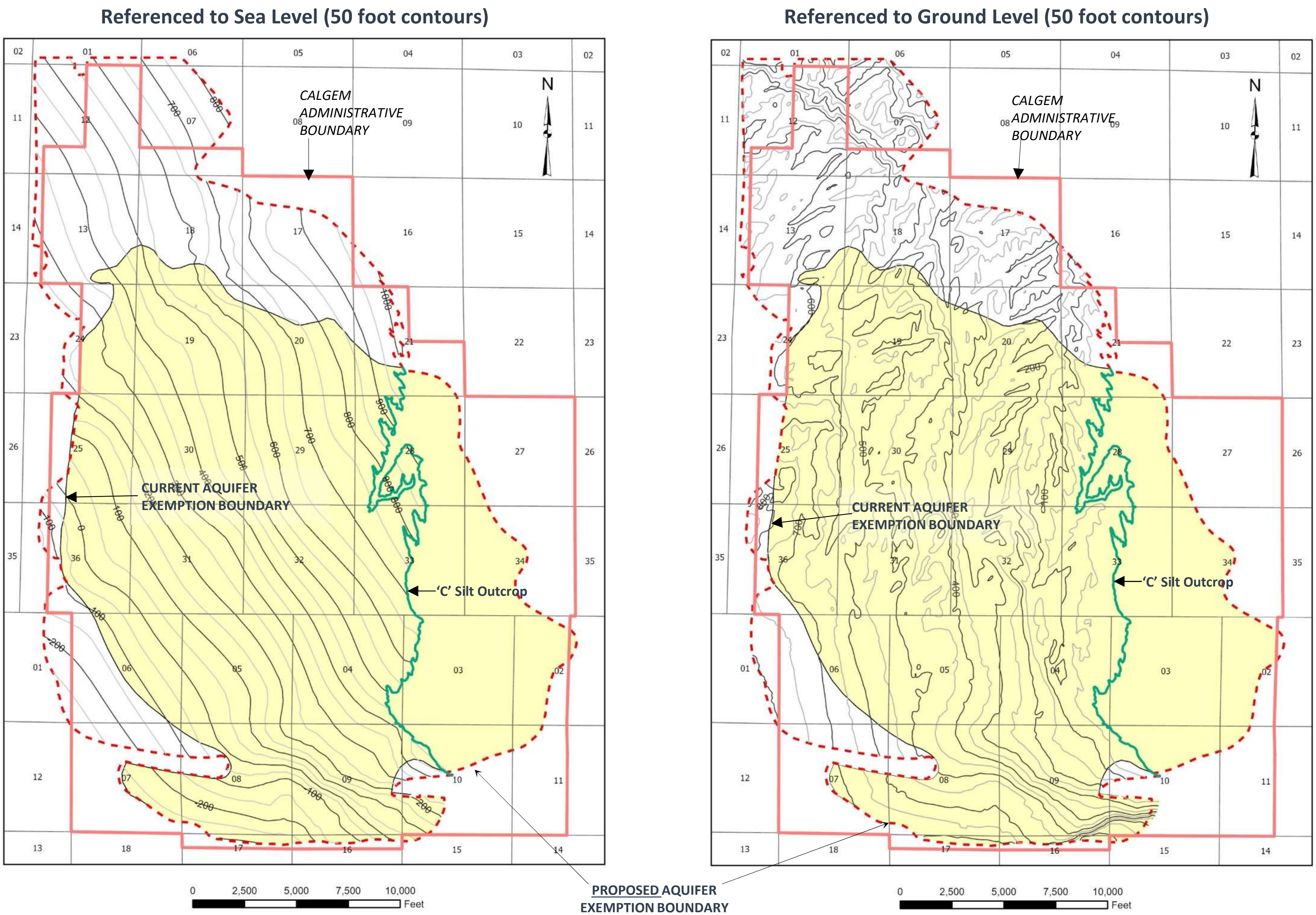



Figure 44 – Structure Map – Top of Confining 'G' Silt

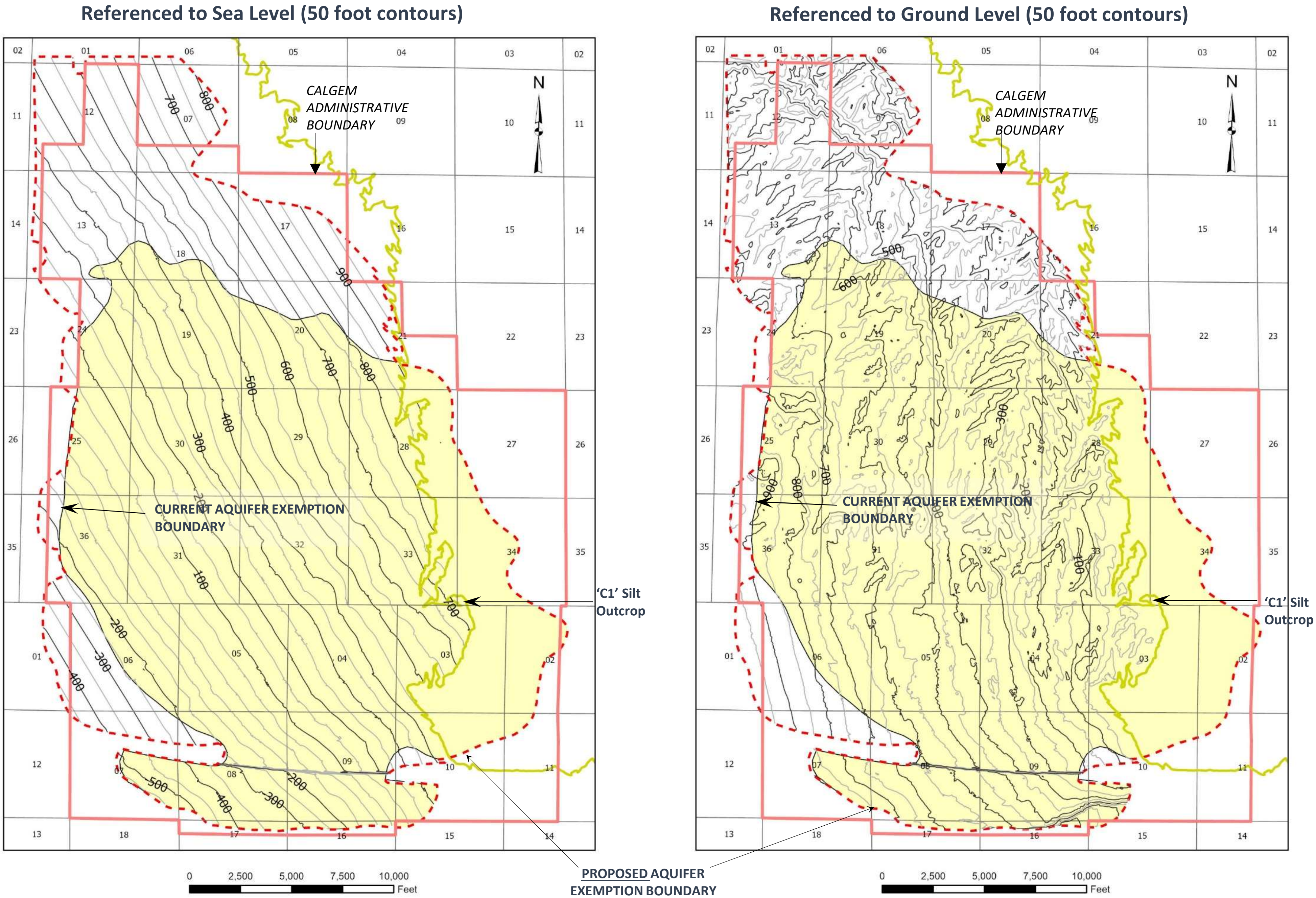



Figure 45 – Structure Map – Top of Confining 'C1' Silt

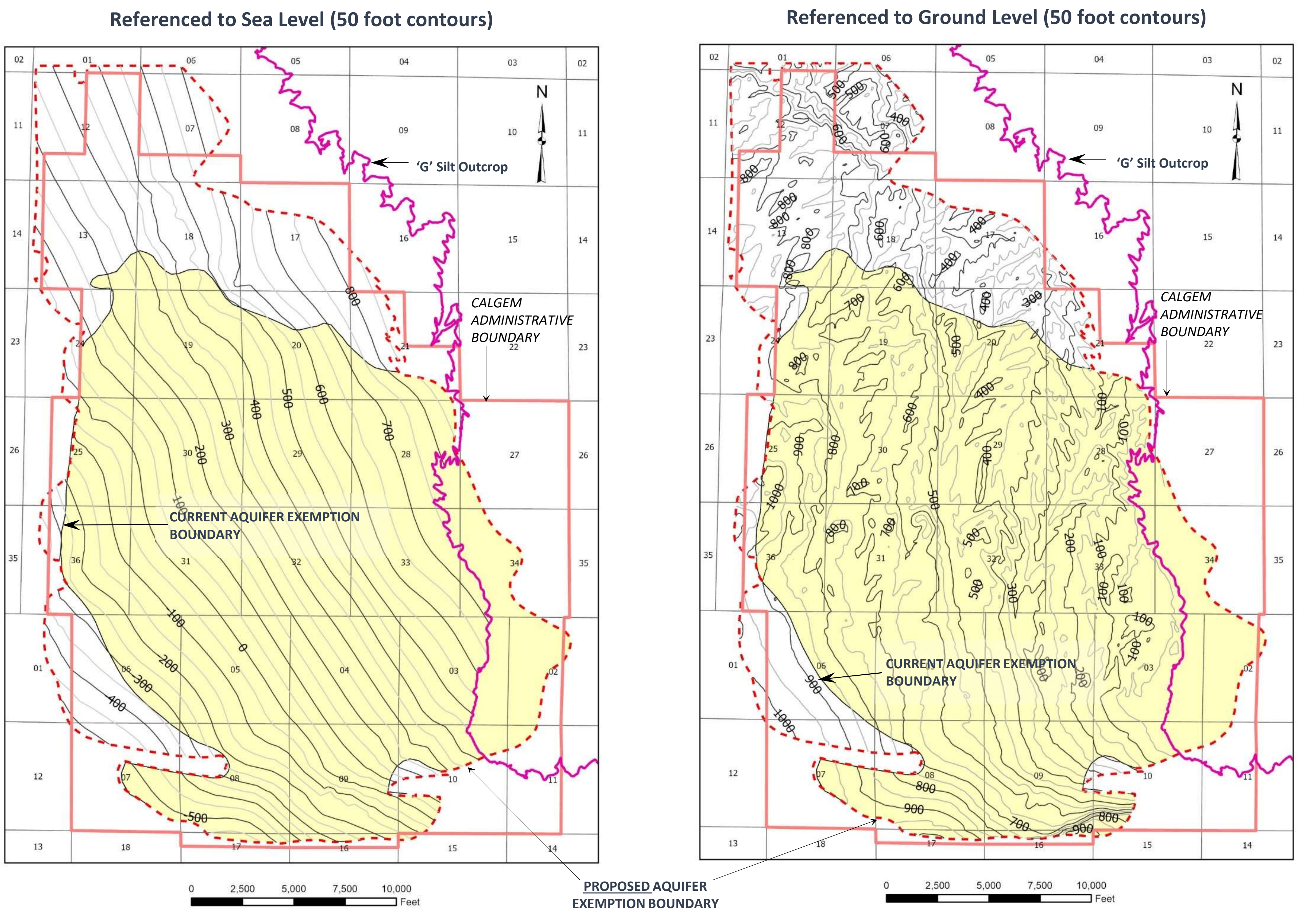



Figure 46 – Structure Map – Top of Confining 'G' Silt

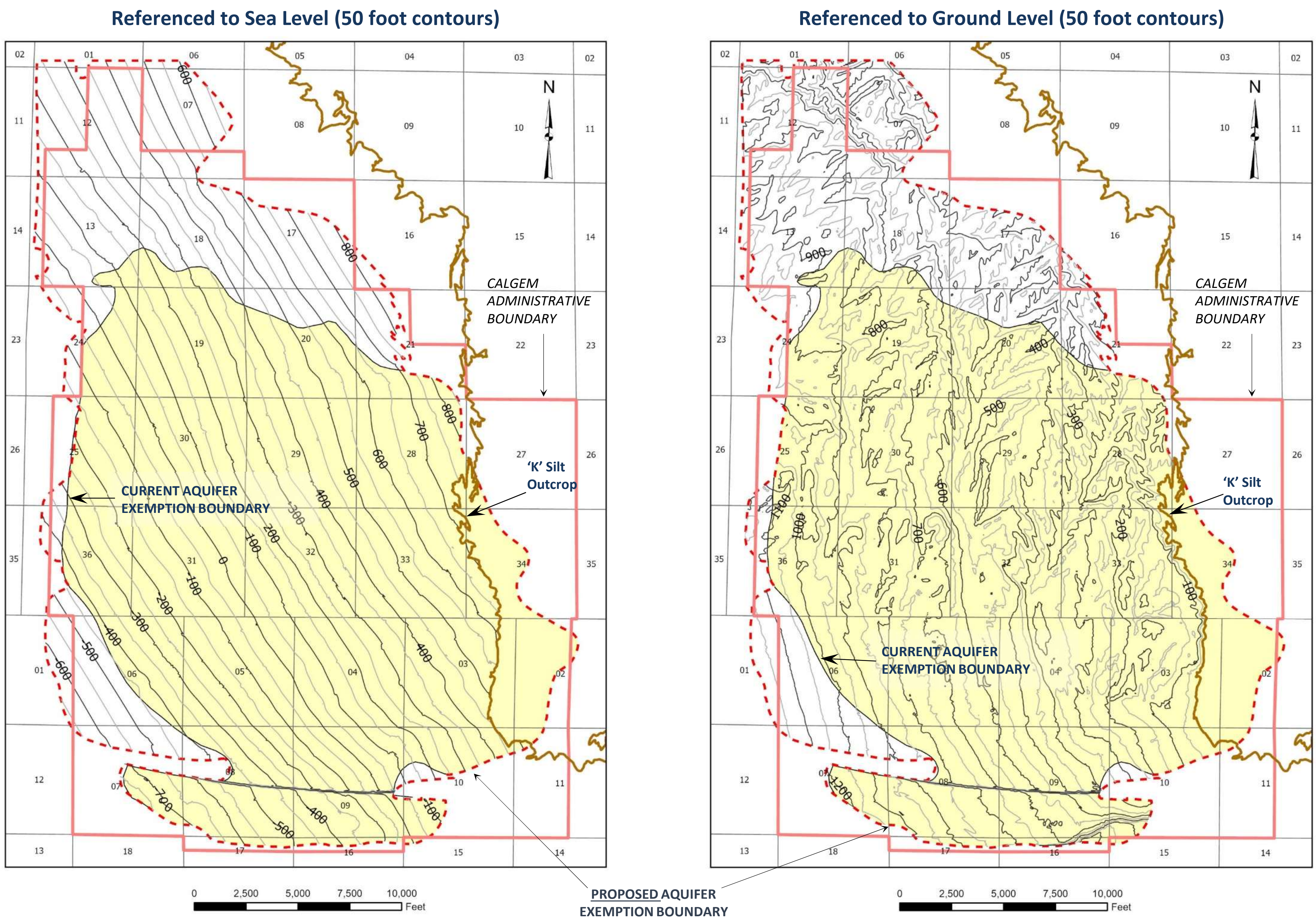
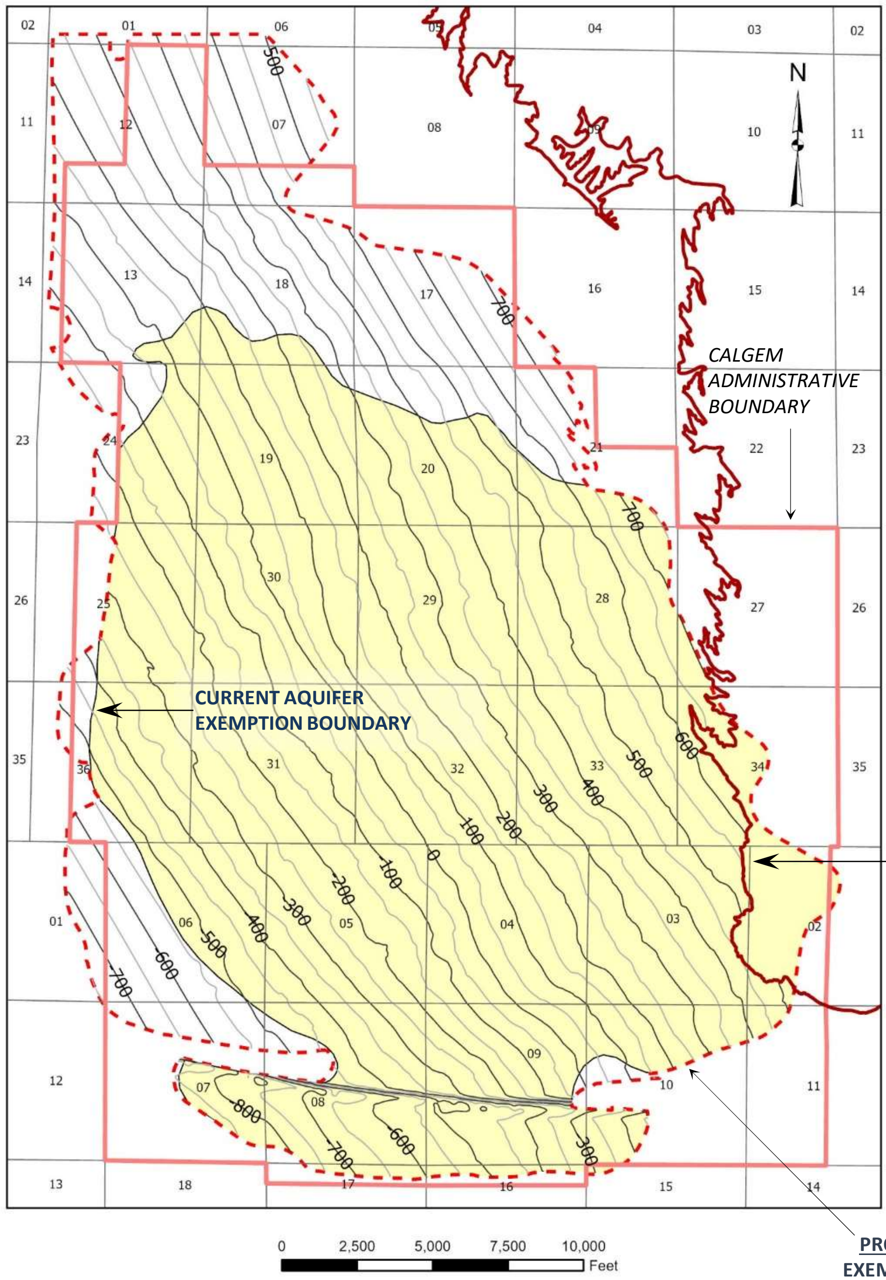
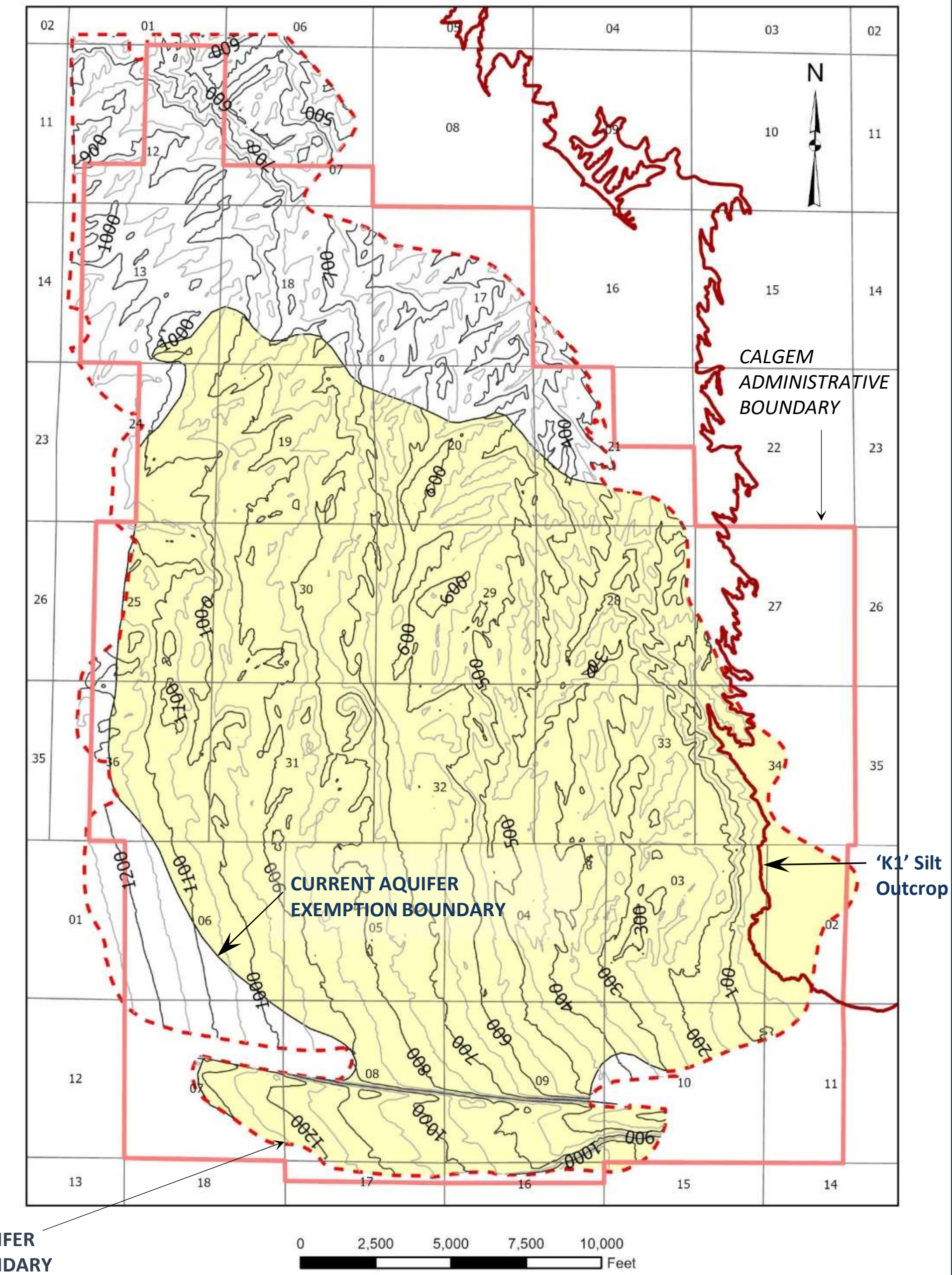



Figure 47 – Structure Map – Top of Confining 'K' Silt

## Referenced to Sea Level (50 foot contours)




## Referenced to Ground Level (50 foot contours)




PROPOSED AQUIFER
EXEMPTION BOUNDARY

Figure 48 – Structure Map – Top of Confining 'K1' Silt

## Referenced to Sea Level (50 foot contours)

## Referenced to Ground Level (50 foot contours)

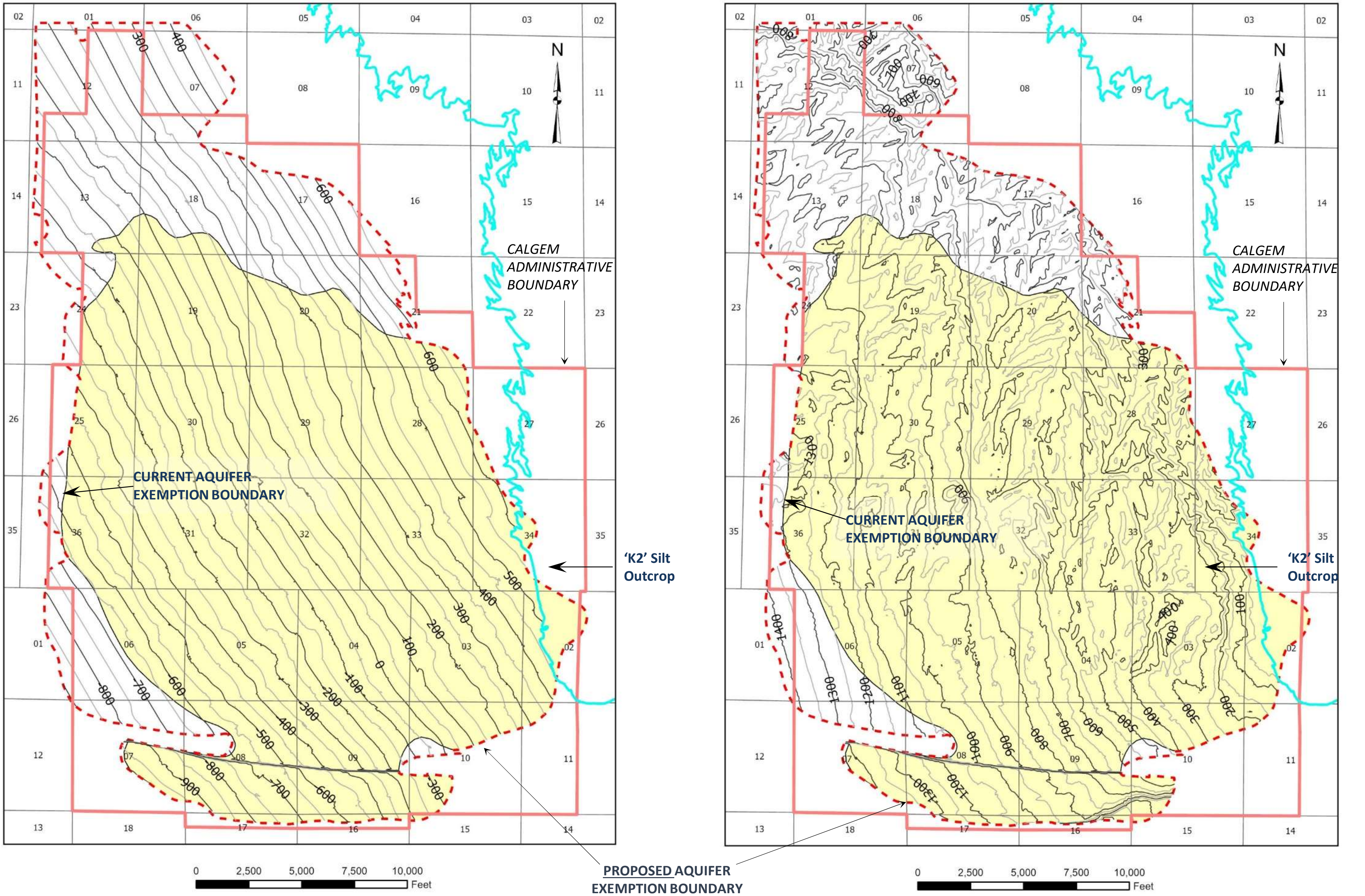
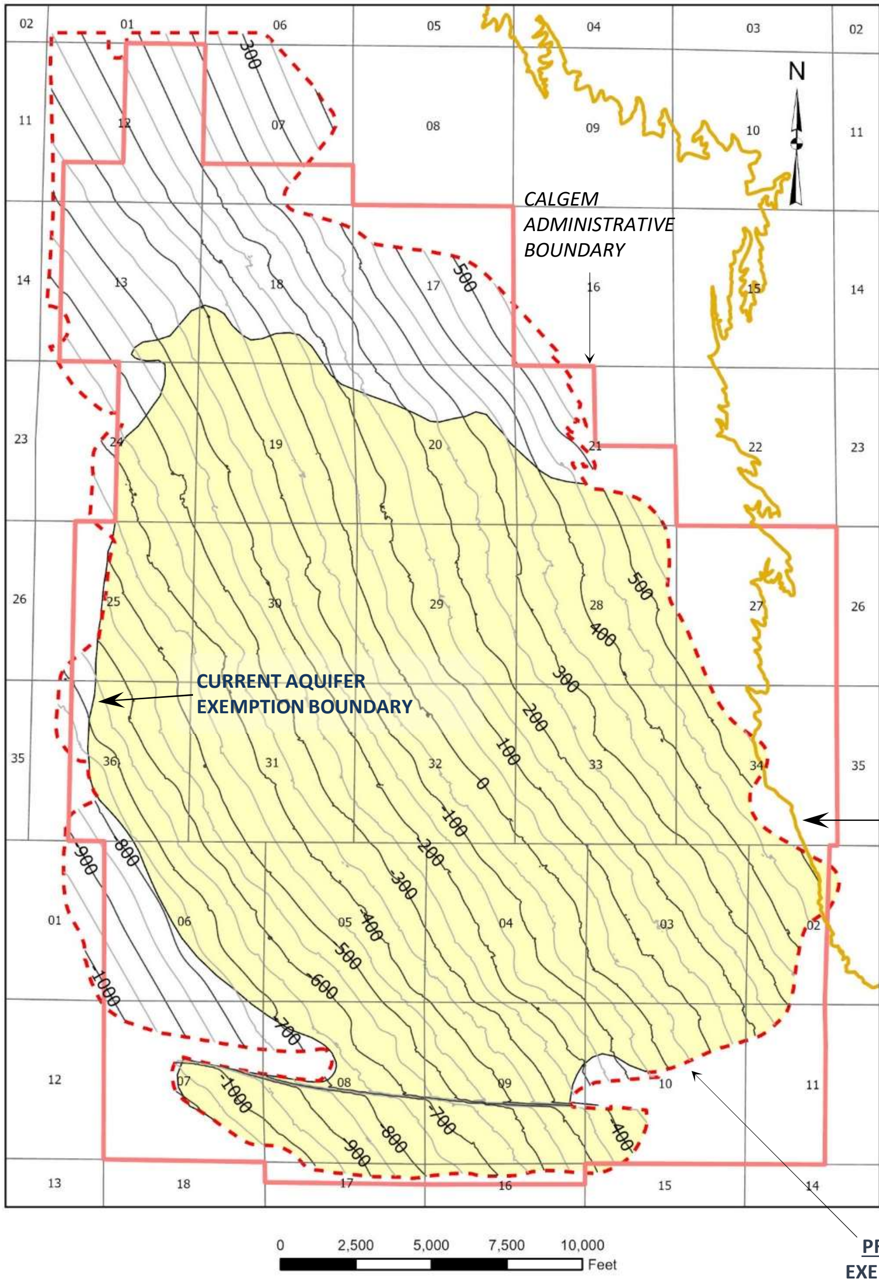



Figure 49 – Structure Map – Top of Confining 'K2' Silt

## Referenced to Sea Level (50 foot contours)




## Referenced to Ground Level (50 foot contours)

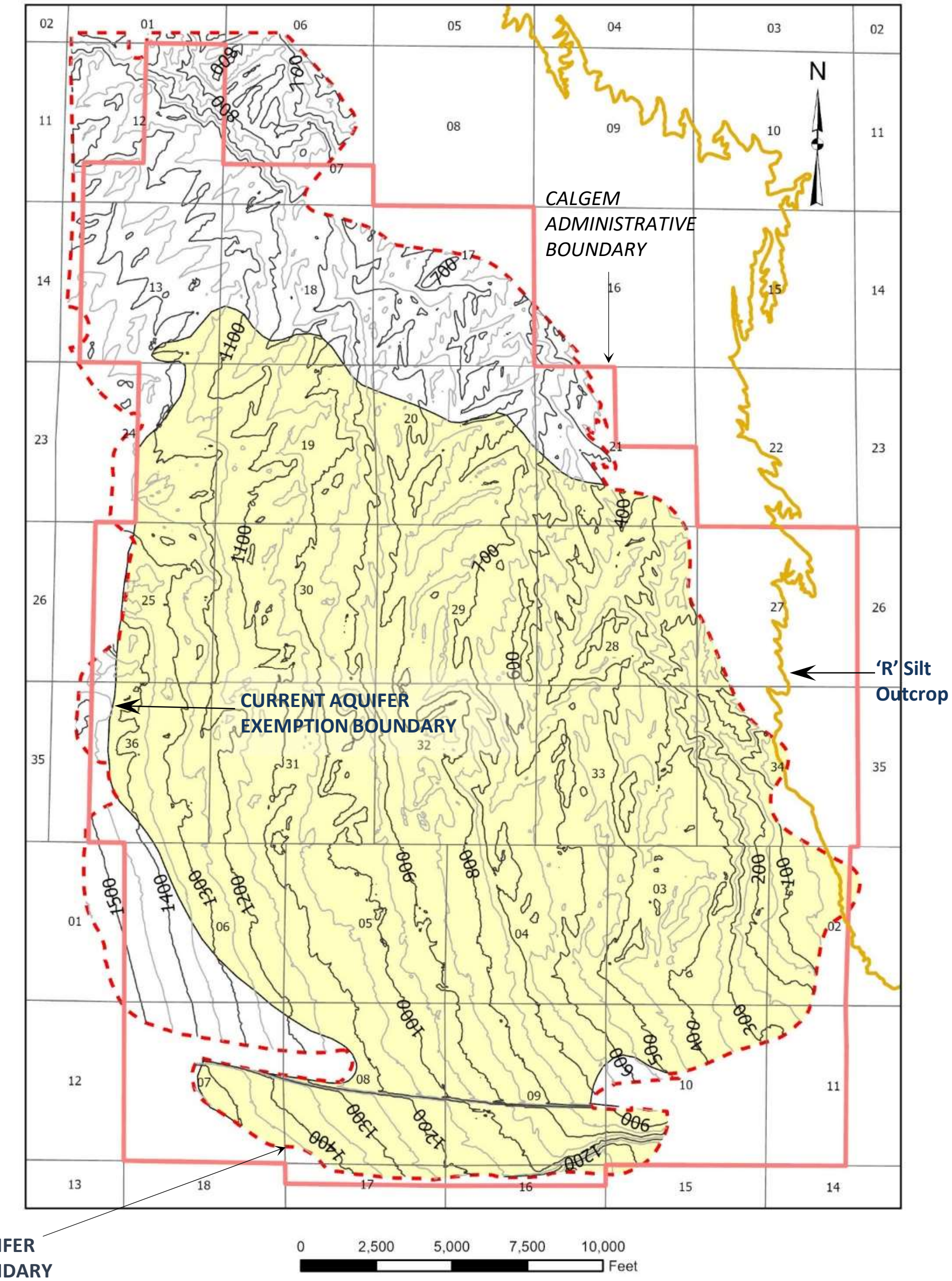



Figure 50 – Structure Map – Top of Confining 'R' Silt

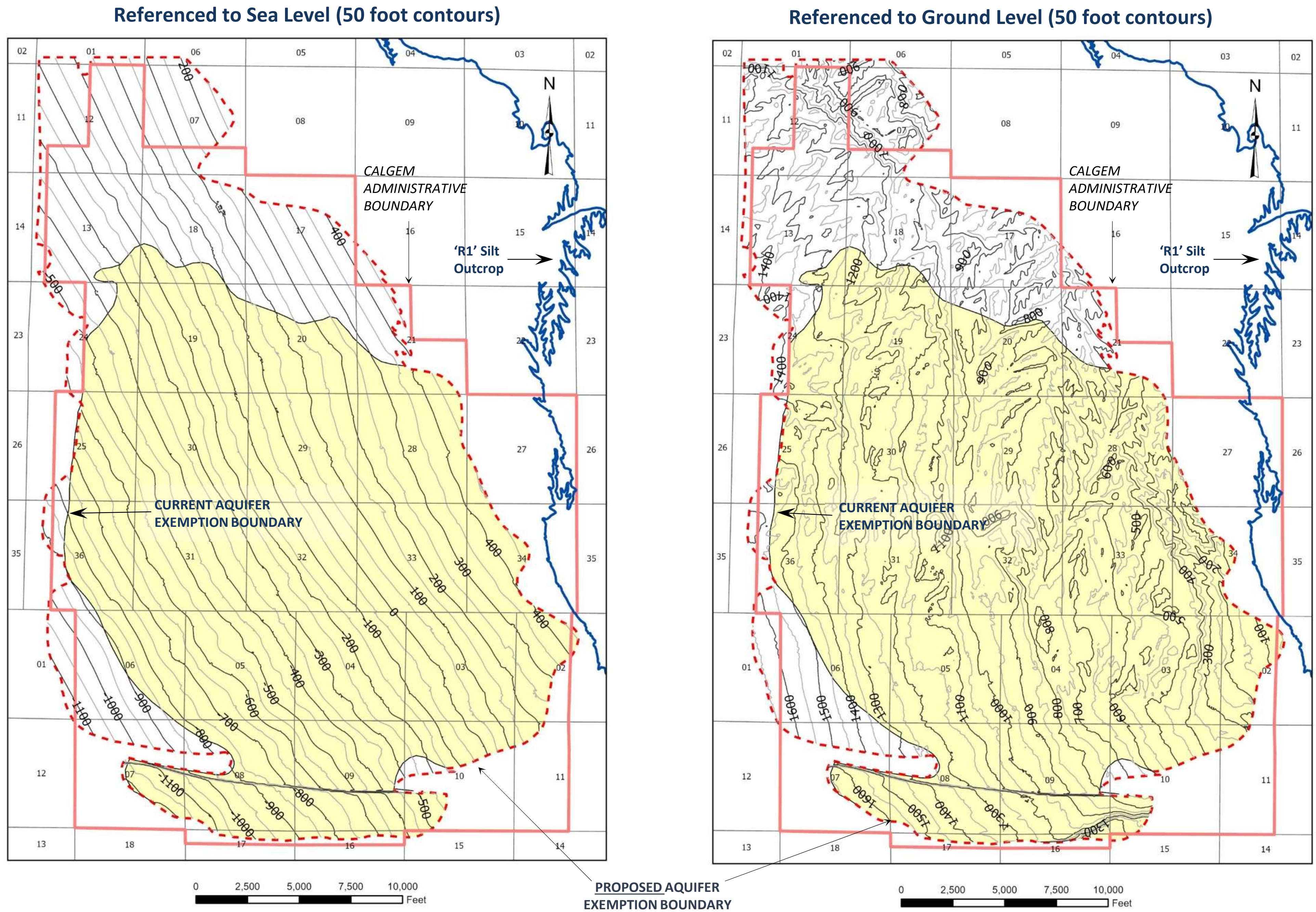



Figure 51 – Structure Map – Top of Confining 'R1' Silt

**Referenced to Sea Level (50 foot contours)** **Referenced to Ground Level (50 foot contours)**

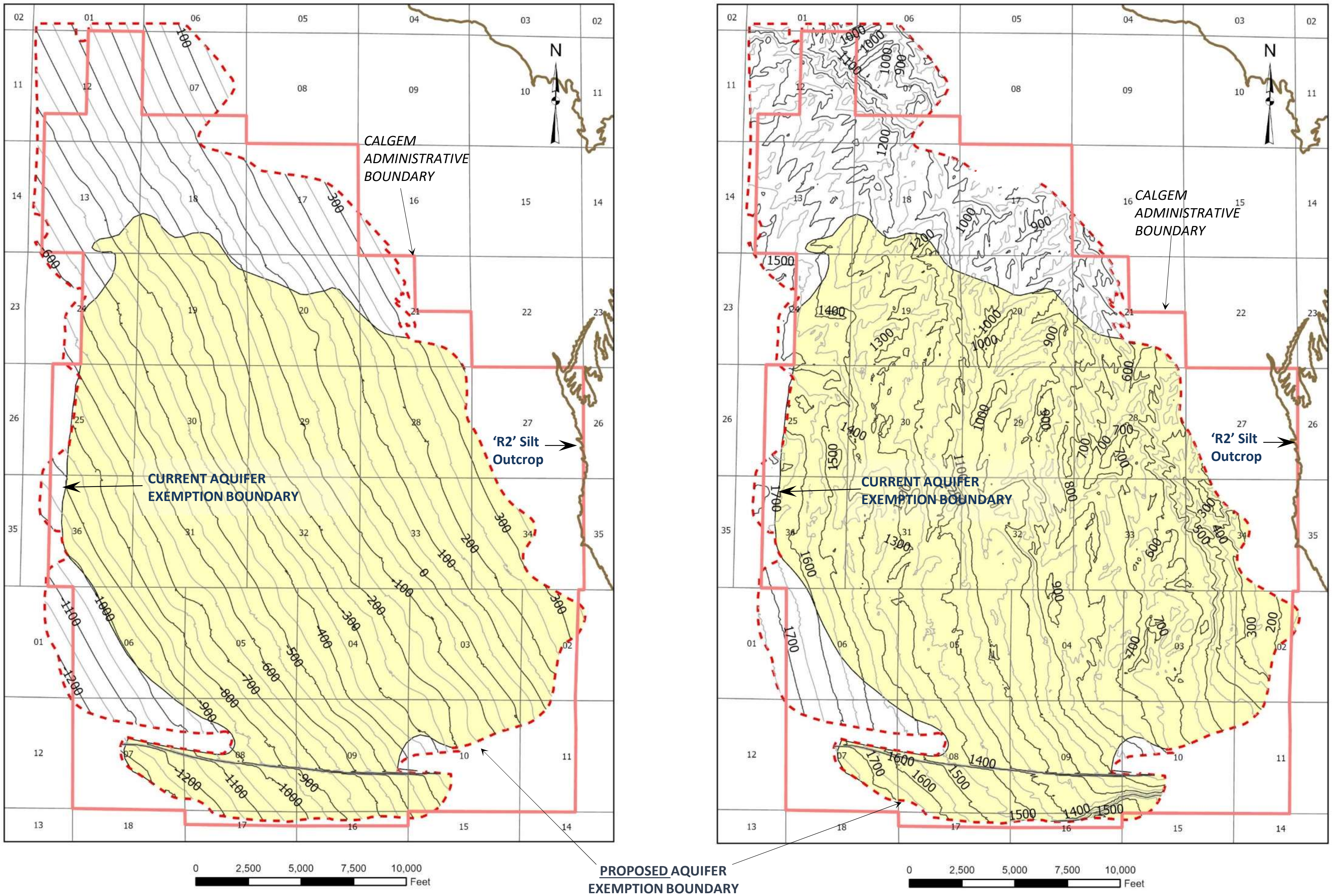



Figure 52 – Structure Map – Top of Confining 'R2' Silt

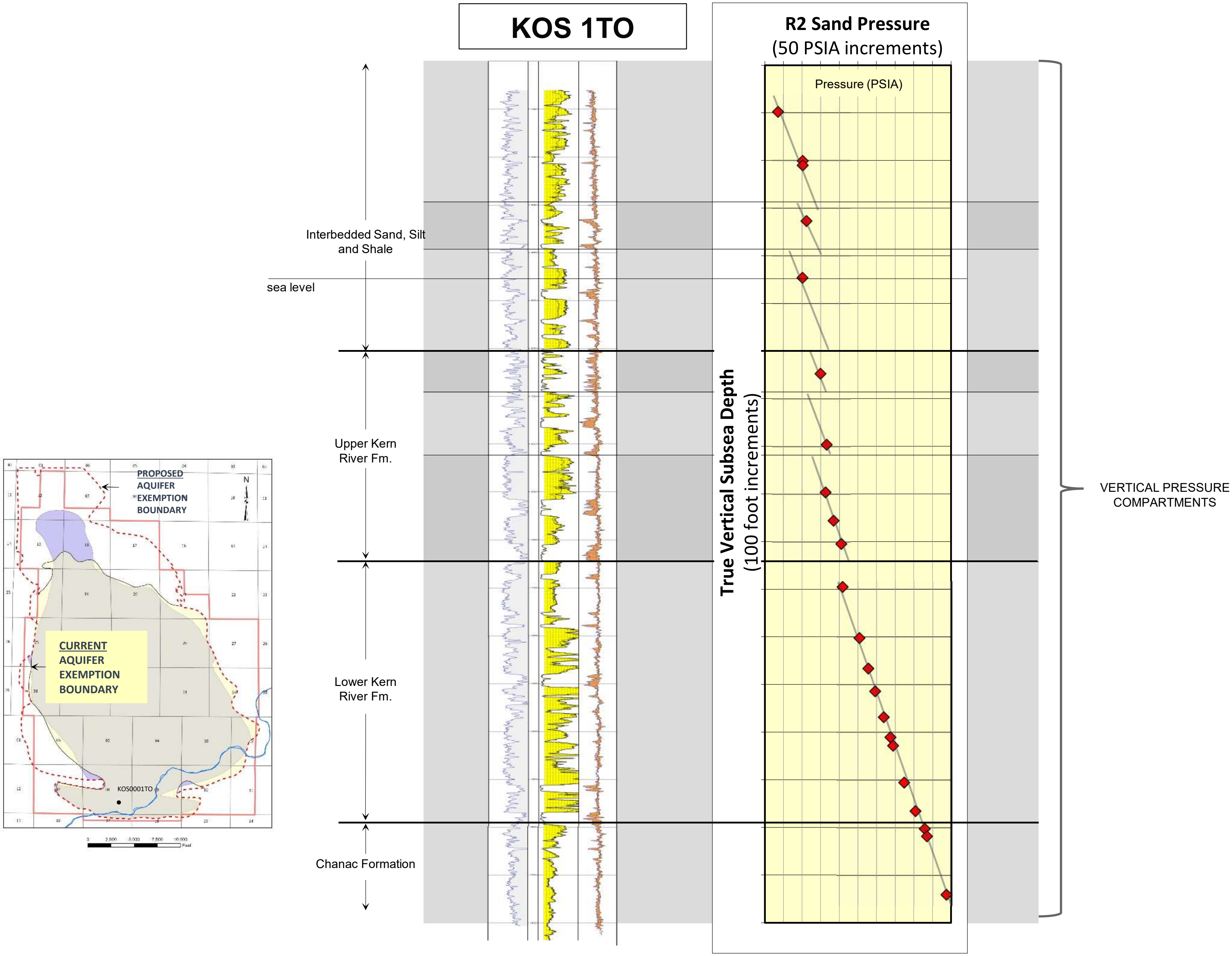



Figure 53 – Pressure Compartmentalization Due to Vertical Permeability Barriers

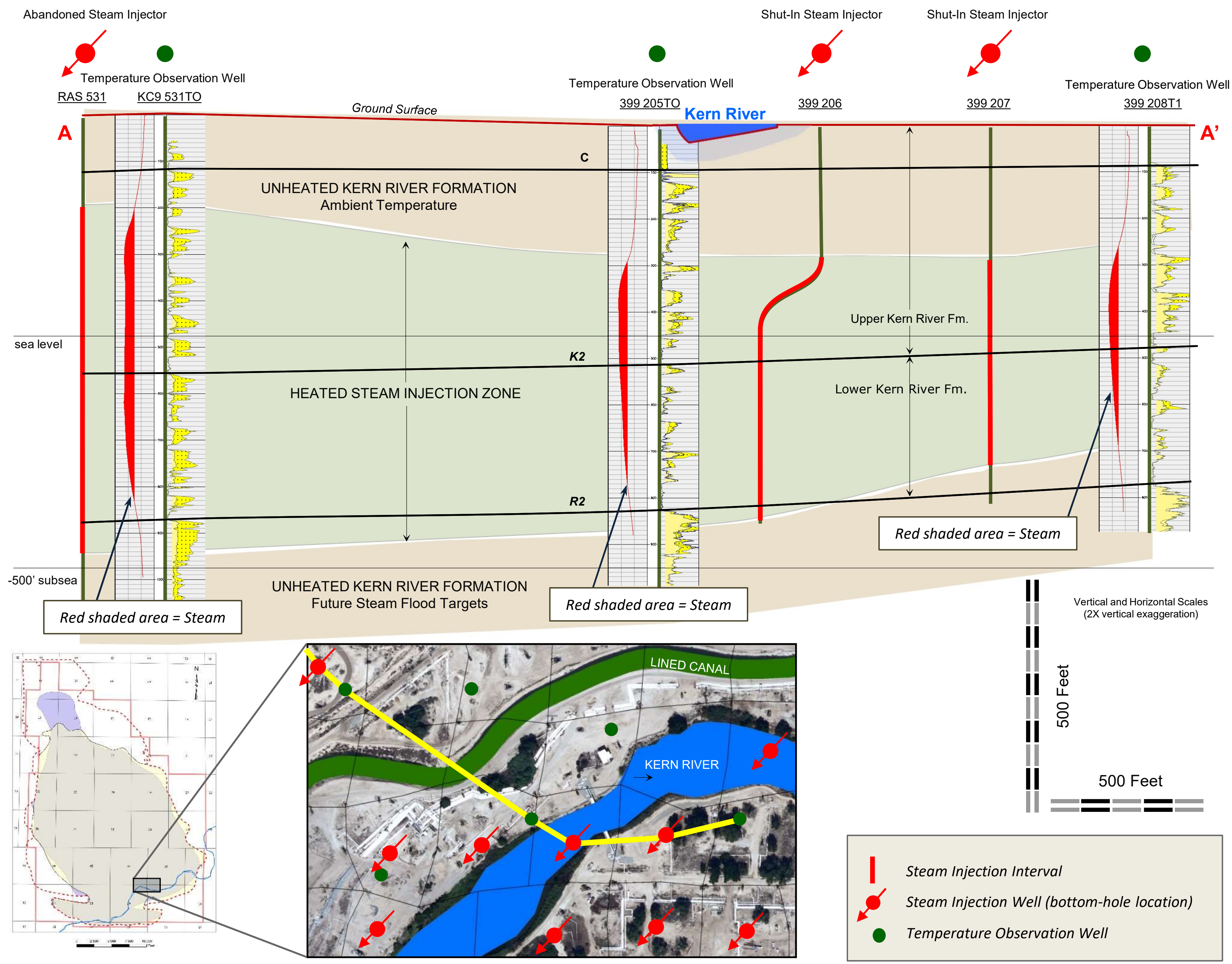



Figure 54 – Injection Zone Isolation Kern River Waterway

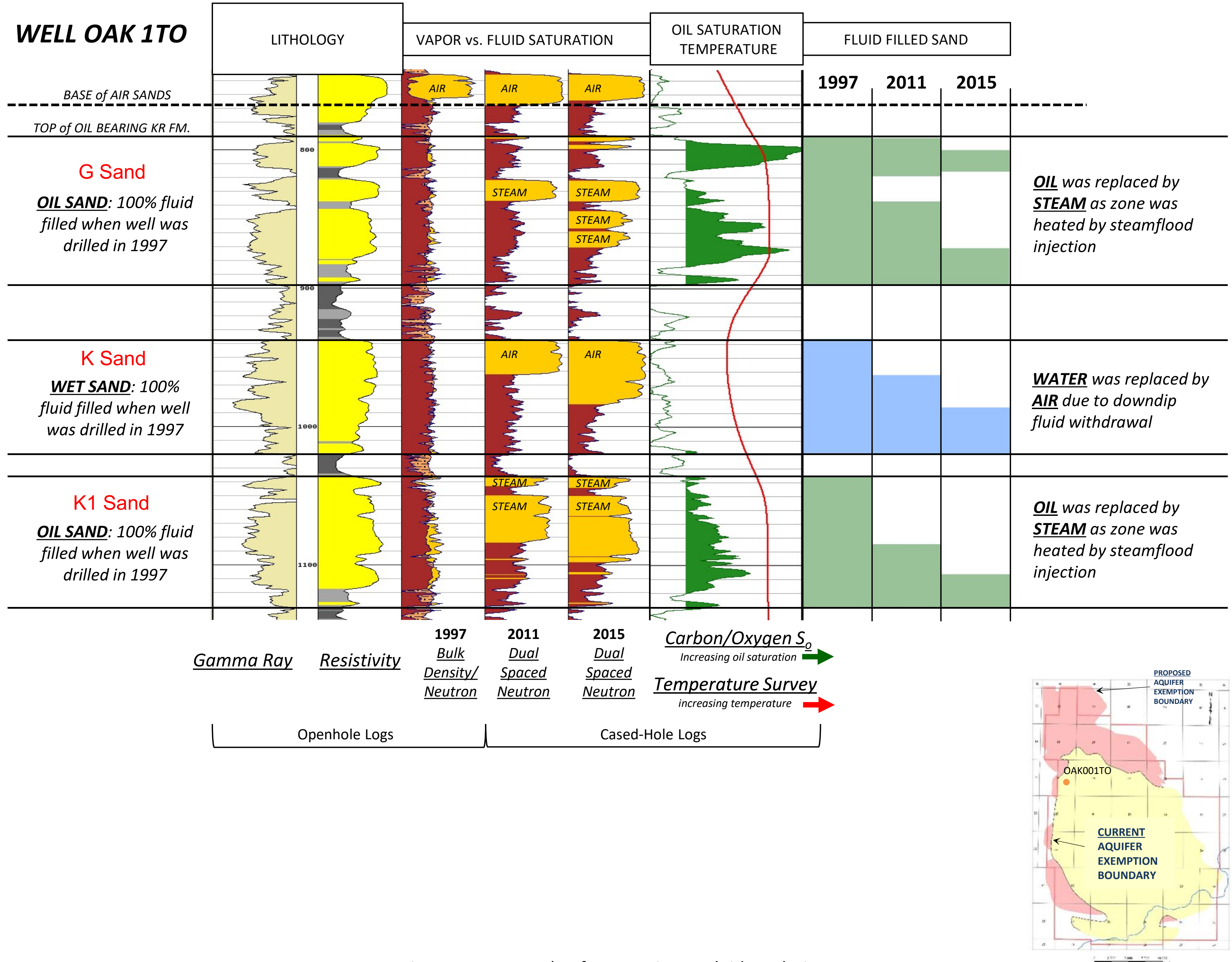
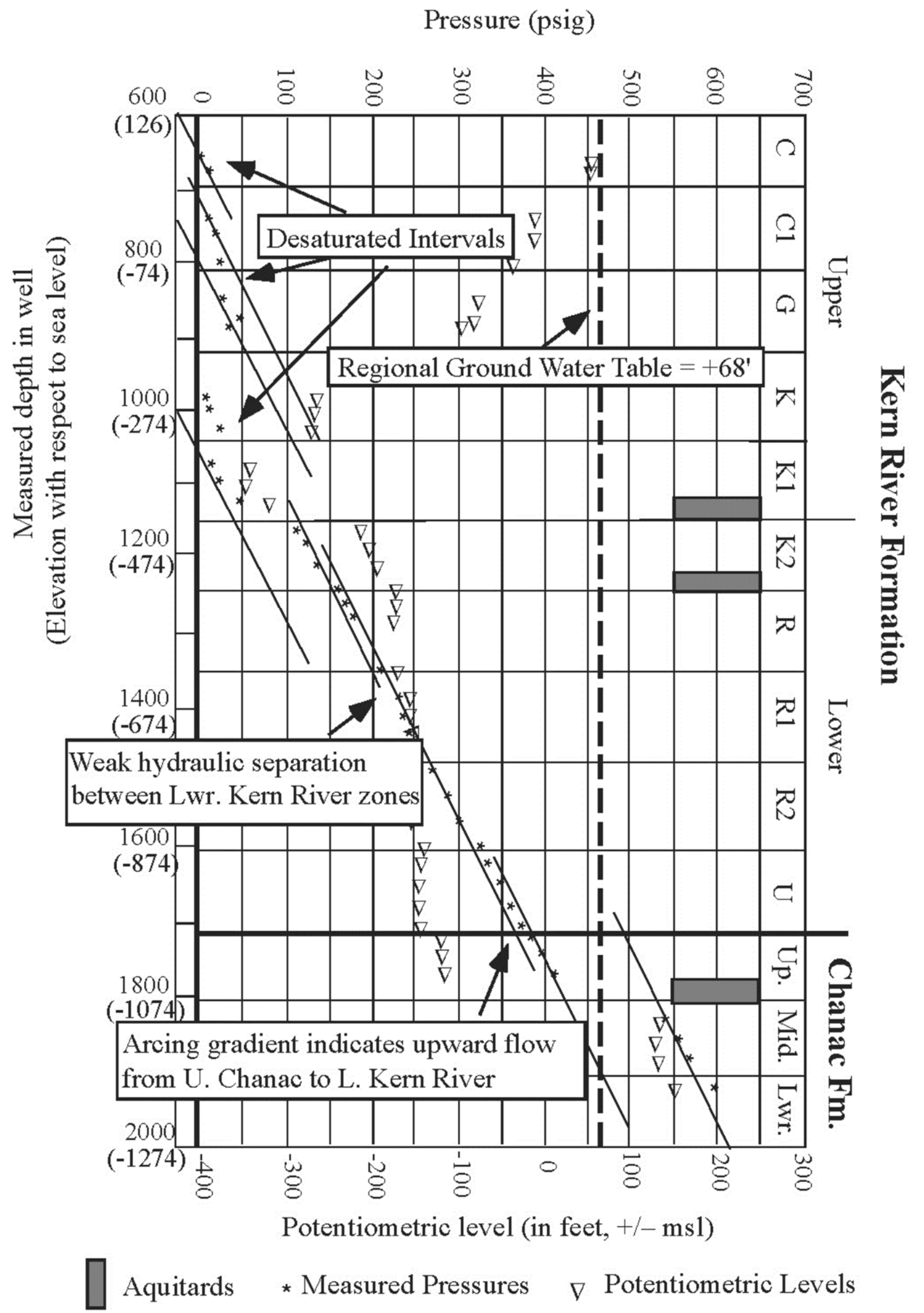



Figure 55 – Example of Reservoir Net Fluid Depletion




Source: Coburn , M.G, Gillespie, J.M. 2002. A Hydrogeologic Study to Optimize Steamflood Performance in a Giant Oilfield: Kern River Field, California . AAPG Bulletin v. 86, no. 8.

**Figure 56 - Vertical Reservoir Pressure Data, 2013-2014**

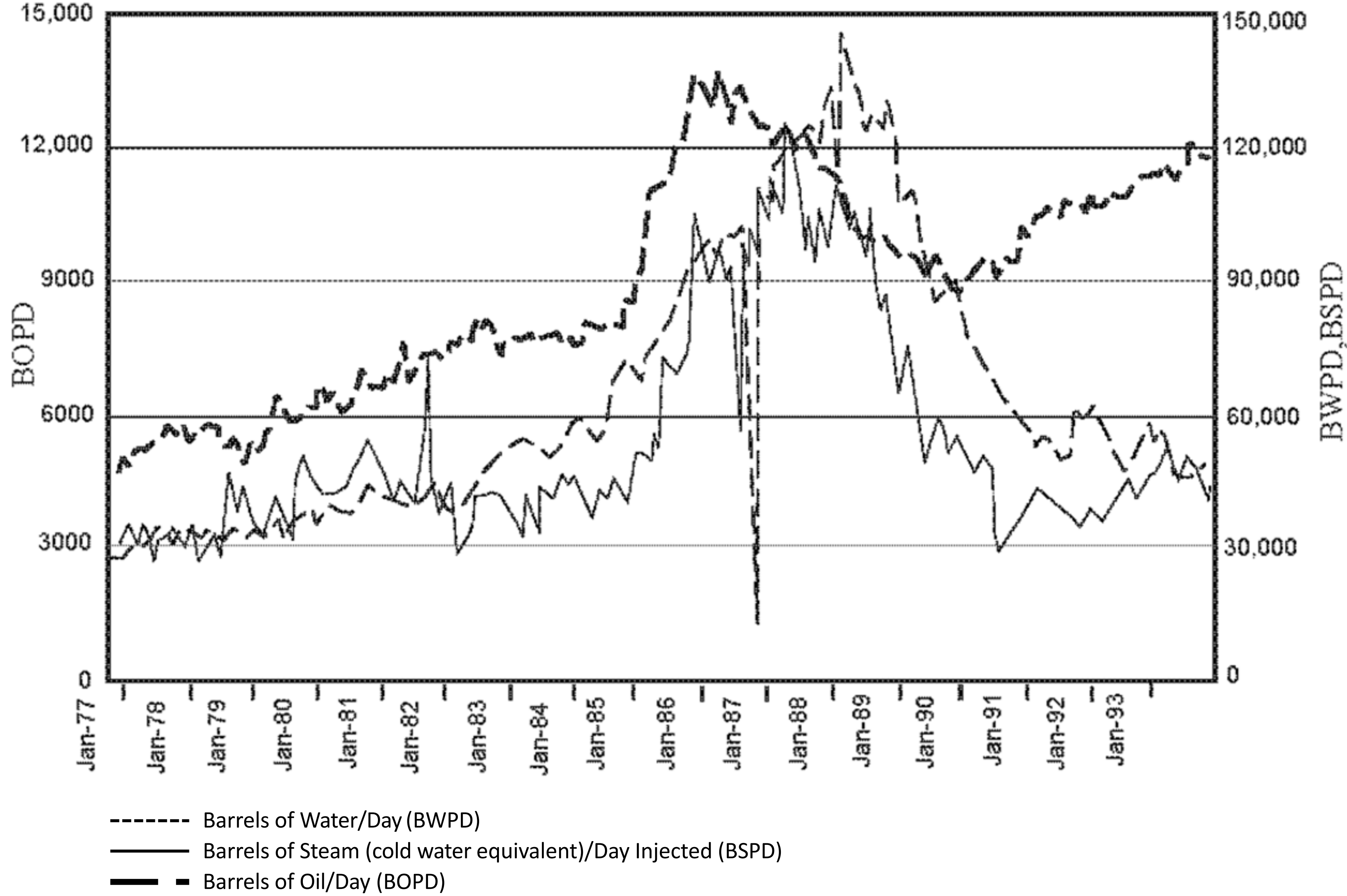
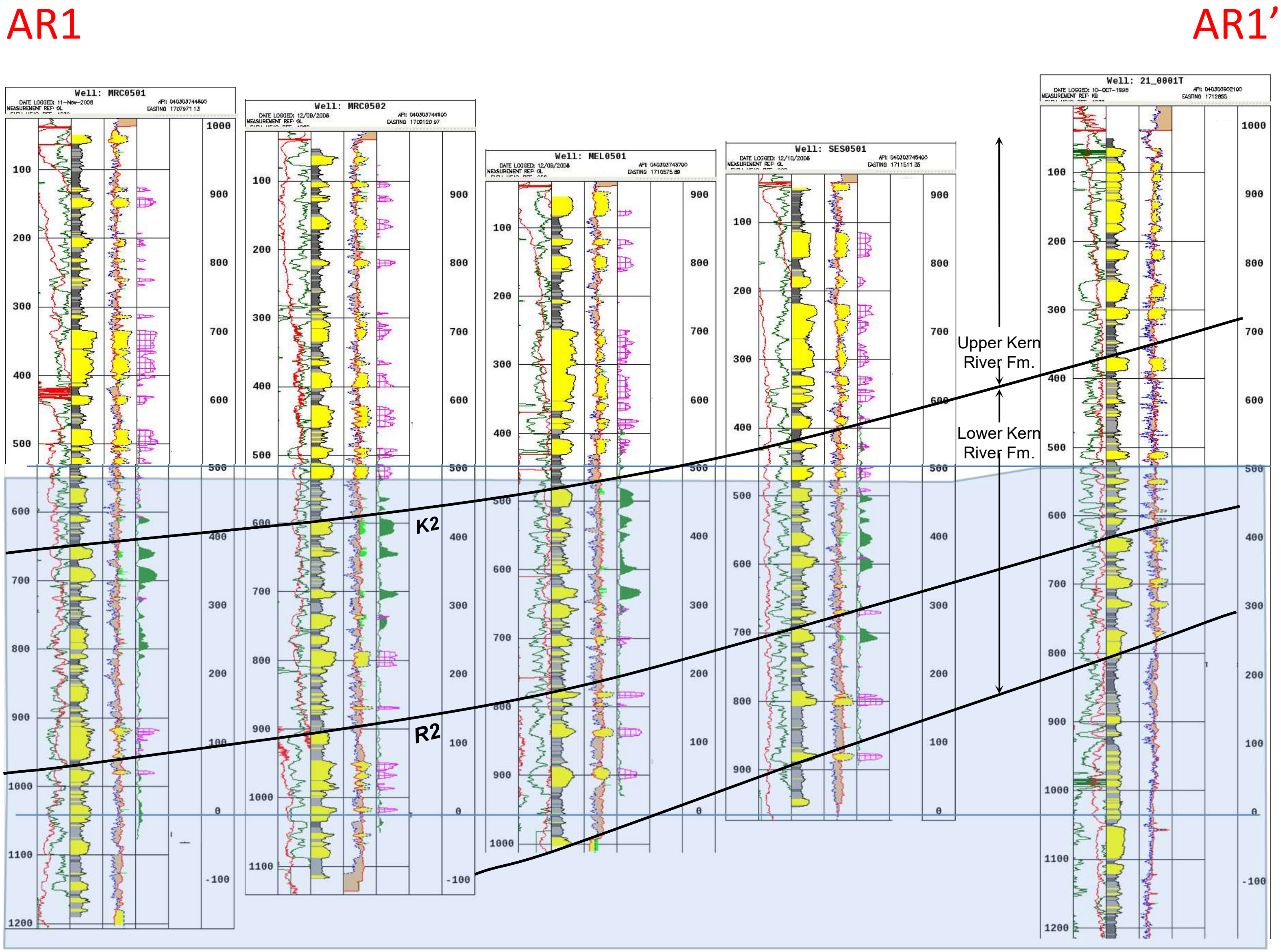
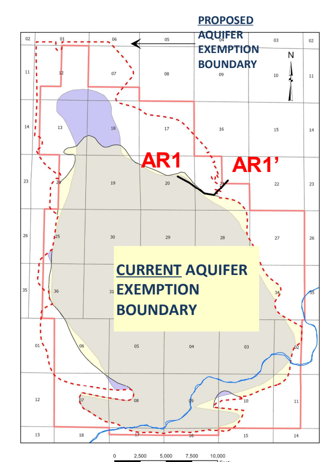



**Figure 57 - Production and Steam Injection Curves Section 3 (T28S/R28E)**

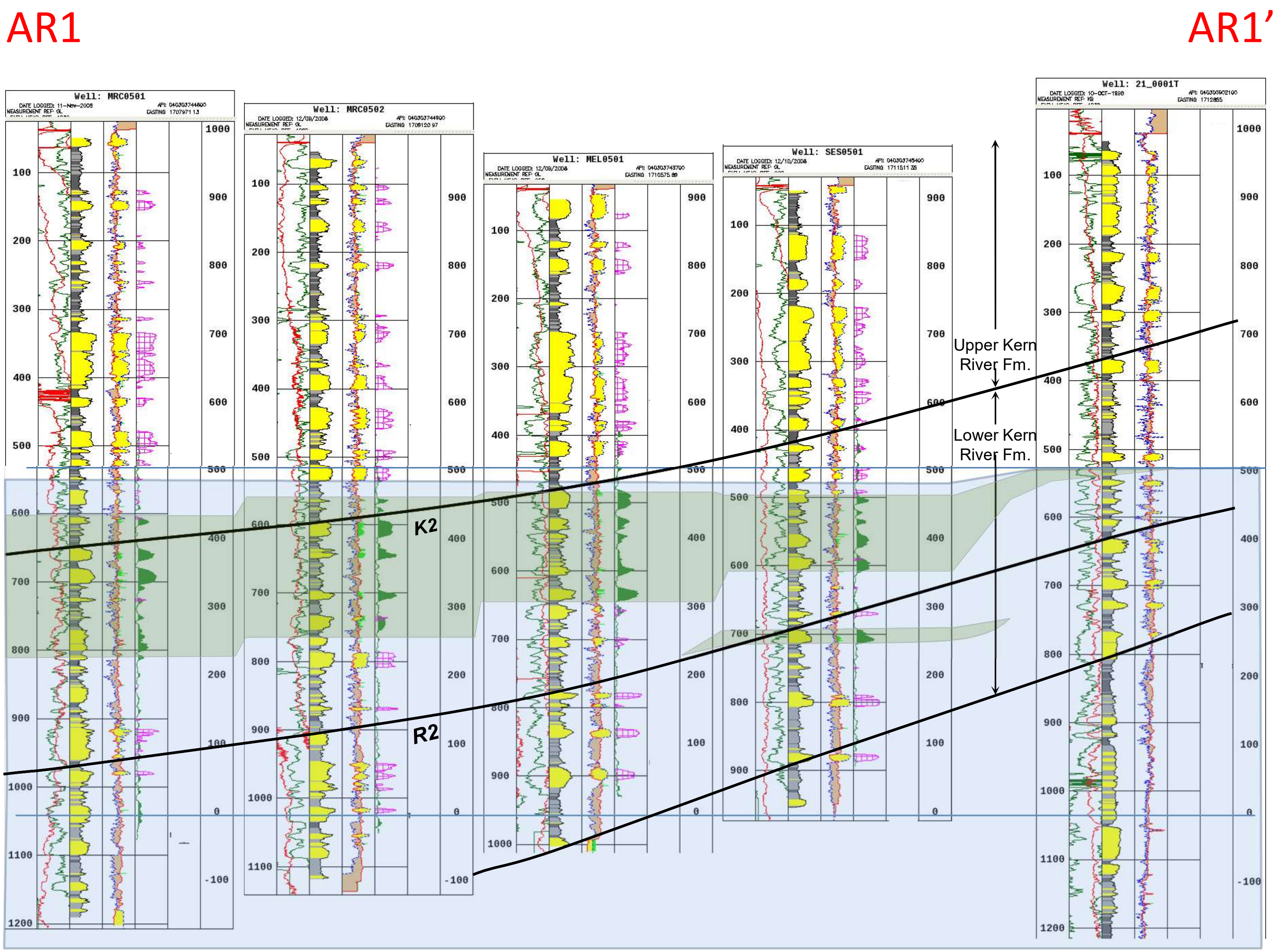




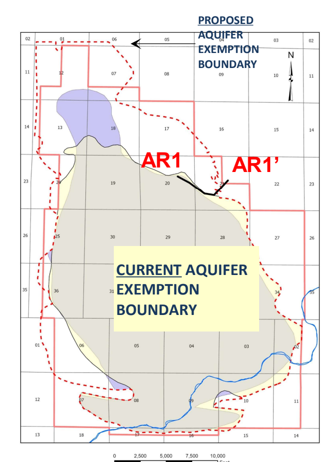



**NOTE**: Oil was sourced from deeper, older formations and migrated from the basin-ward (southwest) direction

**Figure 58 - Regional Groundwater Table Before Oil Emplacement**








**NOTE**: Oil was sourced from deeper, older formations and migrated from the basin-ward (southwest) direction

**Figure 59 - Regional Groundwater Table After Oil Emplacement**

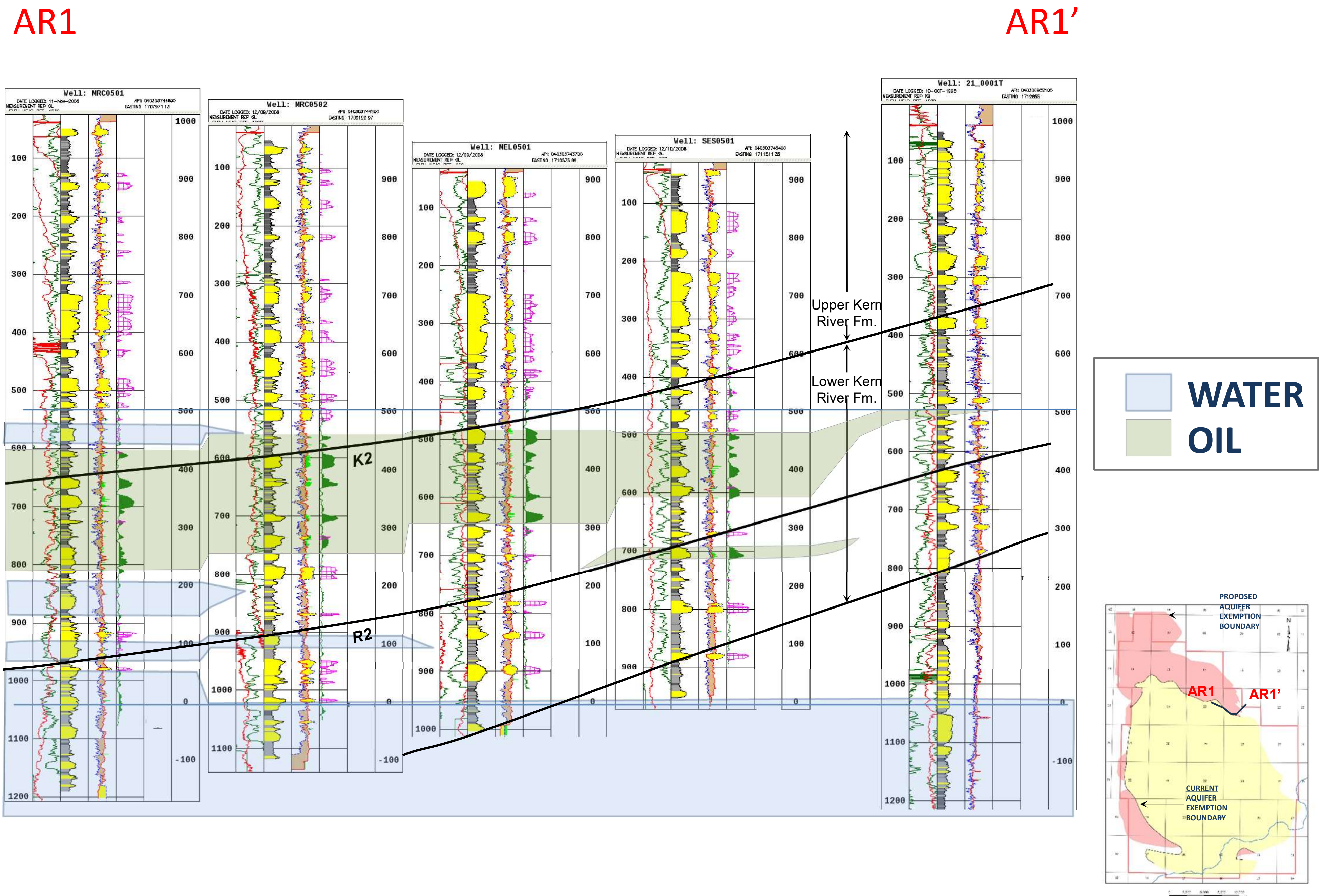



**Figure 60 – Current Regional Groundwater Table**

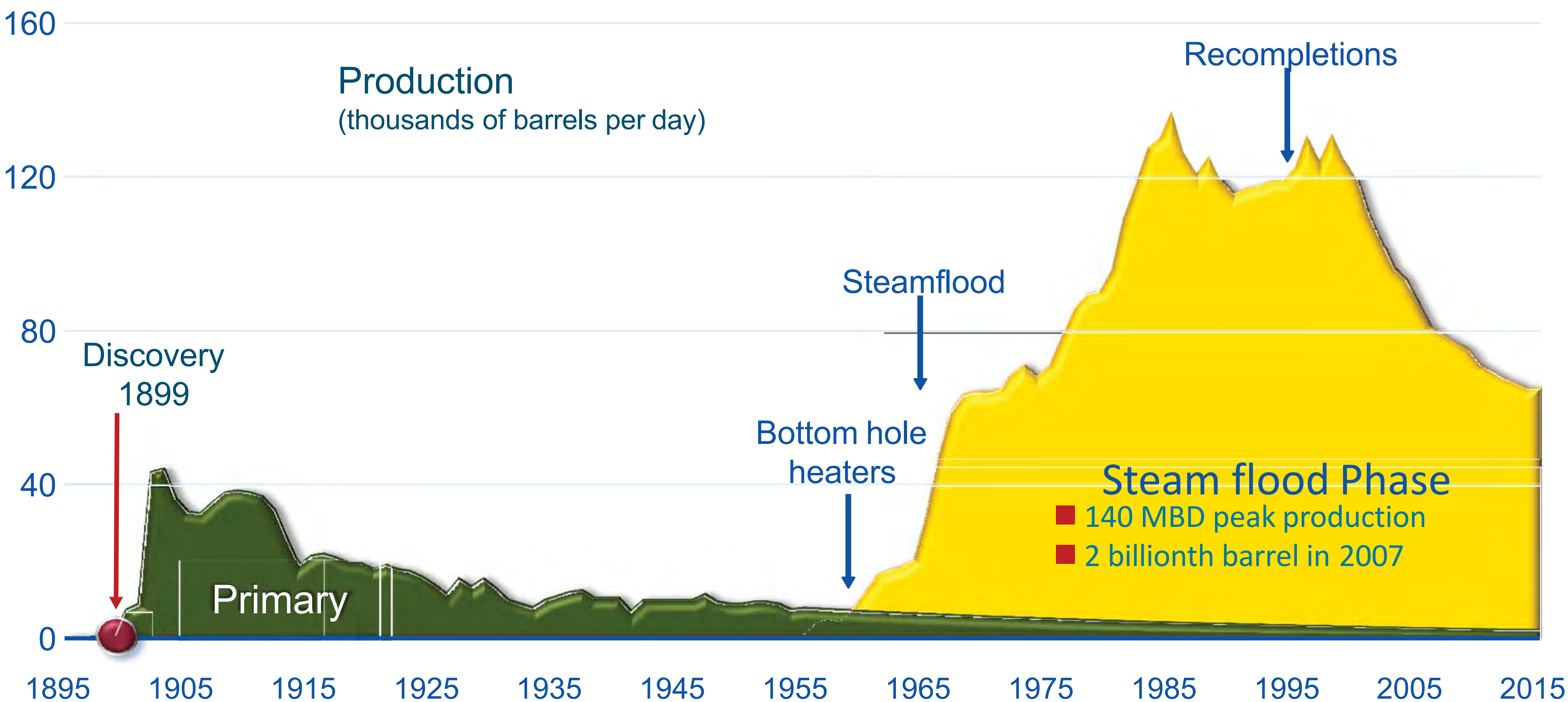
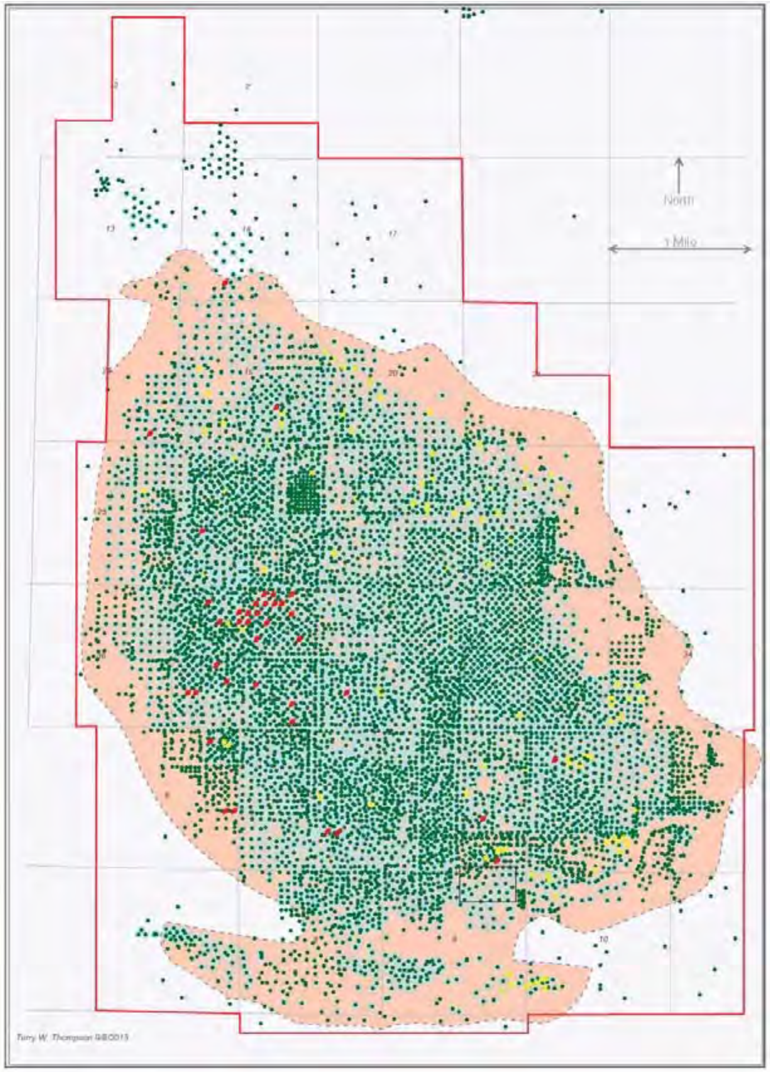
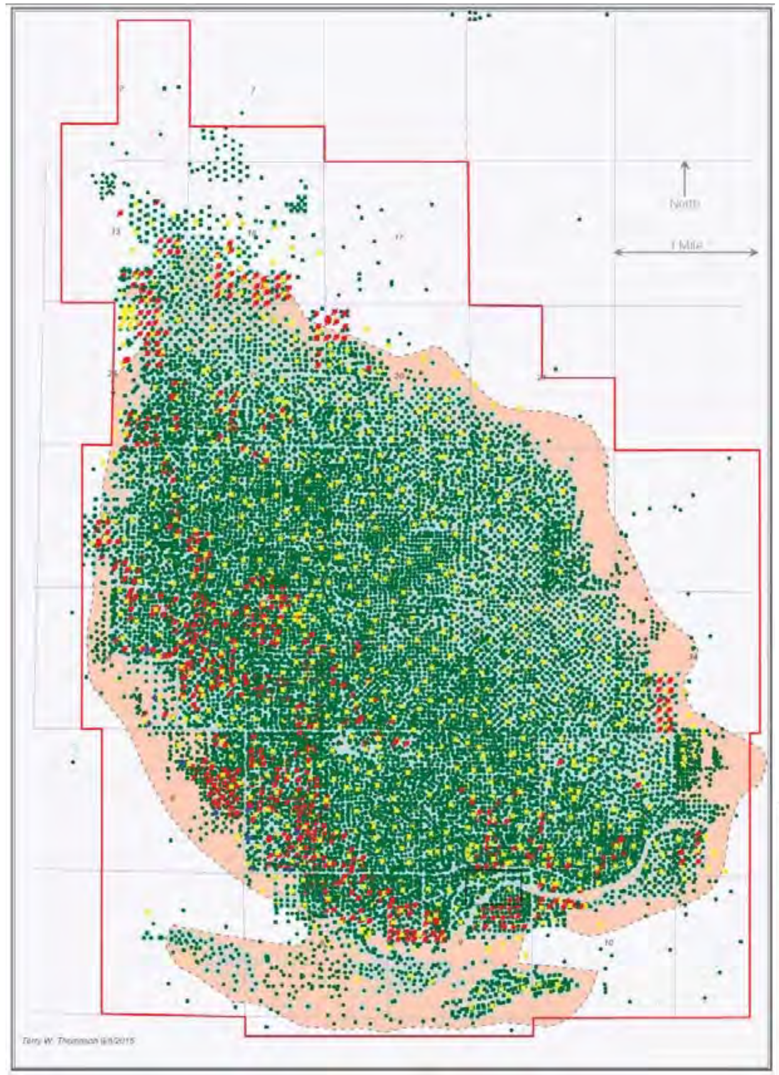



**Figure 61 - Kern River Operations Production and the Impact of Steam Flooding**




**Current CALGEM Kern River Field Aquifer Exemption Boundary and Pre-1975 Well Development**




**Current Kern River Field Development (June 2015)**

*1973-74 CALGEM Field Boundary – Current Aquifer Exemption Limit*

*DOGGR Administrative Boundary*

***WELL TYPE & STATUS - JUNE 2015***

- *Oil Well: Active Producer, Abandoned or Idle*
- *Relative Cumulative Oil Production (where records exist)*
- *Steam Injector*
- *Temperature Observation Well*
- *Water Interdiction Well*

- Cumulative-oil symbols represent relative production for all operators in the Kern River Field
- All production is from the Kern River Formation
- Data is from Chevron, third-party and CALGEM sources
- Because of differing cut-off dates, this information is incomplete and should be regarded only as an <u>approximate record of the limits of known historic field production</u>

**Figure 62 - Oil Field Development Pre-1975 and June 2015**

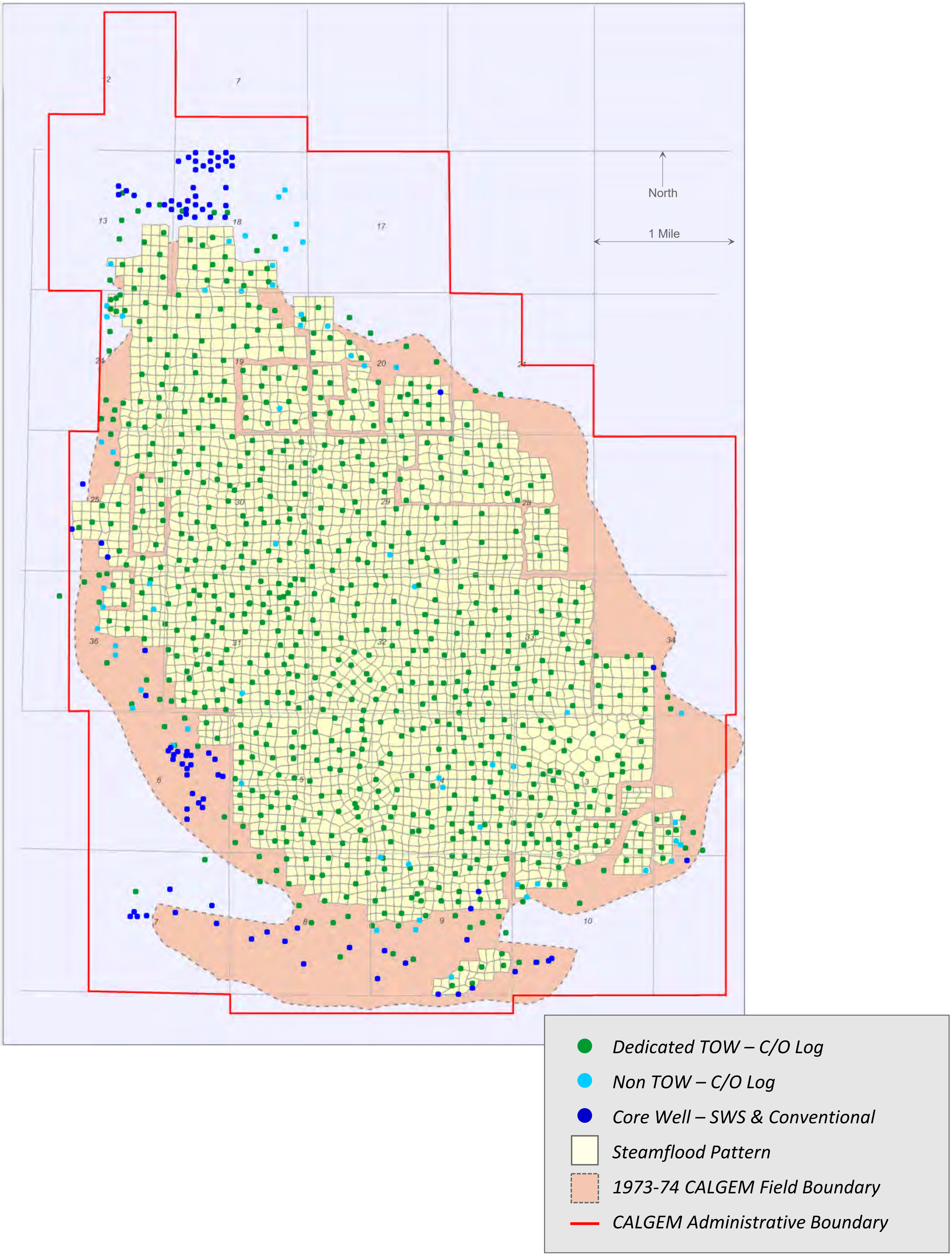



**Figure 63 - Oil Saturation Data**

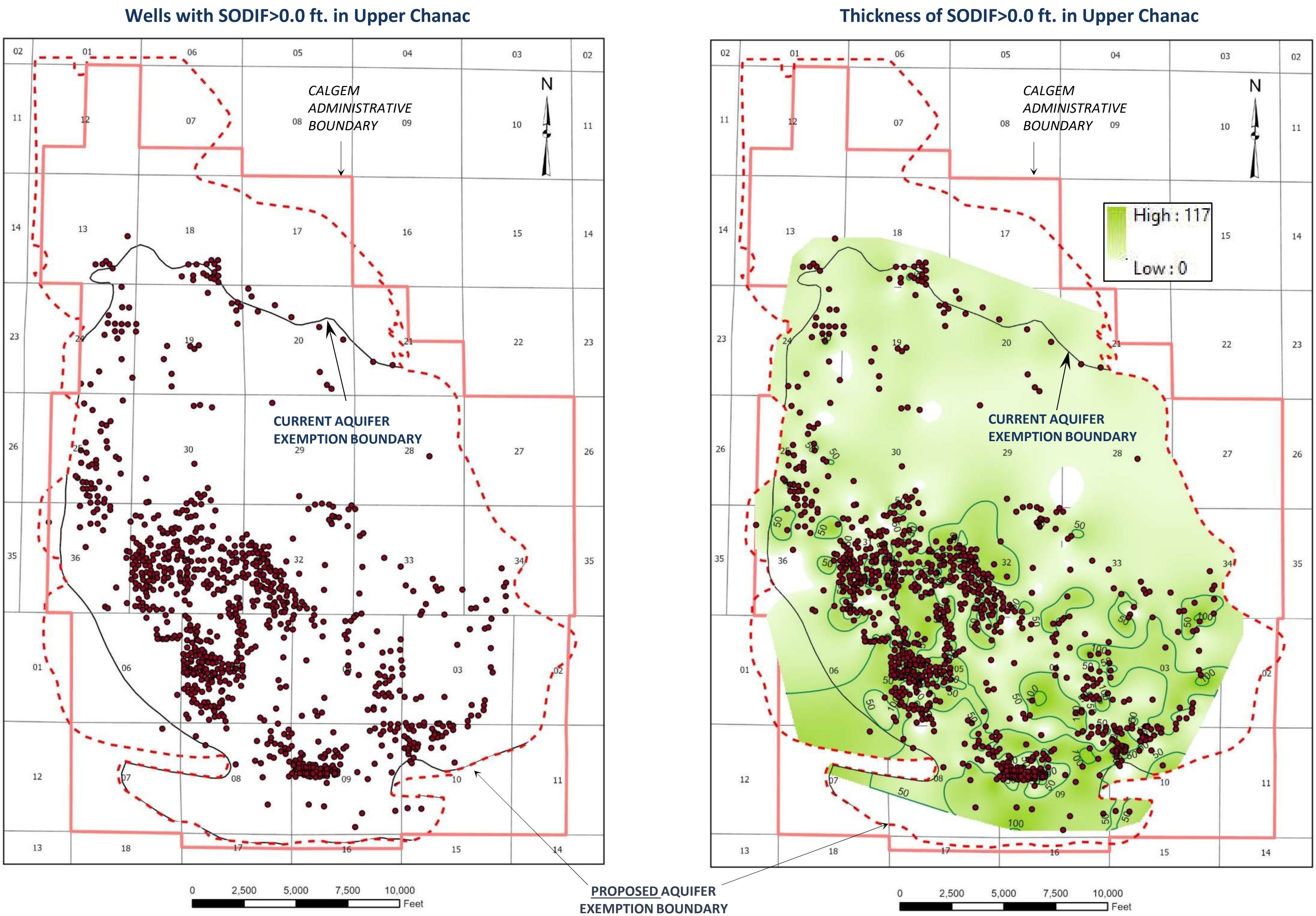



Figure 64 – Thickness of Upper Chanac Oil Sands from Dielectric Scanner

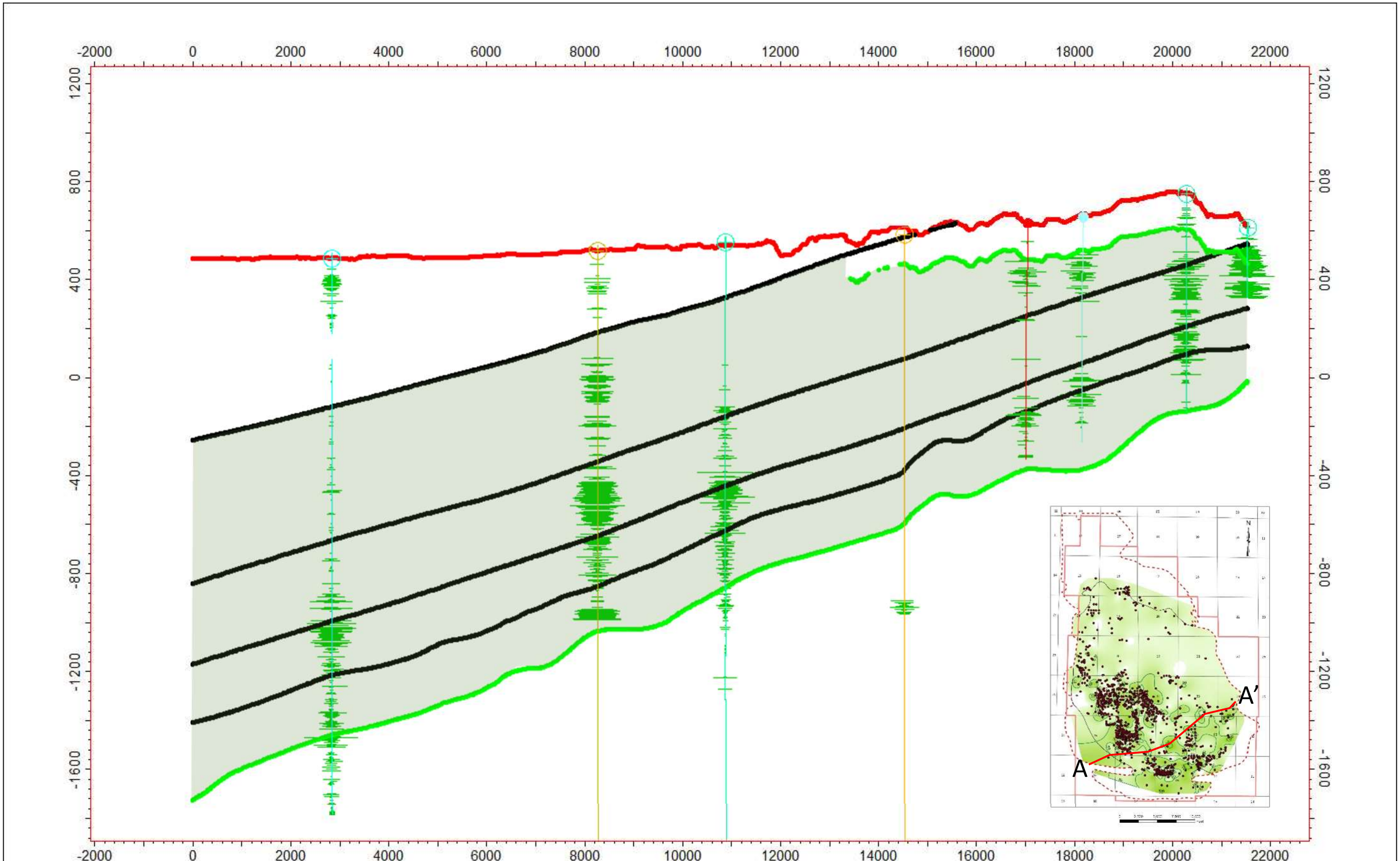



Figure 65 – Structure Section – Presence of Chanac Oil from Dielectric Log

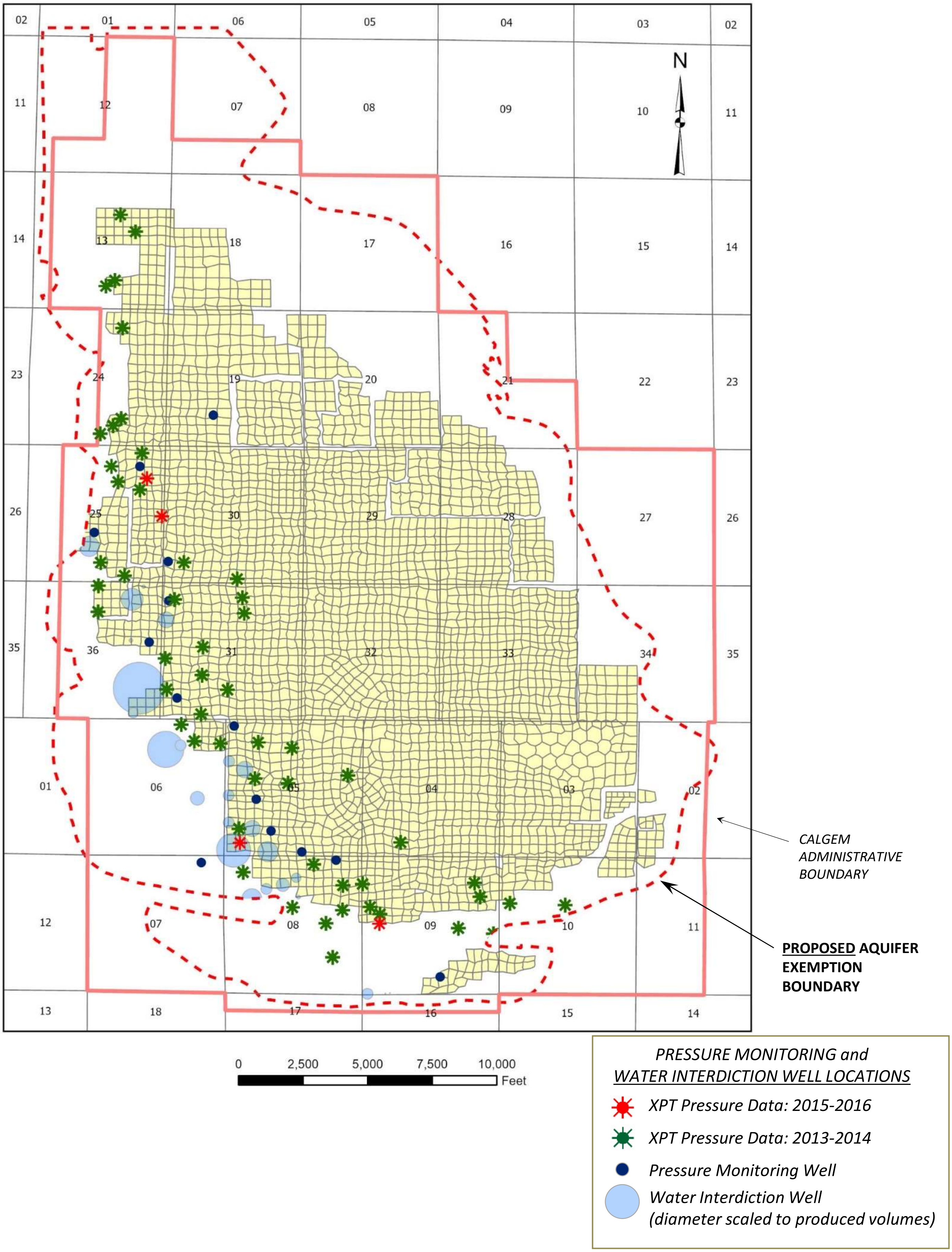



**Figure 66 - Interdiction Water Wells - Volumes**

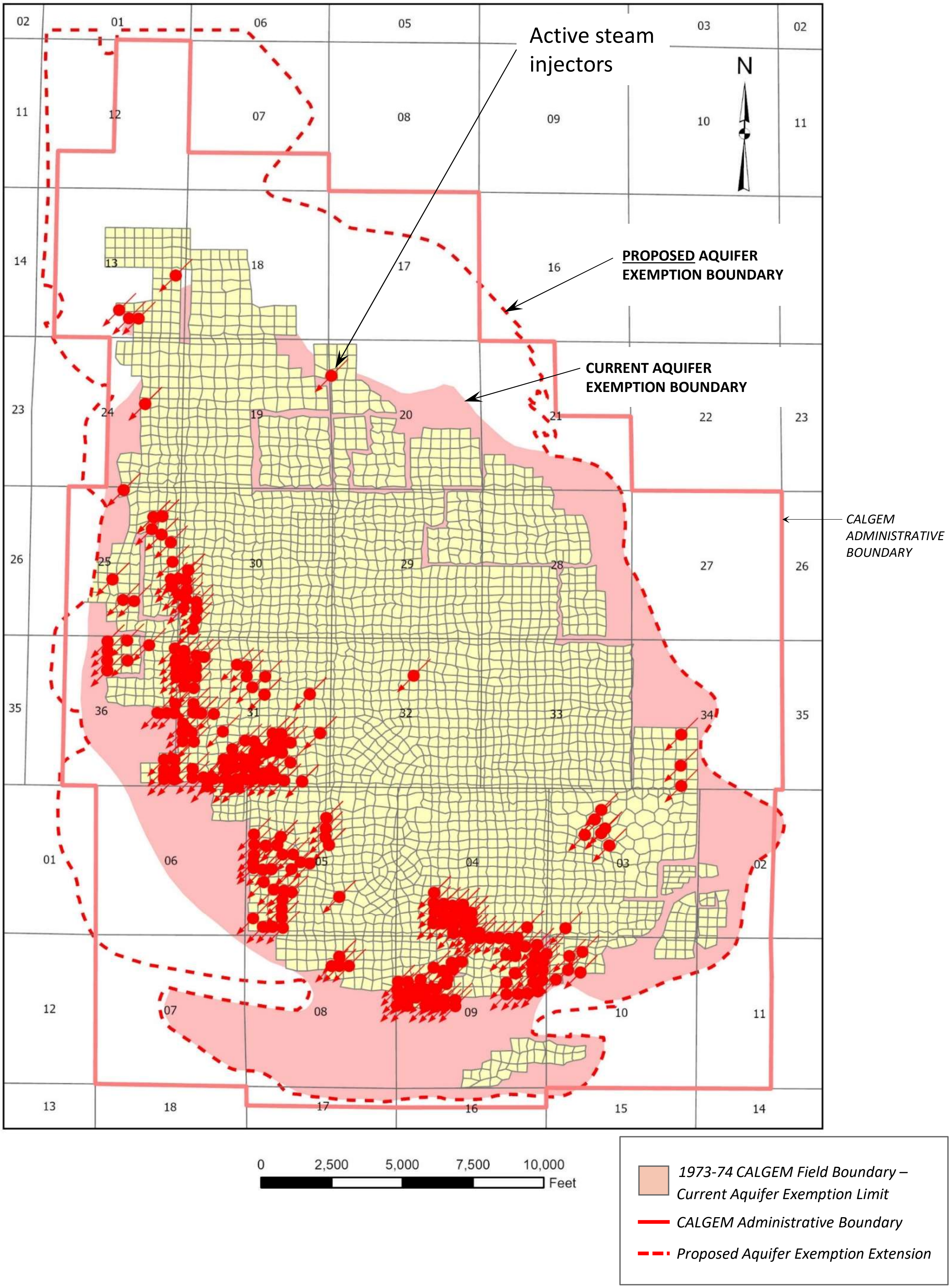



**Figure 67 - Steam Injection Locations**

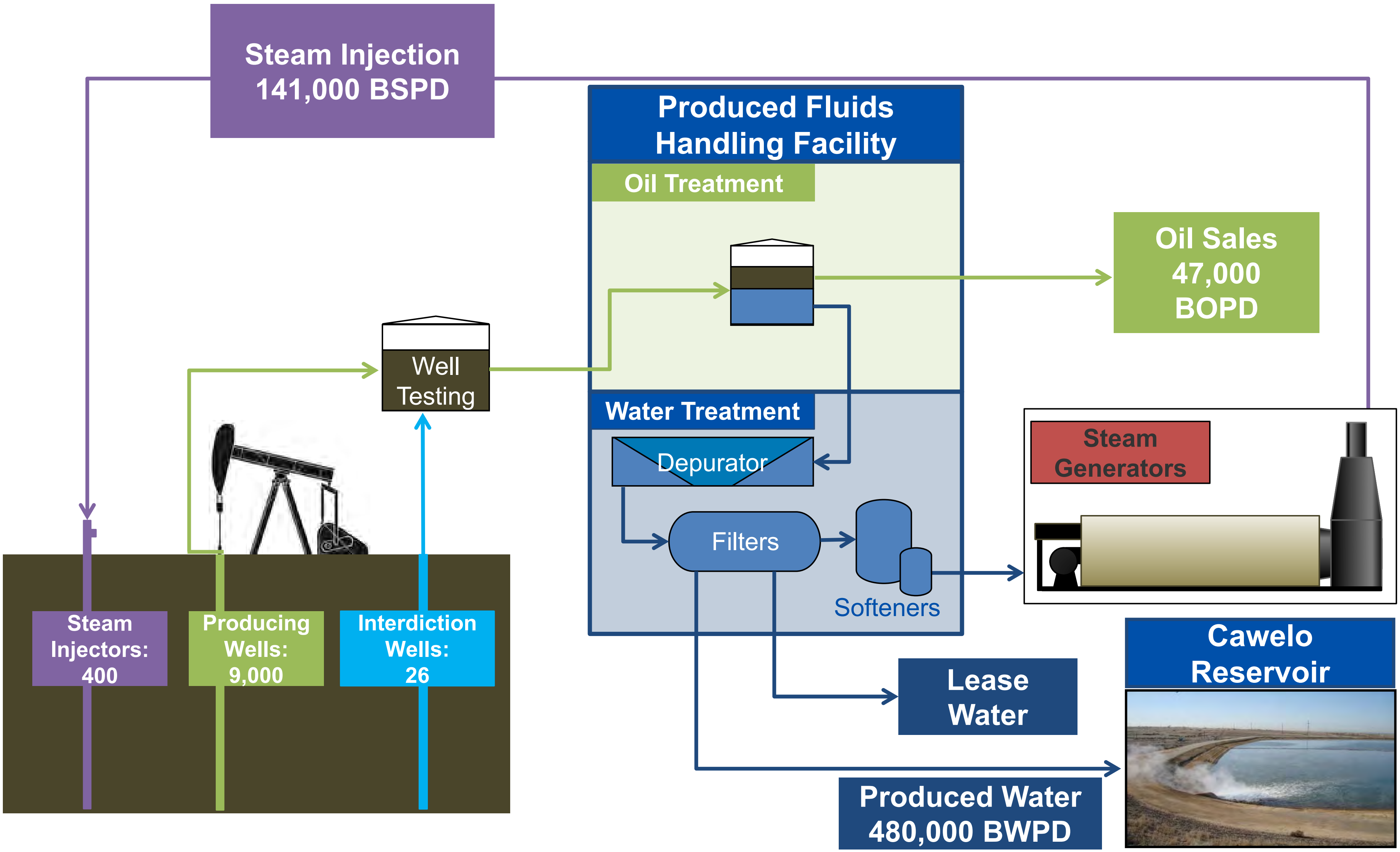



**Figure 68 - Kern River Field Produced Water Cycle**

# Attachment 1

Kern River Operators Letters in Support of Application

| | |
|---|---|
| **From:** | Smith, Adam <Adam.Smith@crc.com> |
| **Sent:** | Friday, March 27, 2020 3:43 PM |
| **To:** | Auffant, Abigale M. |
| **Subject:** | [**EXTERNAL**] CRC Letter of Support for Aquifer Exemption Boundary Expansion (Kern River Field) |
| **Attachments:** | KR AE Boundary.pdf |

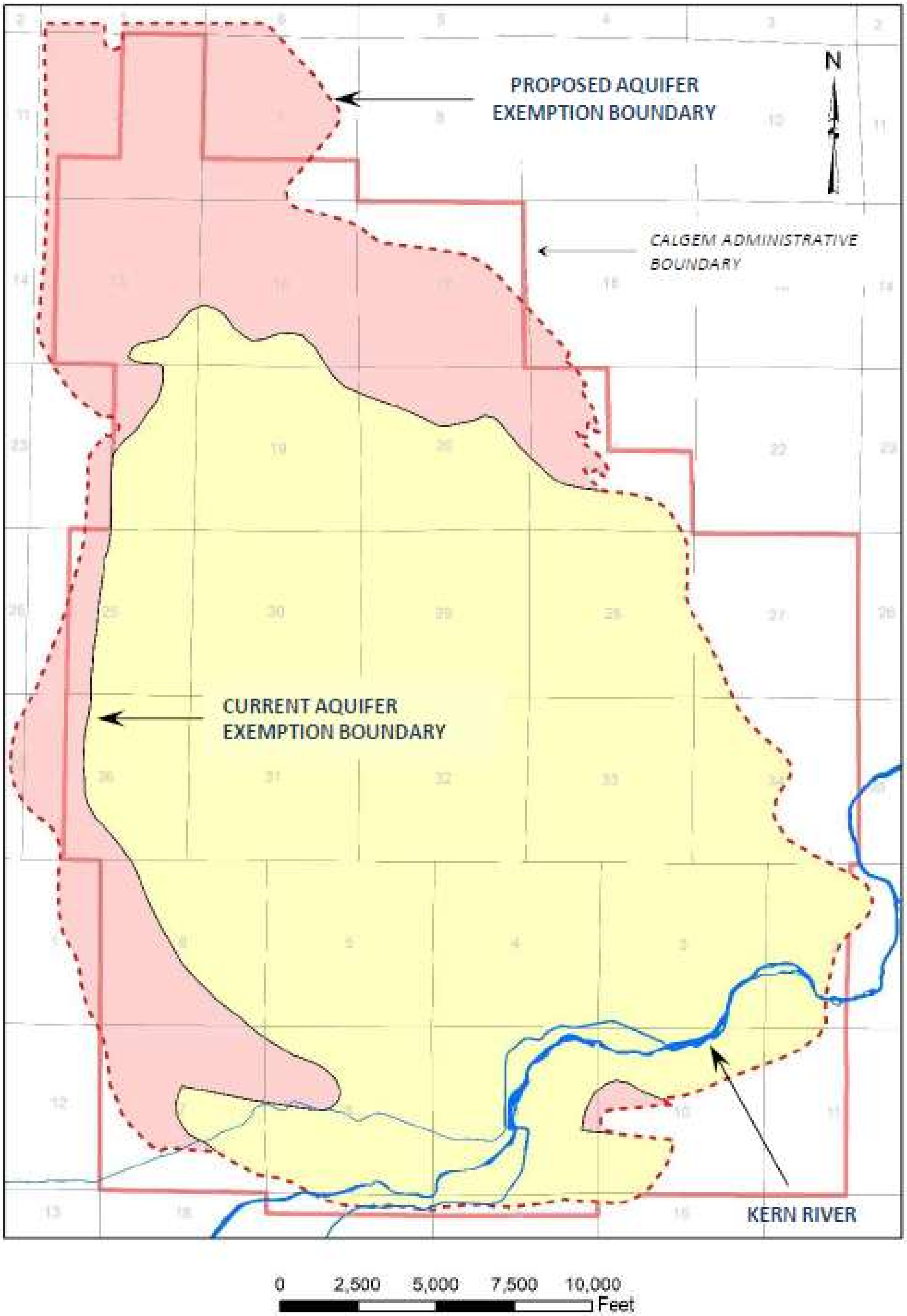
Dear Ms. Auffaunt:

This e-mail is written in support of Chevron U.S.A. Inc.'s proposed Aquifer Exemption Boundary for the Kern River Field. The proposed boundary expansion would extend the existing aquifer exemption for the Kern River Field as depicted on the attached map. As one of the operators within Kern River Field, California Resources Production Corporation (Vintage's successor in interest) fully supports Chevron's aforementioned application to the DOGGR.

Please contact me should you have any questions regarding this matter.

Regards,

Adam Smith
Vice President, Regulatory Affairs
California Resources Production Corporation




Proposed Kern River Aquifer Exemption Boundary
2020

E&B NATURAL RESOURCES

1608 Norris Road • Bakersfield, CA 93308

September 10, 2020

Geologic Energy Management Division (Cal GEM) (District 4)
4800 Stockdale Hwy, Suite 100
Bakersfield, CA 93309-0279
Attn: District Deputy

**Re: Proposed 2020 Kern River Aquifer Exemption Boundary Application**
**Kern River Field, Kern County, California**

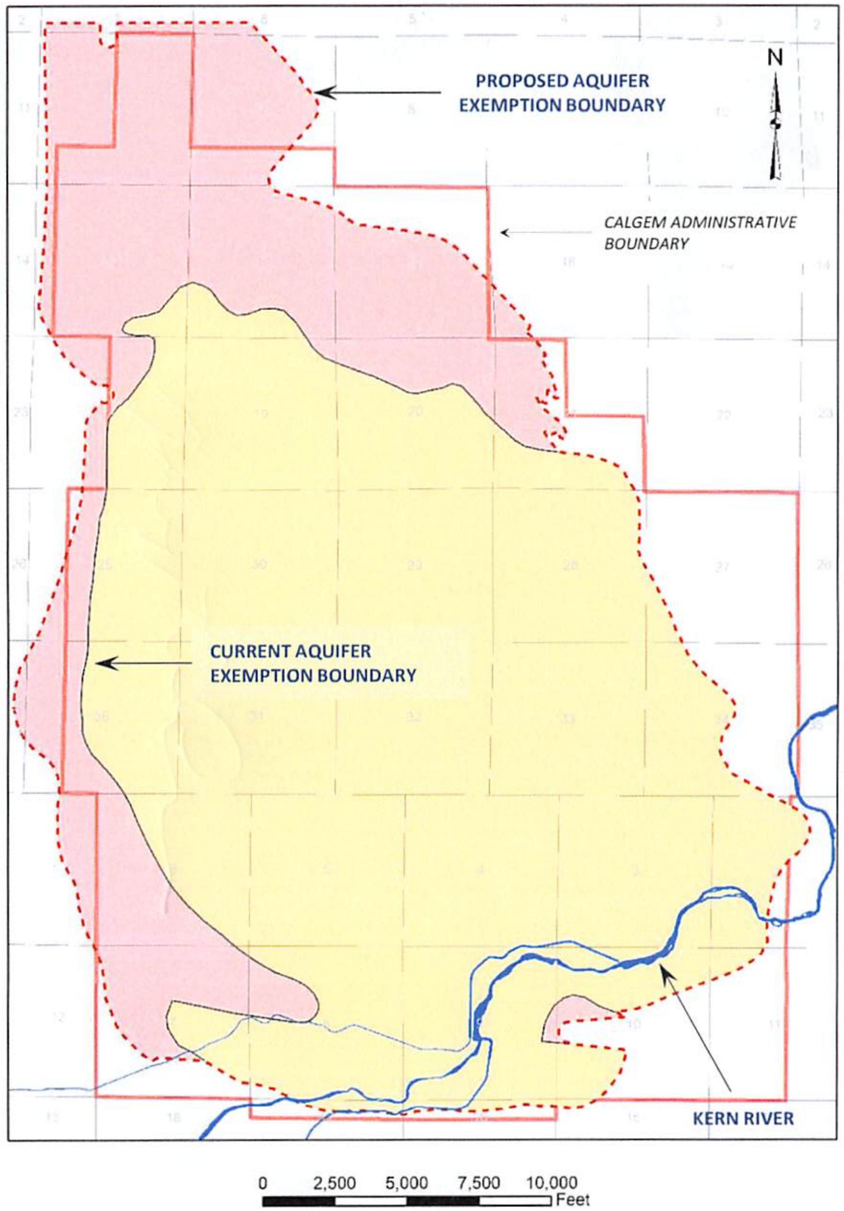
Dear District Deputy,

This letter is written in support of the 2020 Kern River Boundary Expansion Application prepared on behalf of Chevron U.S.A. Inc. The revised boundary expansion would extend the existing aquifer exemption for the Kern River Formation to the boundary as indicated on the attached plat. As an operator within the Kern River Field, E&B Natural Resources supports Chevron's application to extend the aquifer exemption boundary as noted.

Sincerely,

Gary Richardson
Vice President of Business Development

Attachment: Chevron Proposed Kern River Aquifer Exemption Boundary 2020




Proposed Kern River Aquifer Exemption Boundary
2020

**Gray Development Co. LLC**
2701 Patton Way
Bakersfield, CA 93308
Tel (661) 589-4144
Fax (661) 588-3415
**Robert W. Loveless**
(661) 331-8997
2RWL49@GMAIL.COM

March 30, 2020

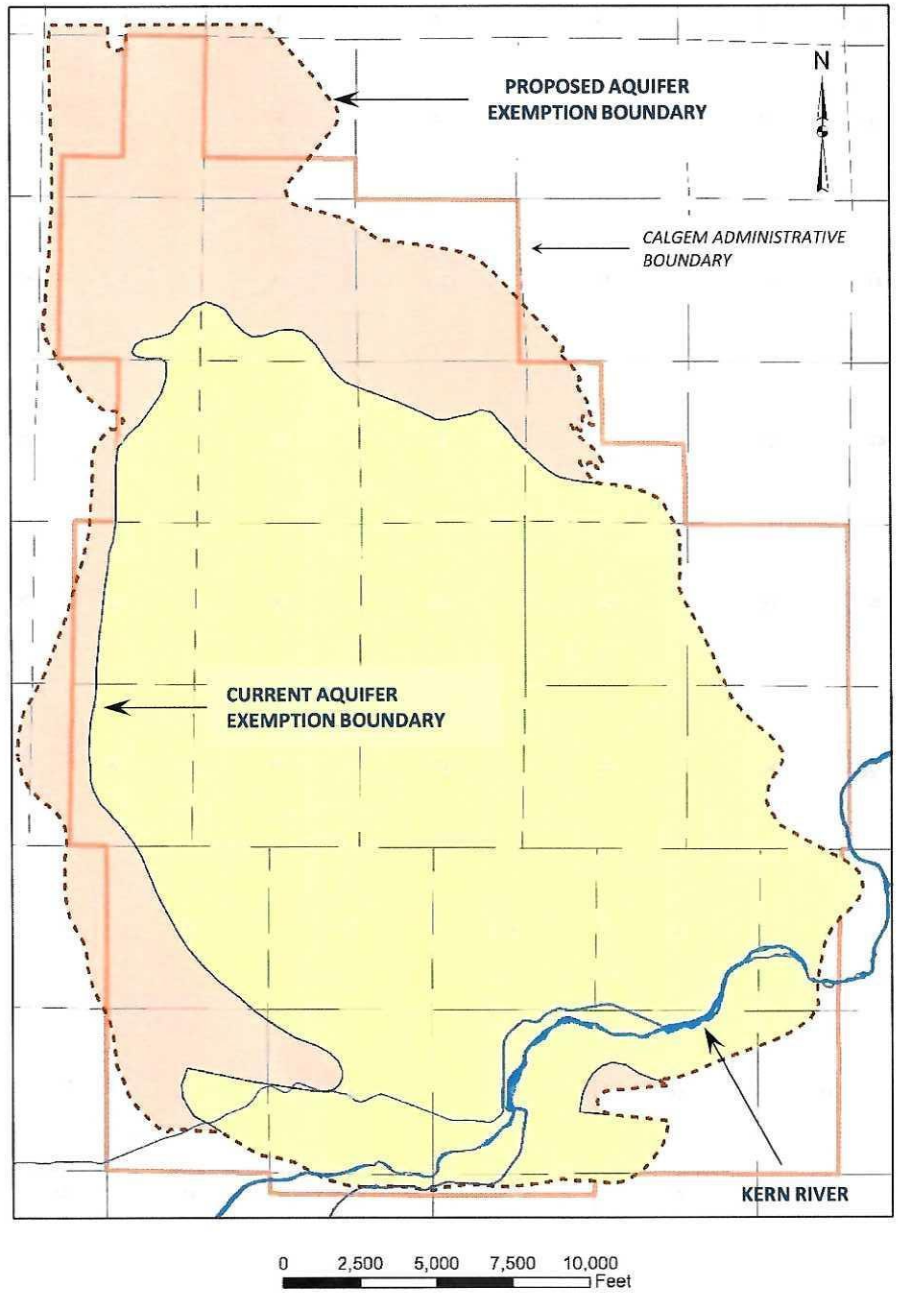
**Chris Flail**
**Sandra Szymanski**
San Joaquin Valley Business Unit
California Land Division
Chevron North America Exploration and Production Company
1546 China Grade Loop, D14
Bakersfield, CA 93308

This letter is written in support of the Kern River Boundary Expansion Application prepared by Kennedy/Jenks Consultants on behalf of Chevron U.S.A. Inc. The boundary expansion would extend the existing aquifer exemption for the Kern River formation to the boundary as shown on the enclosed map. As one of the operators within Kern River Field, we fully support Chevron's application to extend the aquifer exemption boundary to the DOGGR's Administrative Boundary.

Sincerely,

Robert W. Loveless

Robert W. Loveless
Managing Member




Proposed Kern River Aquifer Exemption Boundary
2020

Grade 6 Oil

March 27, 2020

California Geologic Energy Management
4800 Stockdale Highway, Suite 100
Bakersfield, CA 93309

Re: Kern River Filed Boundary Expansion 2020

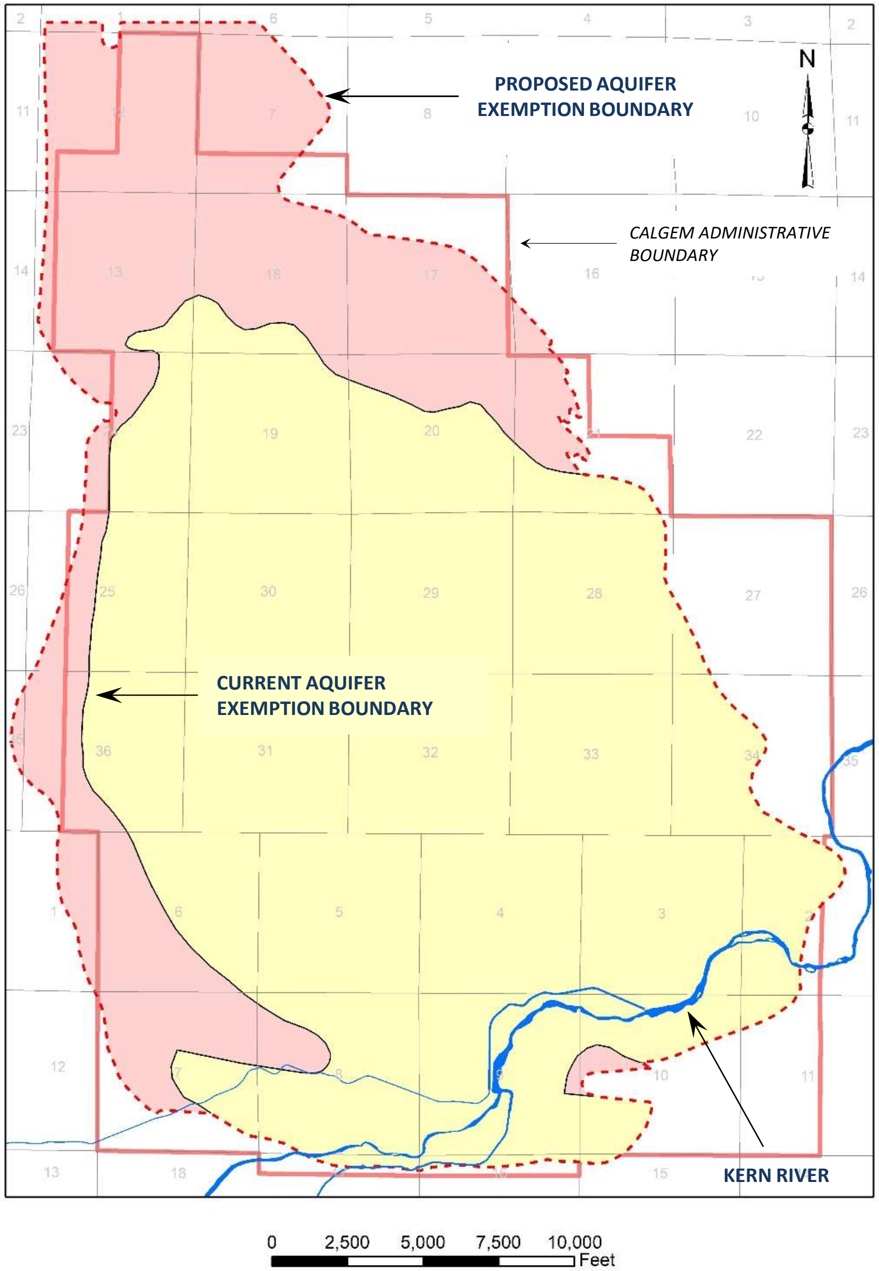
To Whom it May Concern,

This letter is written in support of Chevron U.S.A. Inc.'s updated proposed Aquifer Exemption Boundary for the Kern River Field. The proposed boundary expansion would extend the existing aquifer exemption for the Kern River Field as depicted on the attached map. As one of the operators within the Kern River Field, Kern River Holdings II, LLC fully supports Chevron's aforementioned application to CalGEM. Please contact the undersigned should you have any questions regarding this matter.

Sincerely,

Eric Dhanens
Asset Manager

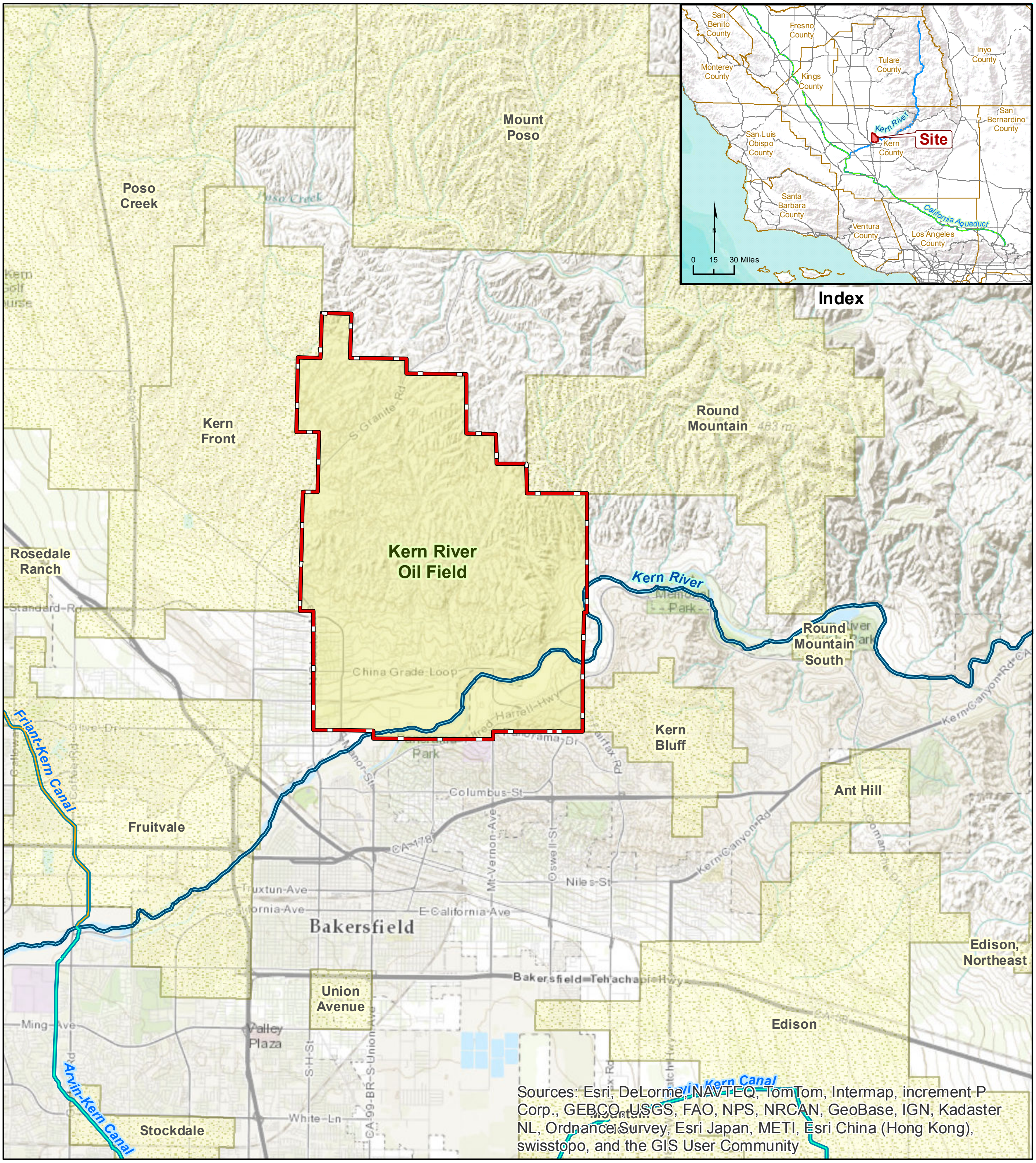
Grade 6 Oil, LLC
1223 Wilshire Blvd #1050
Santa Monica, CA 90403

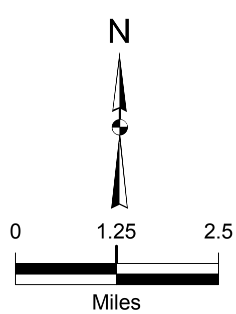



Proposed Kern River Aquifer Exemption Boundary
2020

# Appendix A

## Geology

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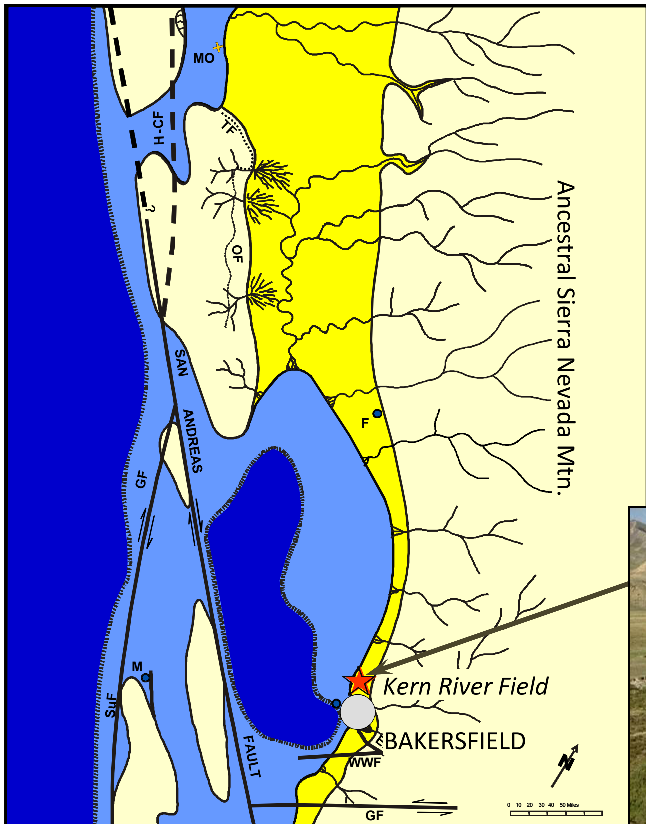
Kern River Aquifer Exemption

**Site Location**

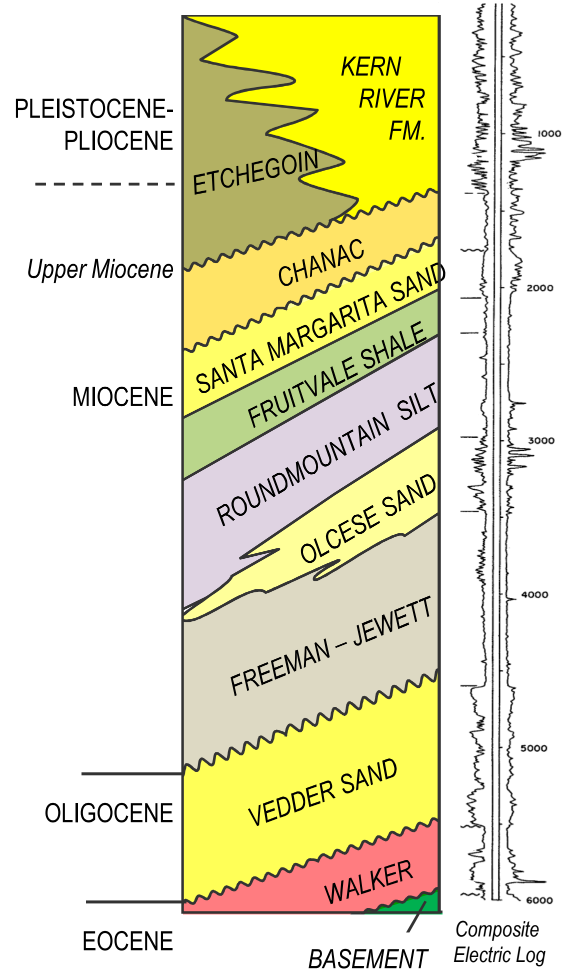
K/J 1565005.00
January 2017
**Exhibit A-1**

# Stratigraphy and Depositional Environment




Western Margin of California
Late Miocene Time

- The Kern River Series is a non-marine, fluvial, braided stream system deposited during Late Miocene to Pliocene time
- The clastic-rich formation was deposited on the eastern shelf of the San Joaquin Basin adjacent to the ancestral Sierra Nevada Mountains

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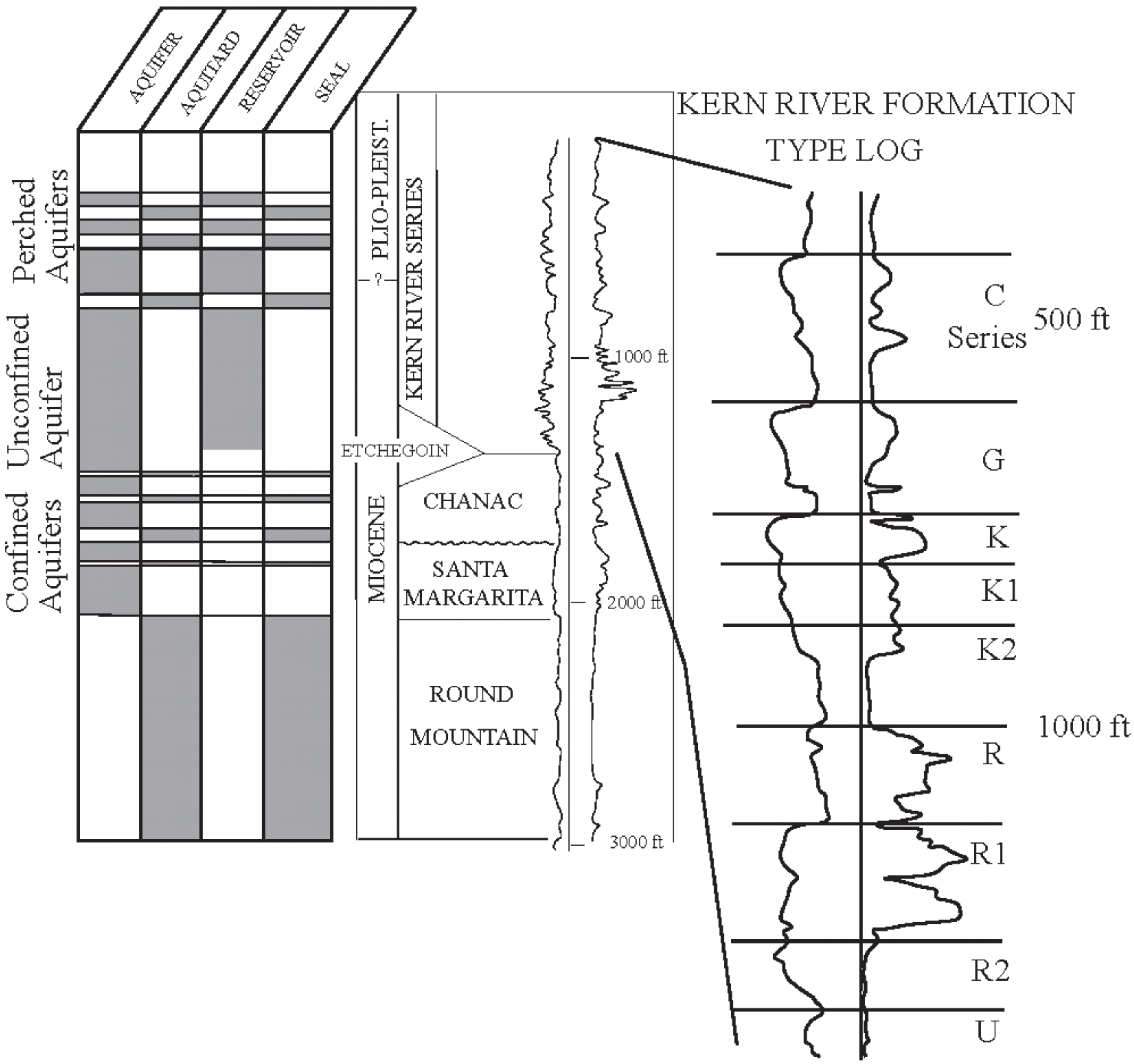
**Kern River Oil Field Area**
**Stratigraphic Column**

K/J 1565005.00
January 2017

**Exhibit A-2**




Source: Coburn, M.G, Gillespie, J.M. 2002. A Hydrogeologic Study to Optimize Steamflood Performance in a Giant Oilfield: Kern River Field, California. AAPG Bulletin v. 86, no. 8."

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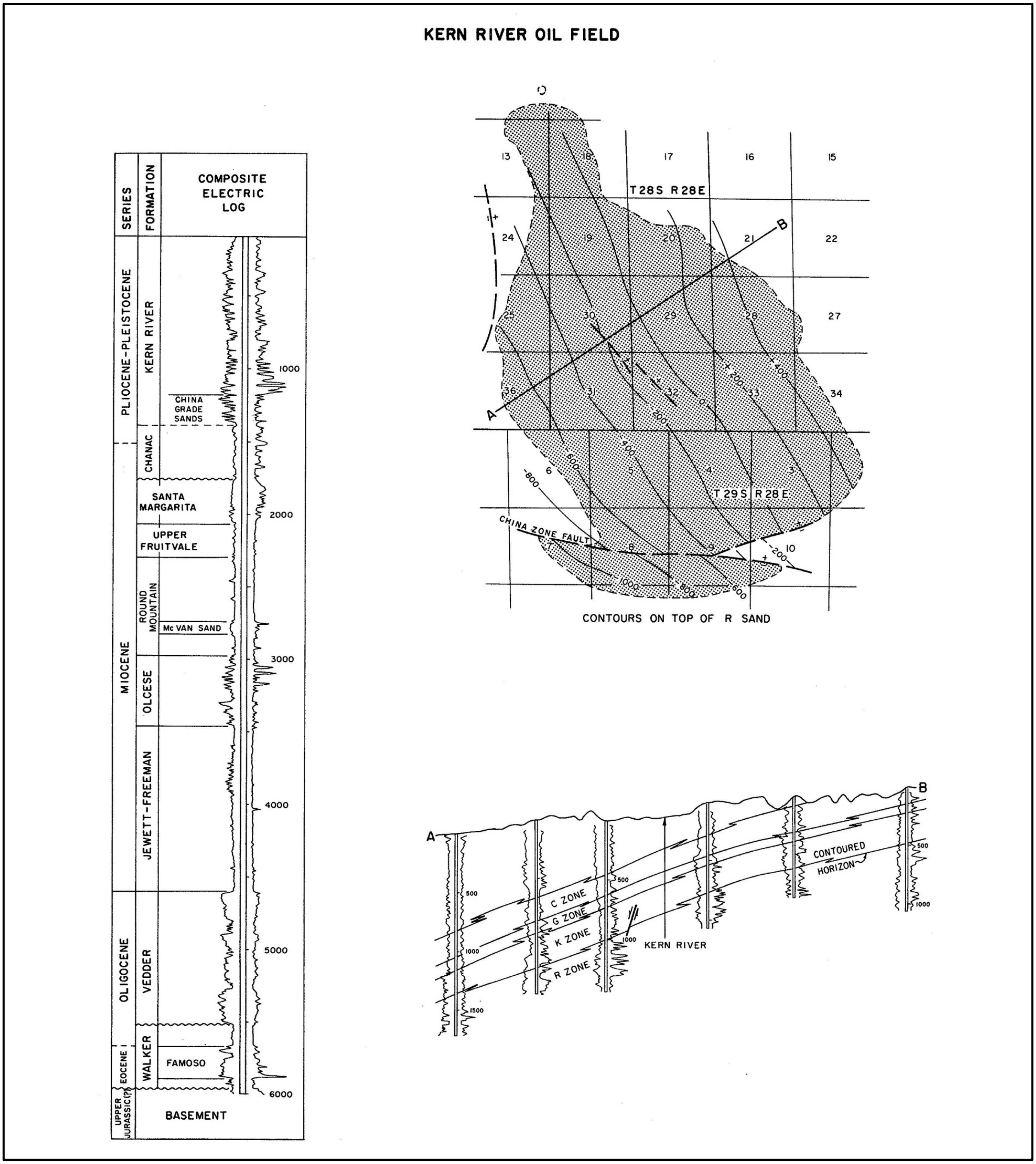
Kern River Aquifer Exemption

**Type Log**

K/J 1565005.00
January 2017

**Exhibit A-3**




Source: Coburn, M.G, Gillespie, J.M. 2002. A Hydrogeologic Study to Optimize Steamflood Performance in a Giant Oilfield: Kern River Field, California. AAPG Bulletin v. 86, no. 8."

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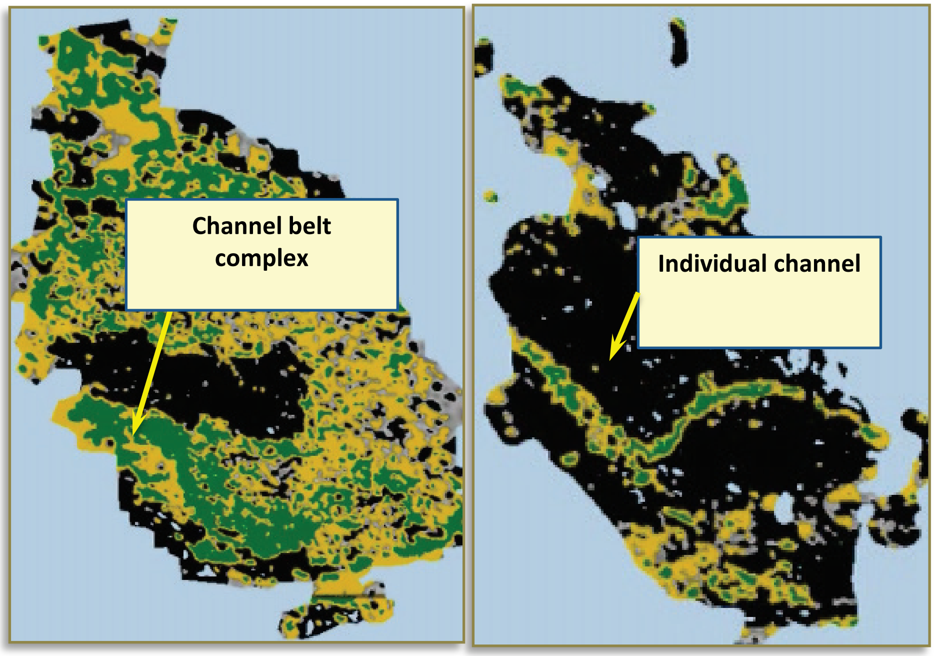
Kern River Aquifer Exemption

**1982 Aquifer Exemption Boundary and Field Data**

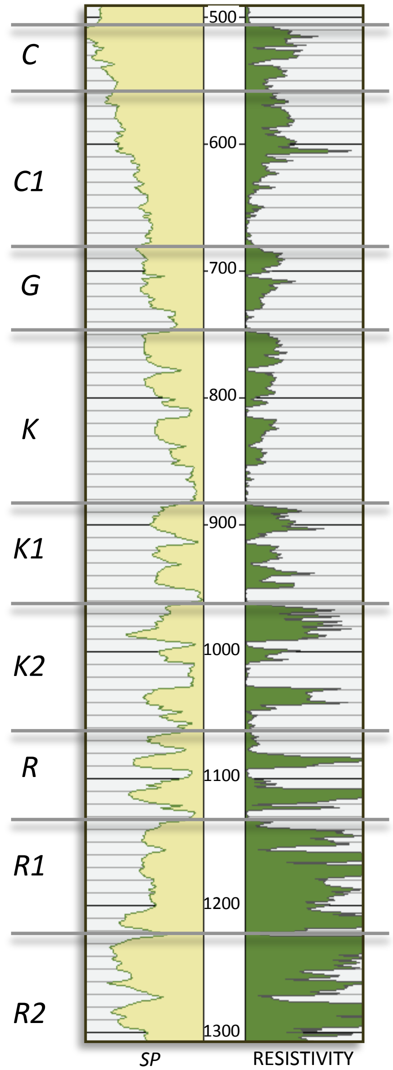
K/J 1565005.00
January 2017
**Exhibit A-4**

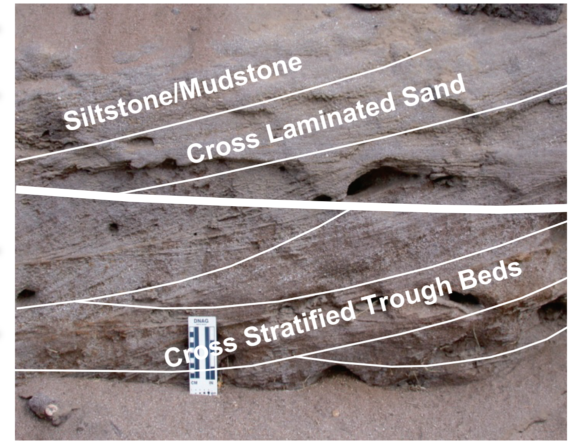
# Appendix B

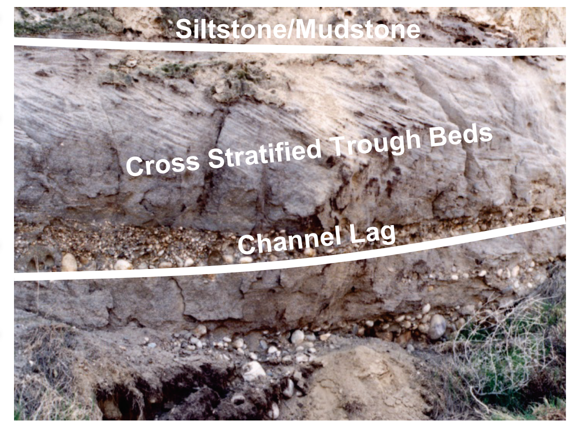
## Lithologic Information




Sand Channel and Flow Path Geometry




## Type Log and Reservoir Architecture

- 9 zones (C, C1, G, K, K1, K2, R, R1 and R2) composed of one or more sand beds
- Units consist predominantly of:
  - Channelized, amalgamated sand lobes
  - Overbank/floodplain interbeds
- Channel sand packages behave as semi-continuous reservoirs

| | |
|---|---|
| RECOVERY METHOD | GRAVITY DRAINGE |
| AVG. NET to GROSS | 76% |
| AVG. POROSITY | 31% |
| AVG PERMEABILITY | 2,000 mD |

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Kern River Aquifer Exemption

**Kern River Formation Lithology and Formation Structure**

K/J 1565005.00
January 2016

**Exhibit B-1**

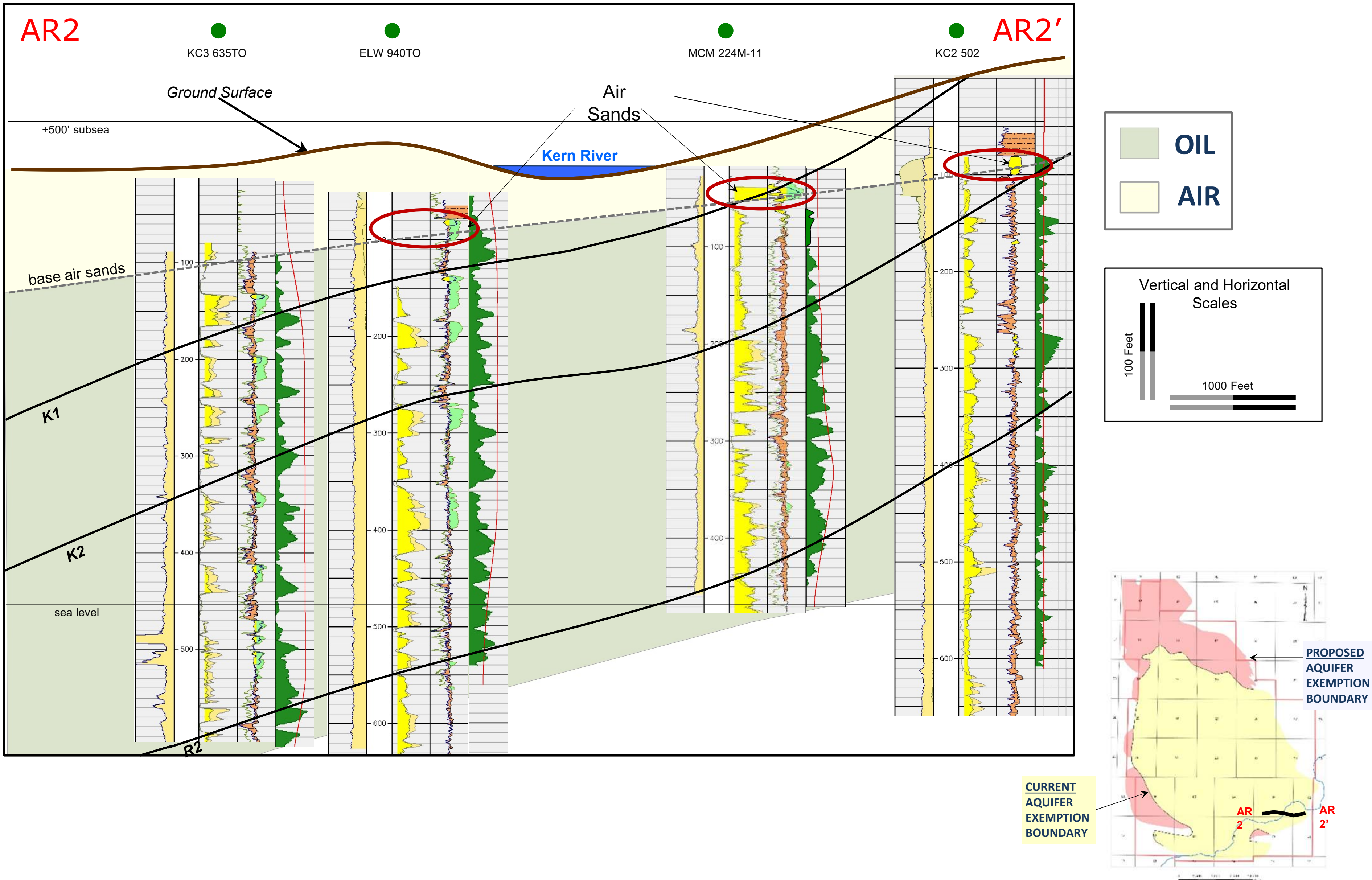
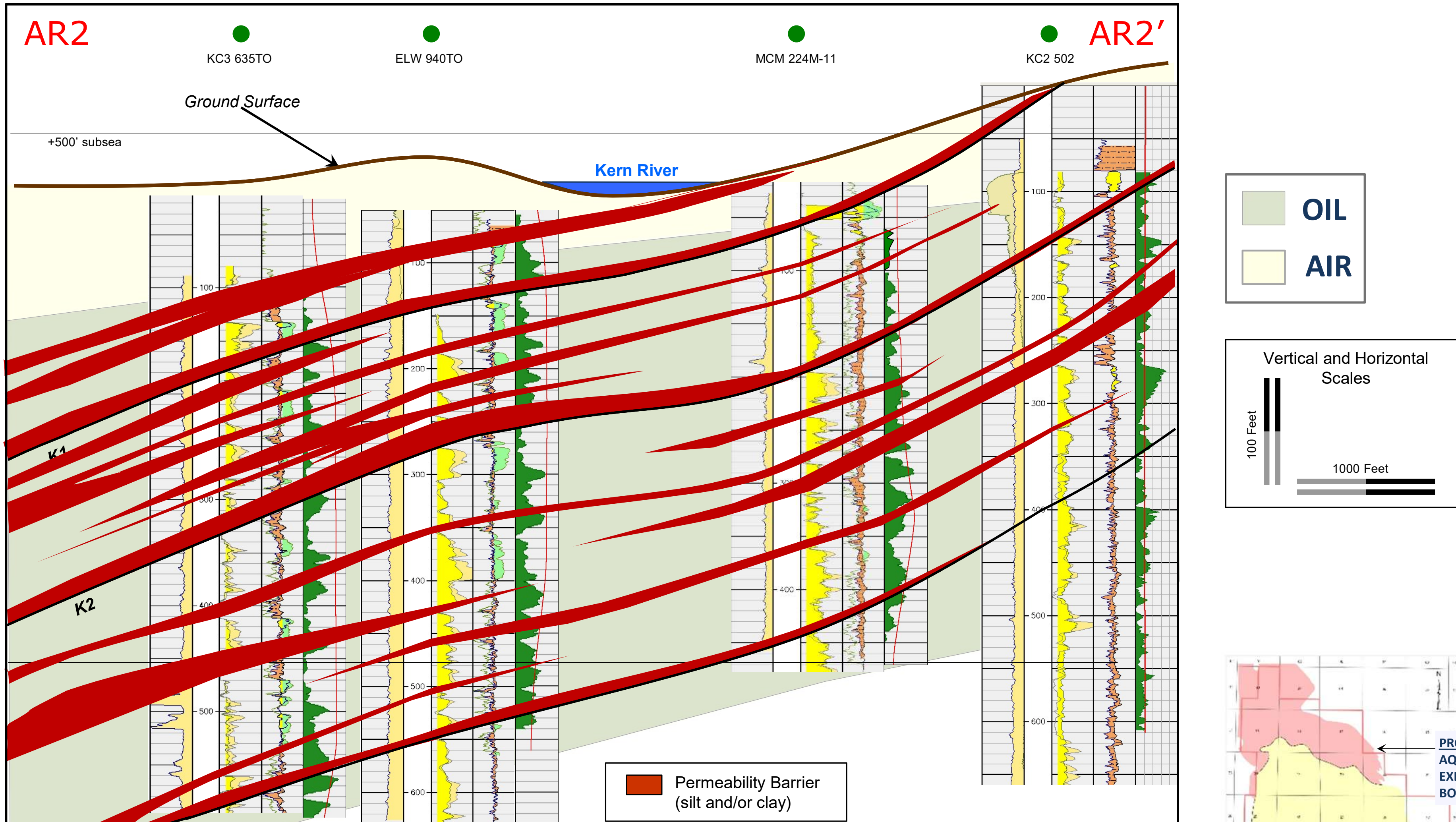



**Exhibit B-2 -** Cross-Section AR2-AR2': Air Sands in Proximity to the Kern River



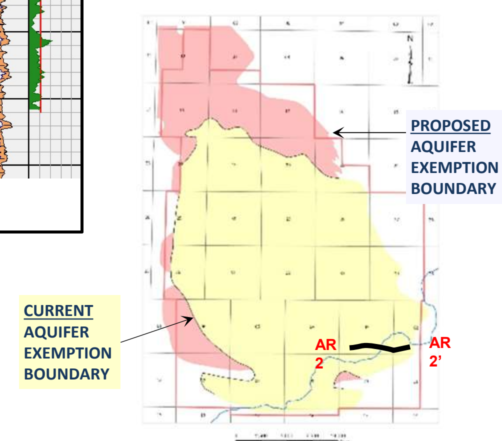




**Exhibit B-3 -** Cross-Section AR2-AR2': Silt/Clay Permeability Barriers

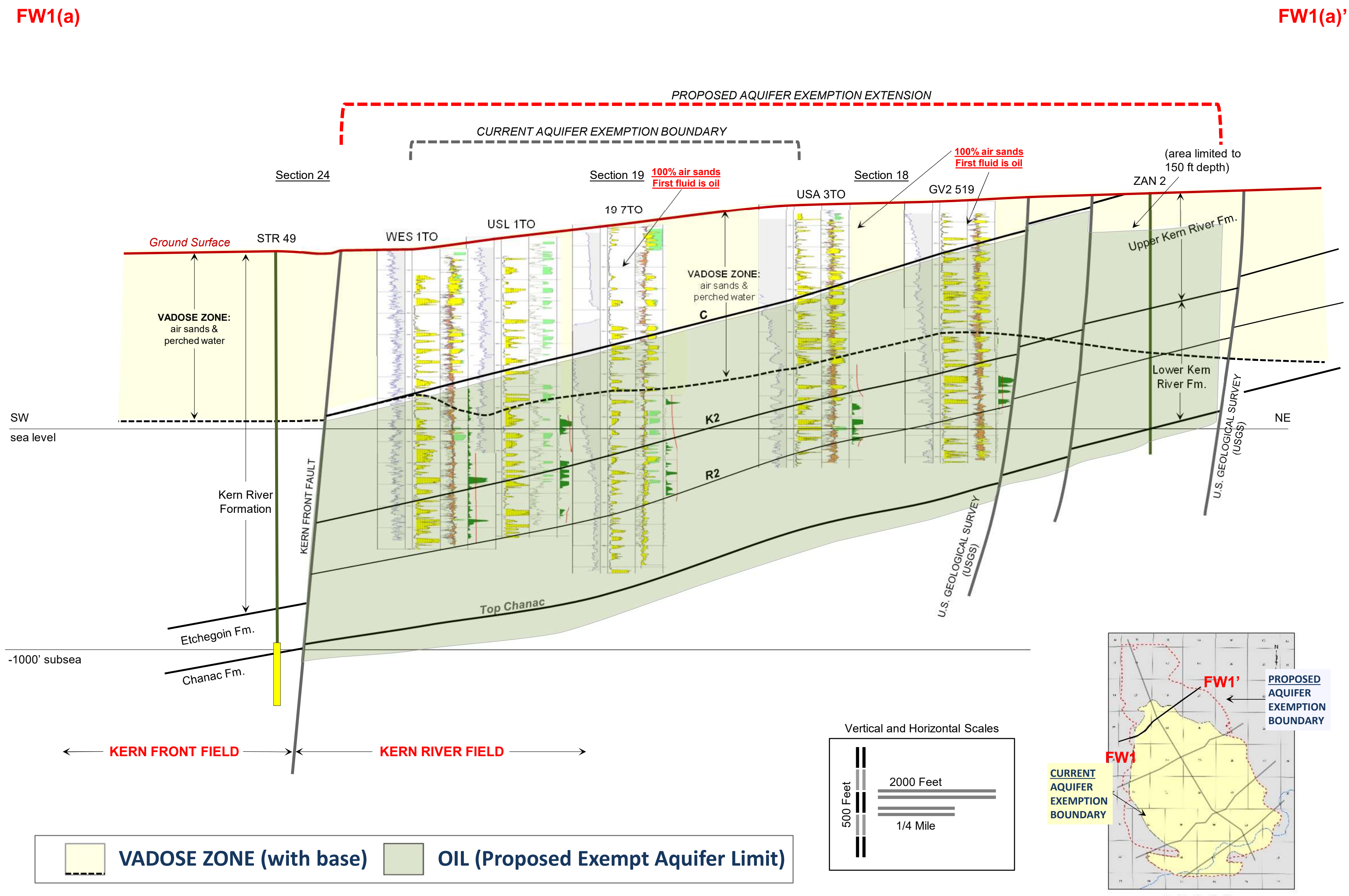
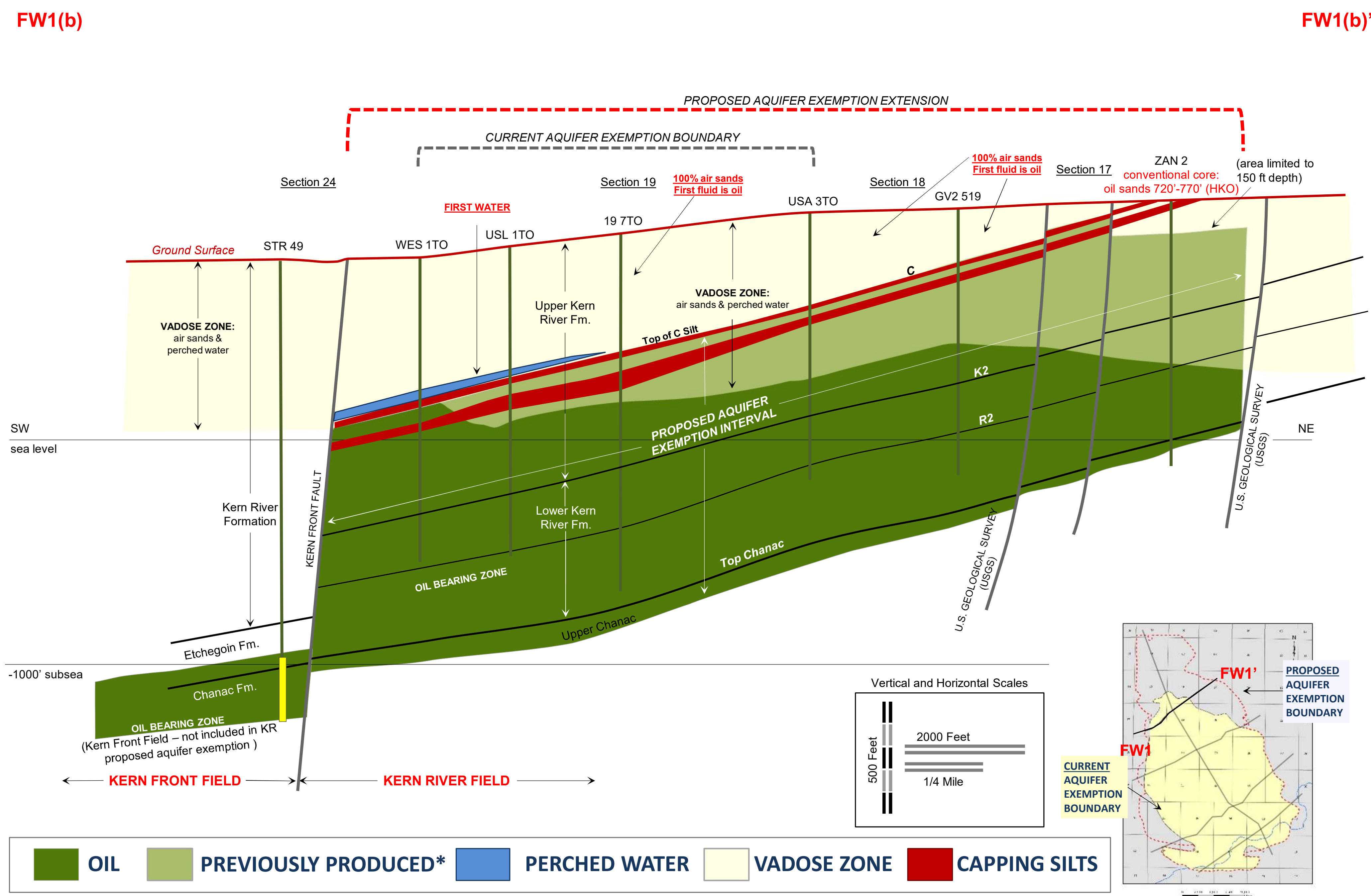



**Exhibit B-4 -** Cross Section FW1-FW1': Proposed Aquifer Exemption Zone




* Zone contains residual oil saturation.

**Exhibit B-5 -** Cross Section FW1-FW1': Proposed Aquifer Exemption Zone and Capping Silt

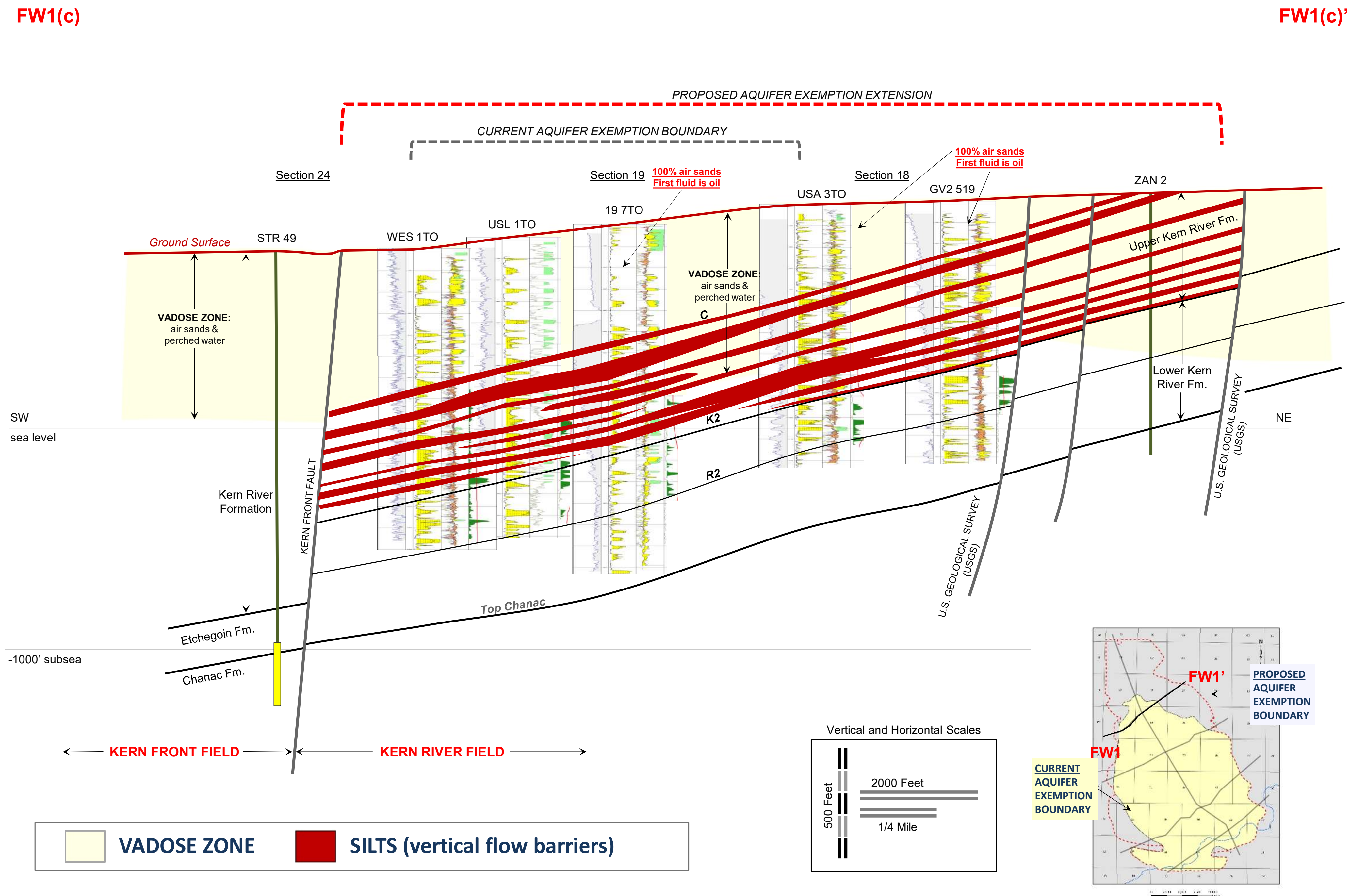



**Exhibit B-6 -** Cross Section FW1-FW1': Correlated Silt/Clay Barriers (upper KR Formation only)

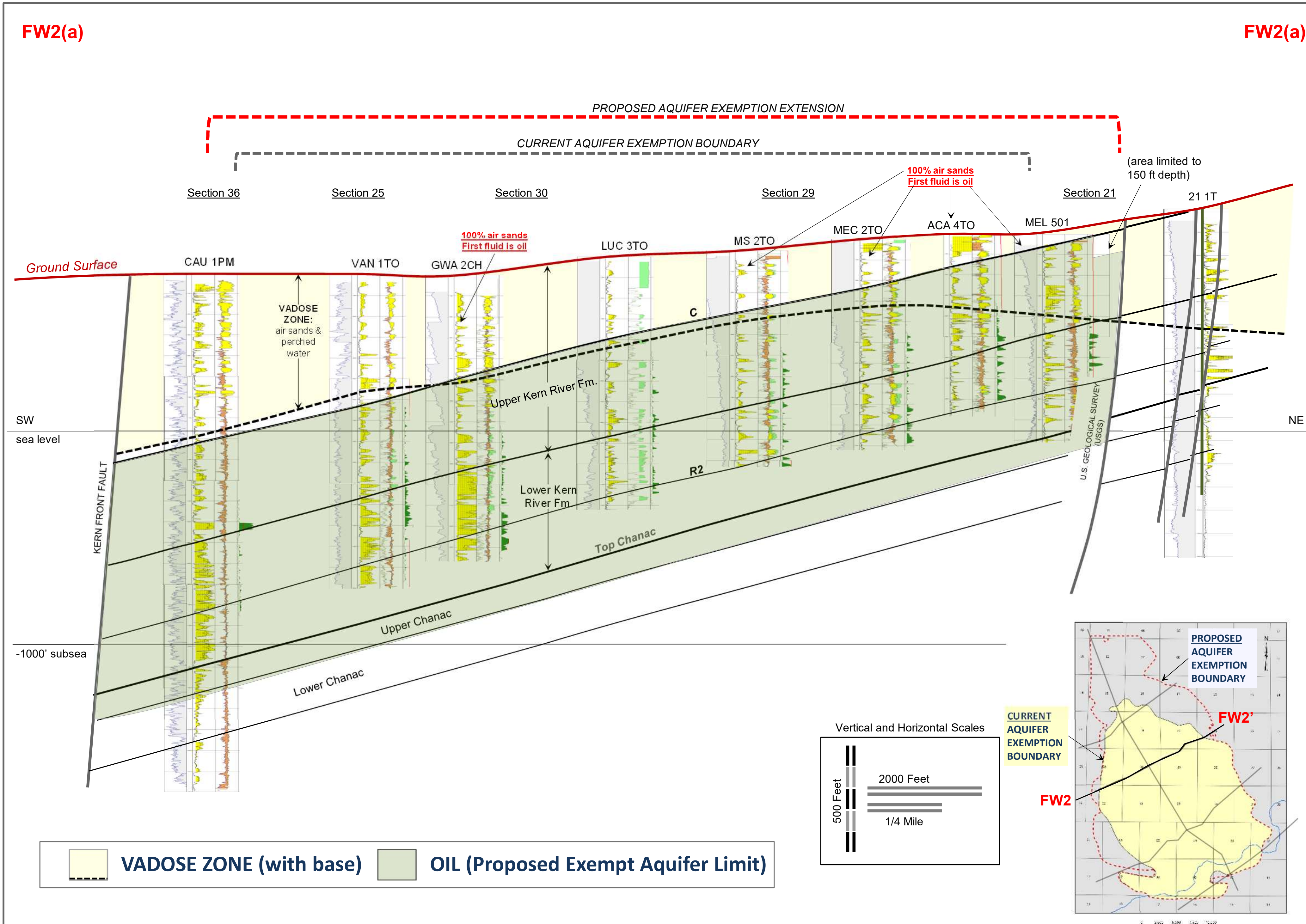
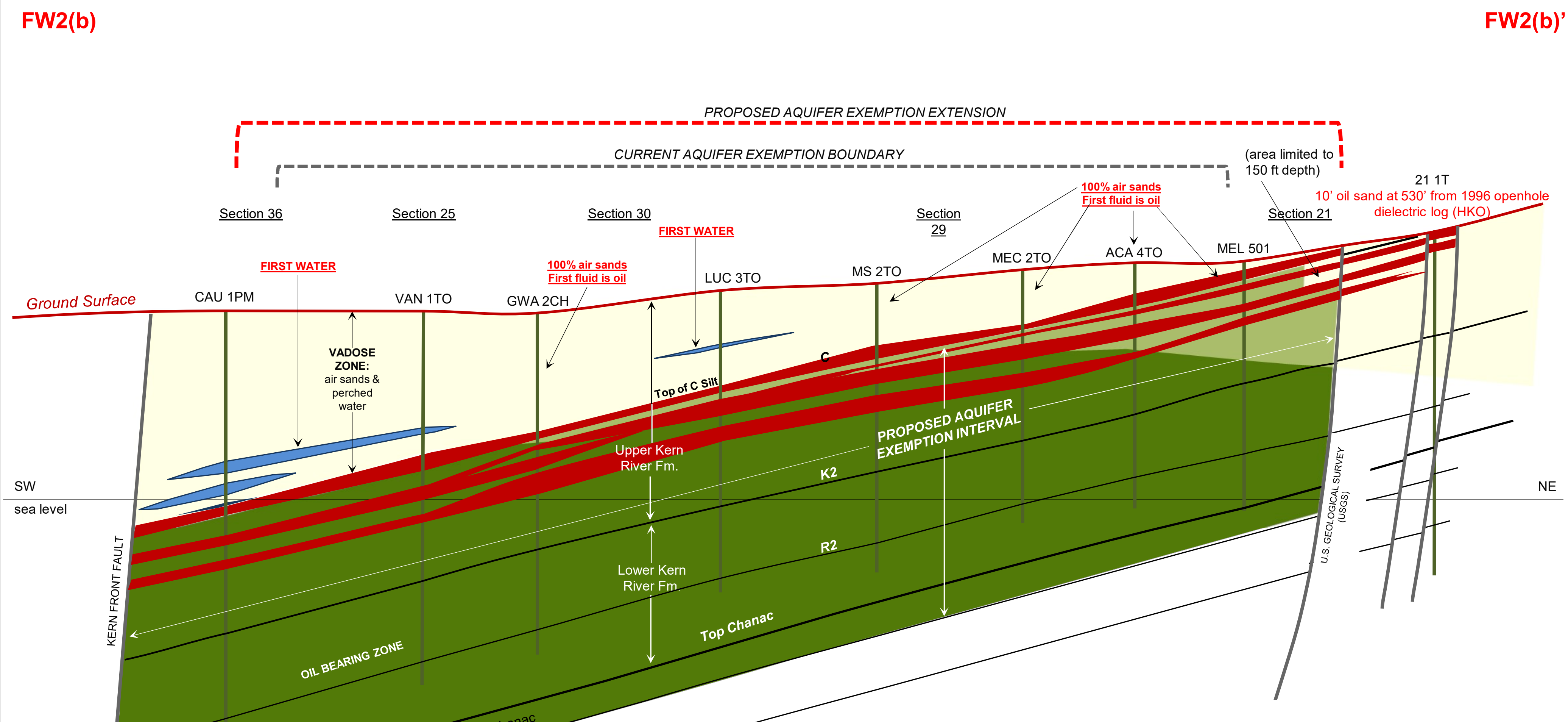
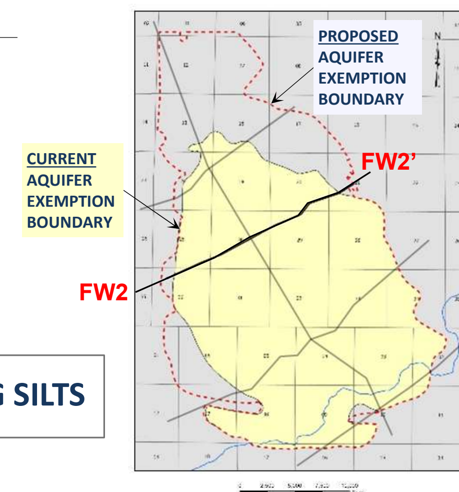



**Exhibit B-7 -** Cross Section FW2-FW2': Proposed Aquifer Exemption Zone




* Zone contains residual oil saturation.

**Exhibit B-8 -** Cross Section FW2-FW2': Proposed Aquifer Exemption Zone and Capping Silt

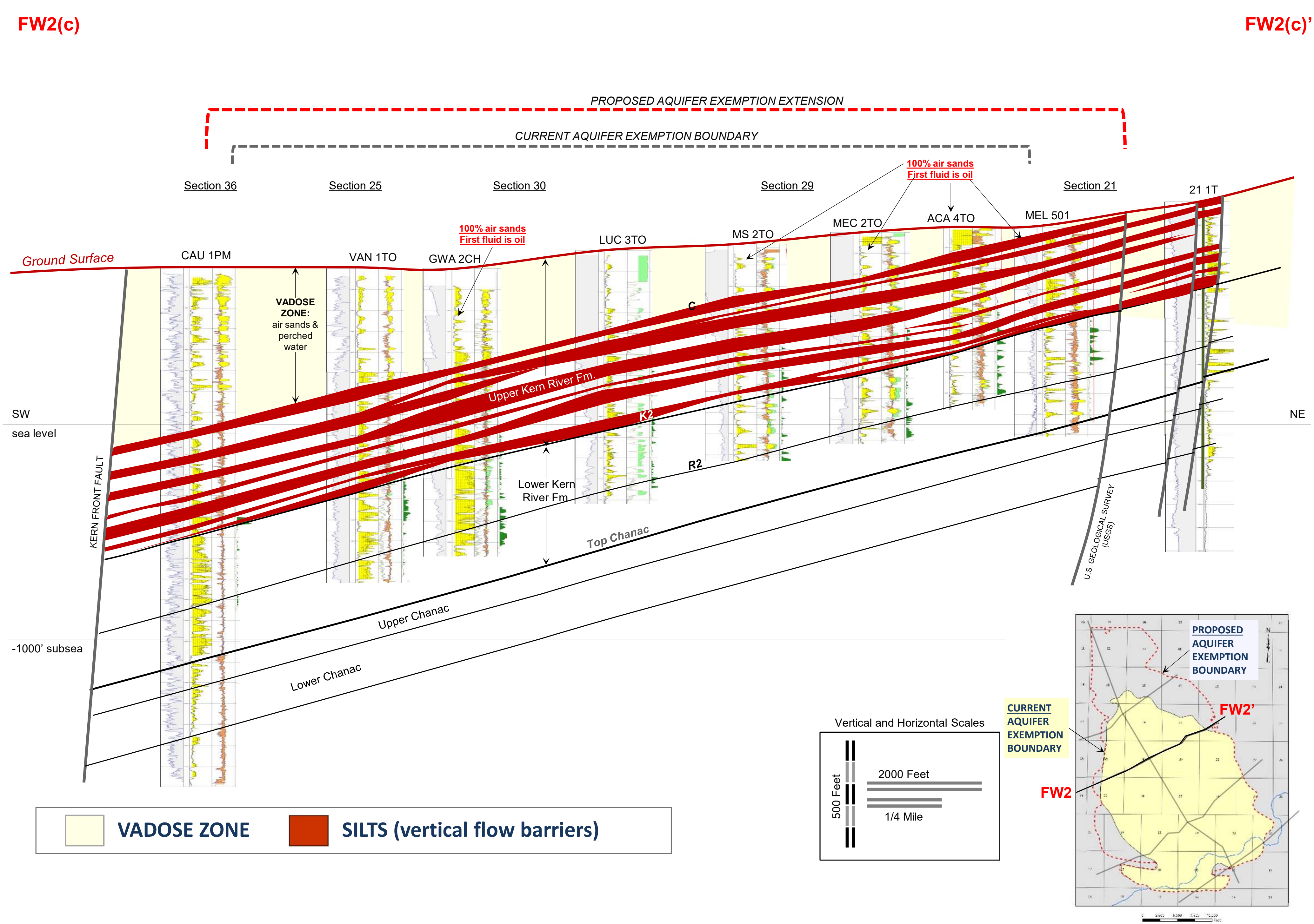



**Exhibit B-9 -** Cross Section FW2-FW2': Correlated Silt/Clay Barriers (upper KR Formation only)

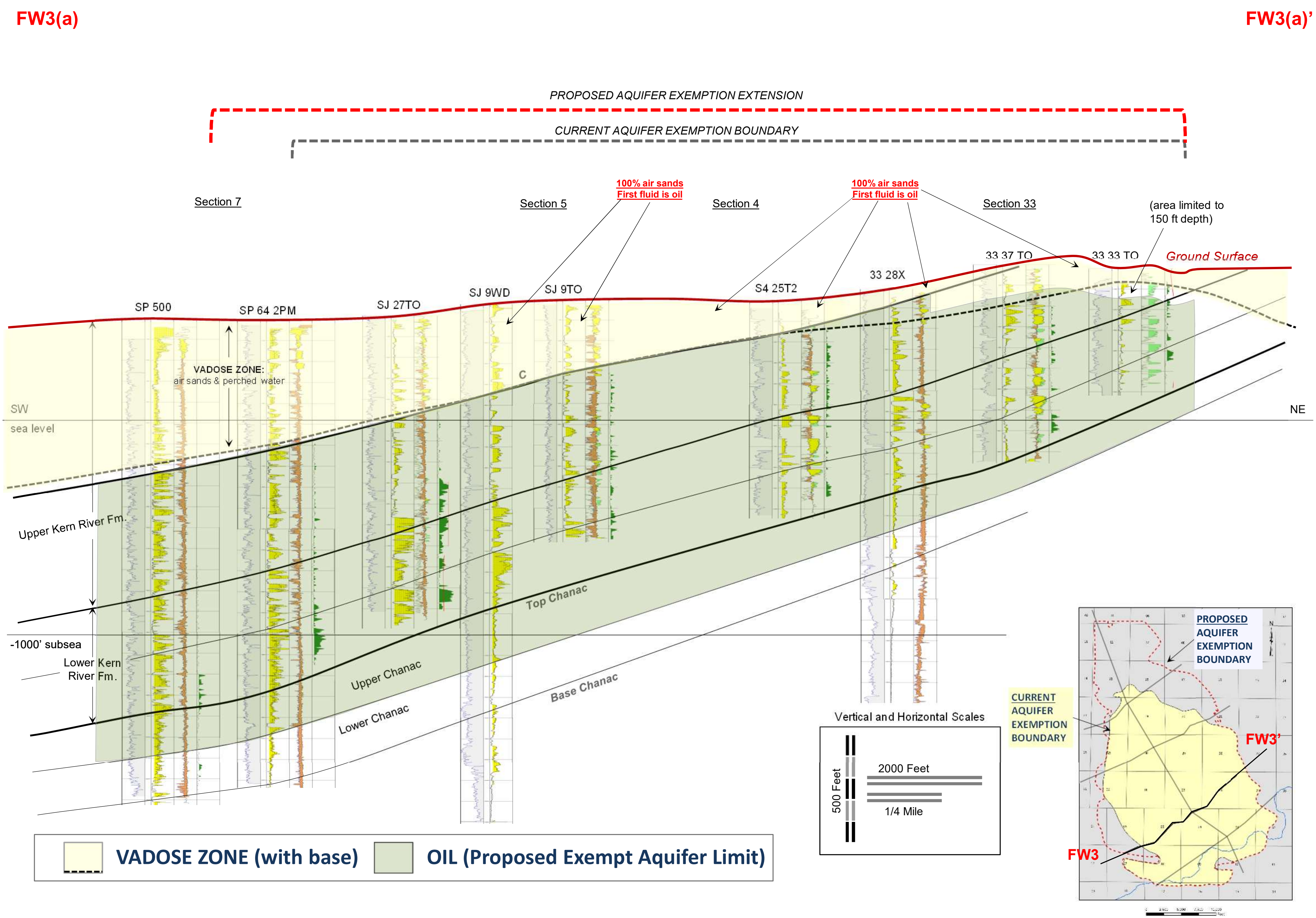
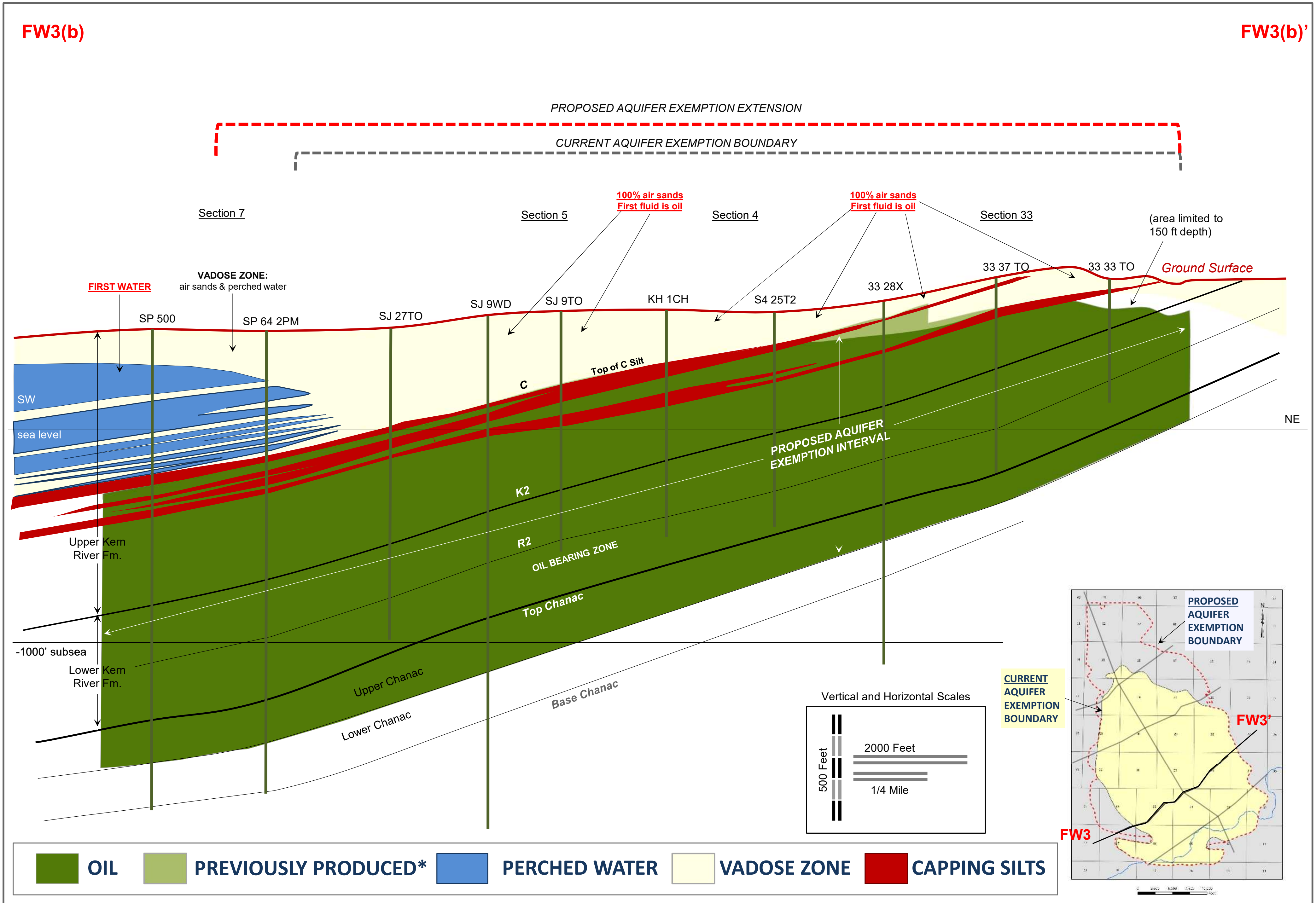



**Exhibit B-10 -** Cross Section FW3-FW3': Proposed Aquifer Exemption Zone




* Zone contains residual oil saturation.

**Exhibit B-11 -** Cross Section FW3-FW3': Proposed Aquifer Exemption Zone and Capping Silt

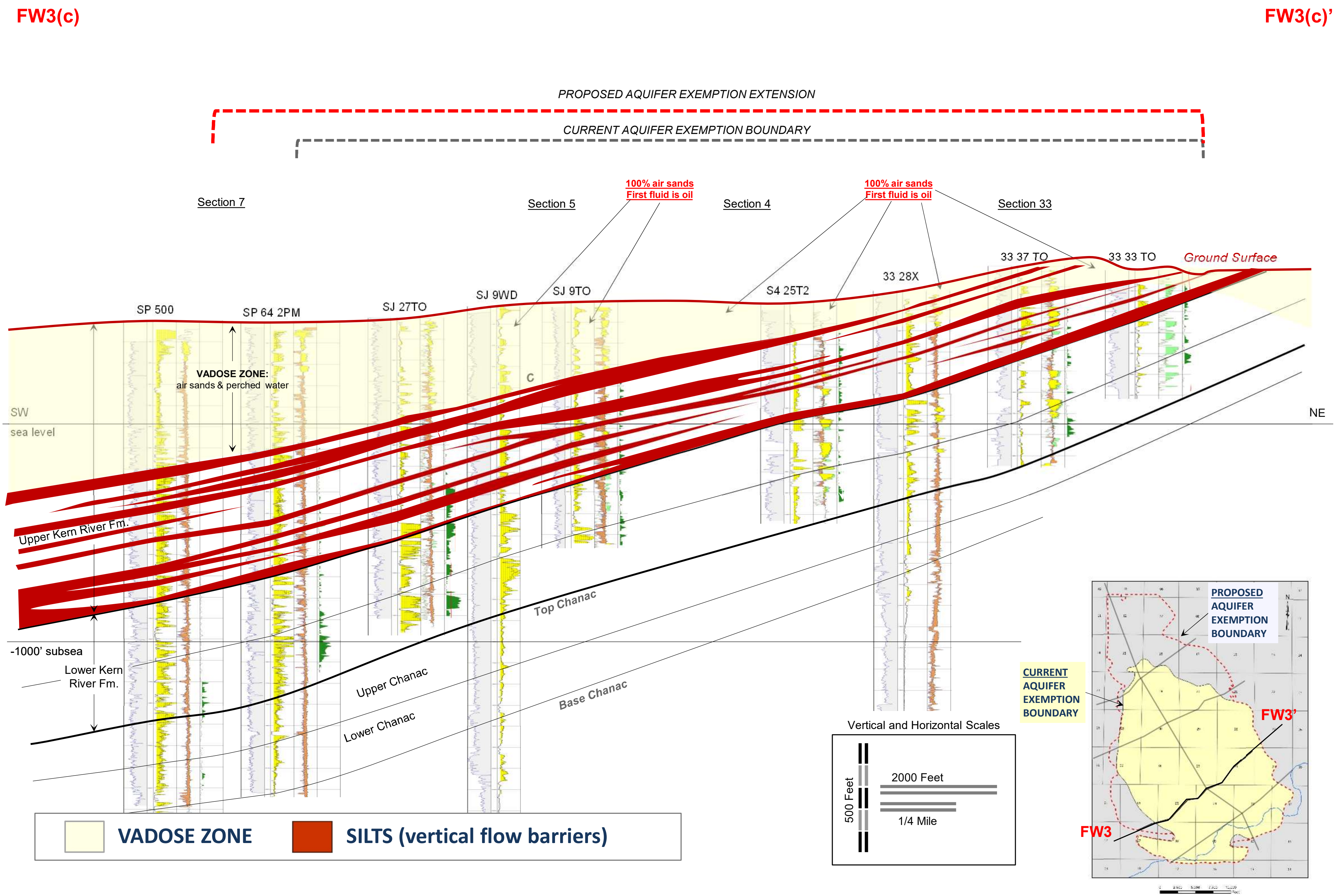



**Exhibit B-12 -** Cross Section FW3-FW3': Correlated Silt/Clay Barriers (upper KR Formation only)

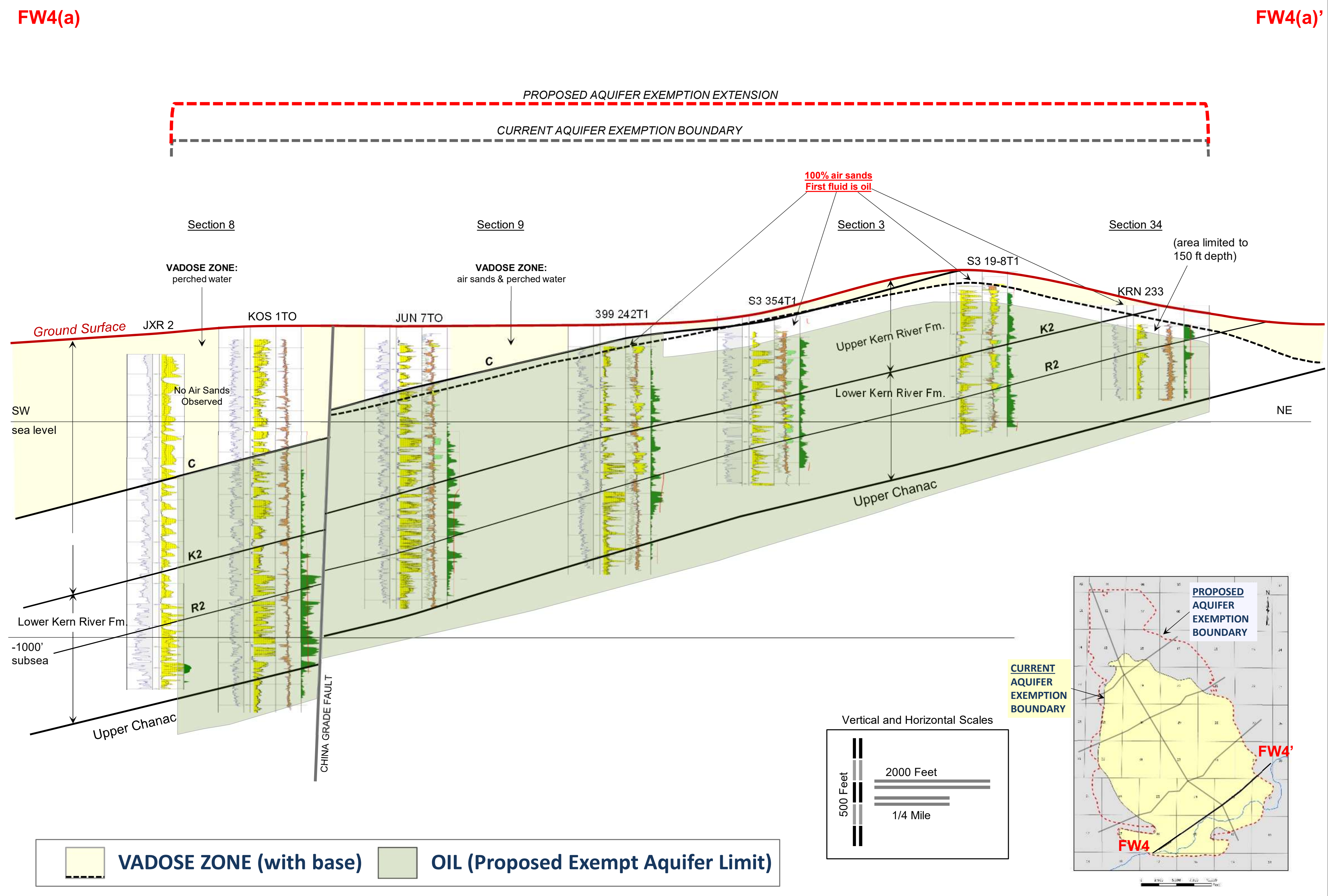
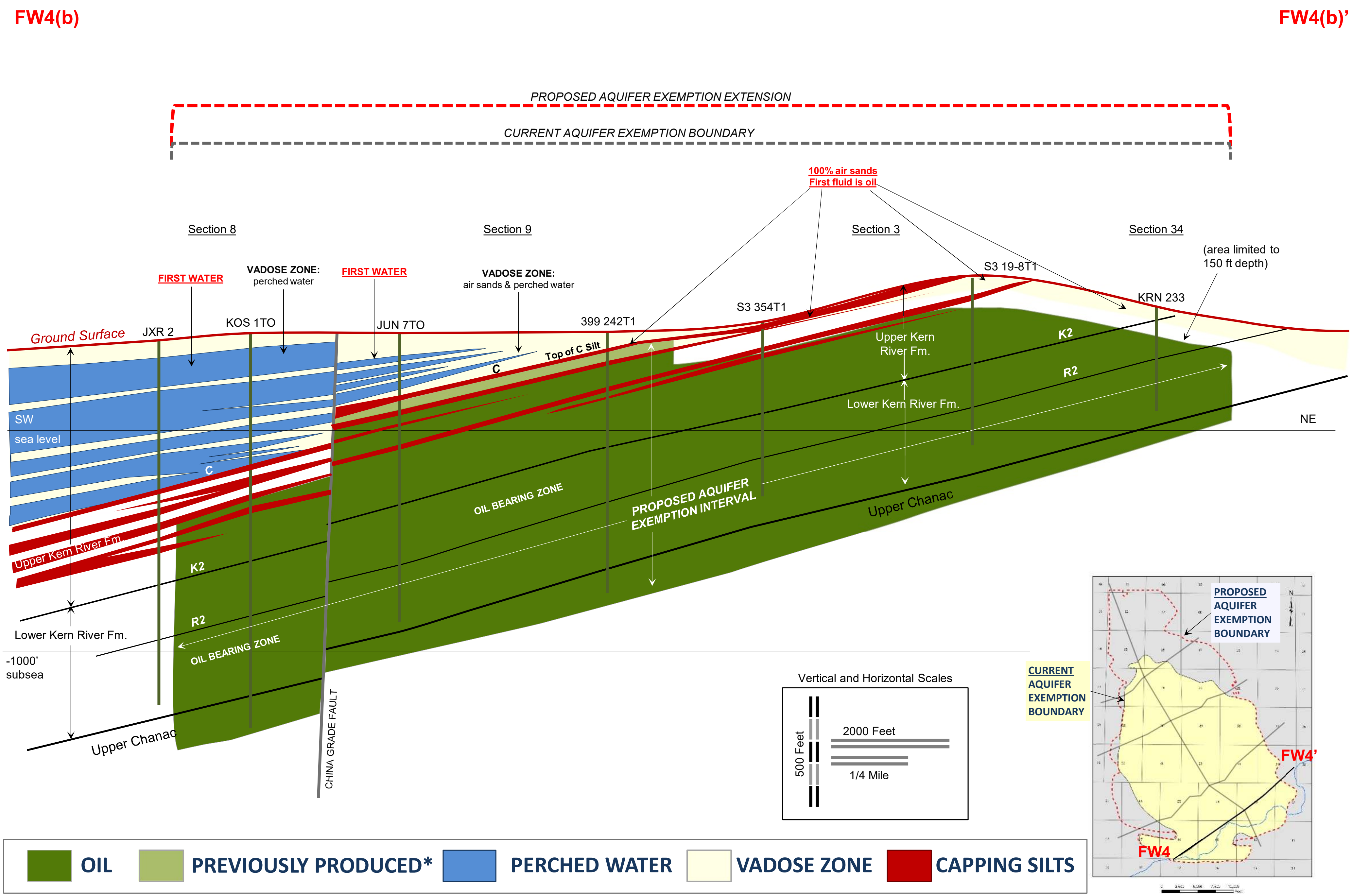



**Exhibit B-13 -** Cross Section FW4-FW4': Proposed Aquifer Exemption Zone




* Zone contains residual oil saturation.

**Exhibit B-14 -** Cross Section FW4-FW4': Proposed Aquifer Exemption Zone and Capping Silt

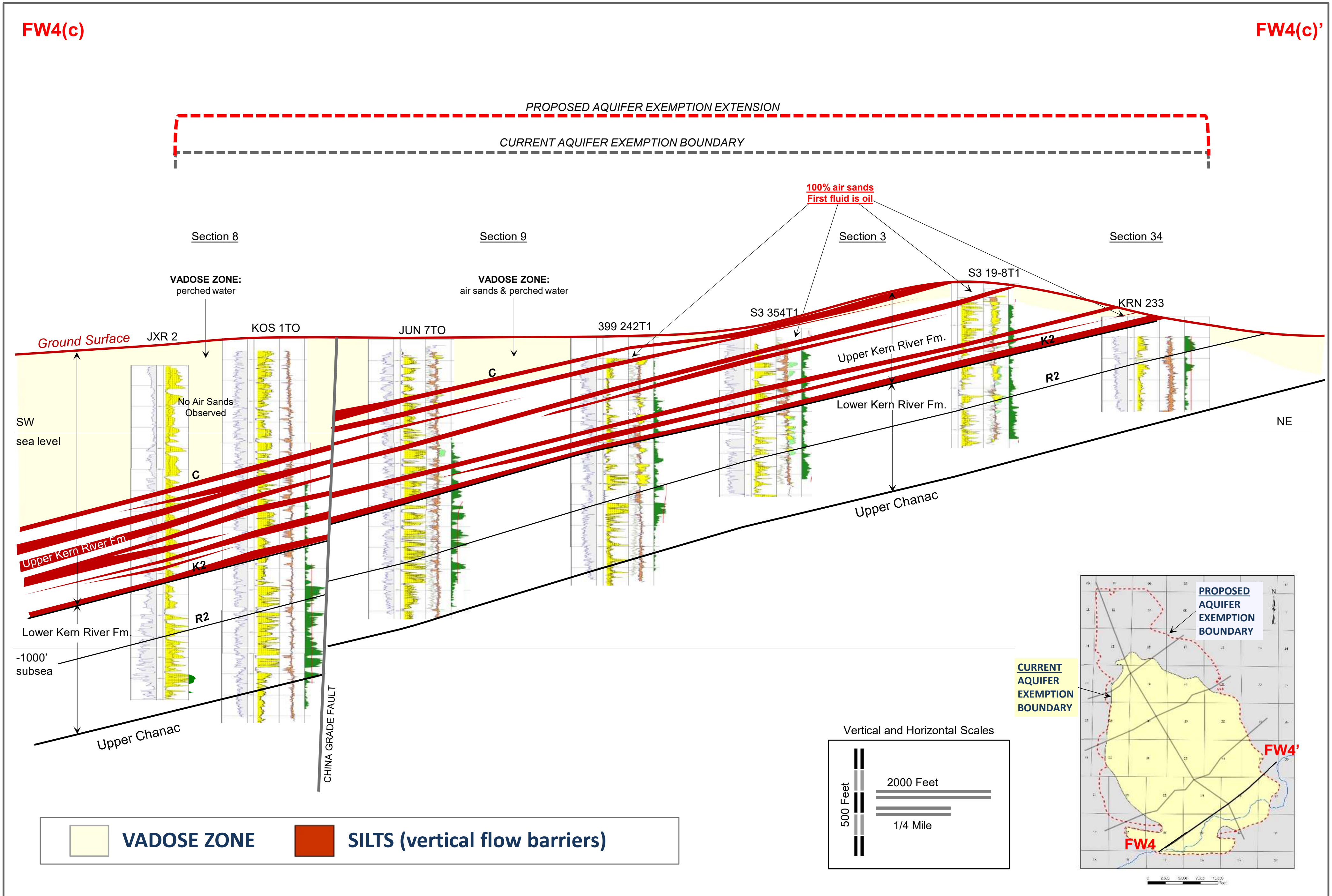



**Exhibit B-15 -** Cross Section FW4-FW4': Correlated Silt/Clay Barriers (upper KR Formation only)

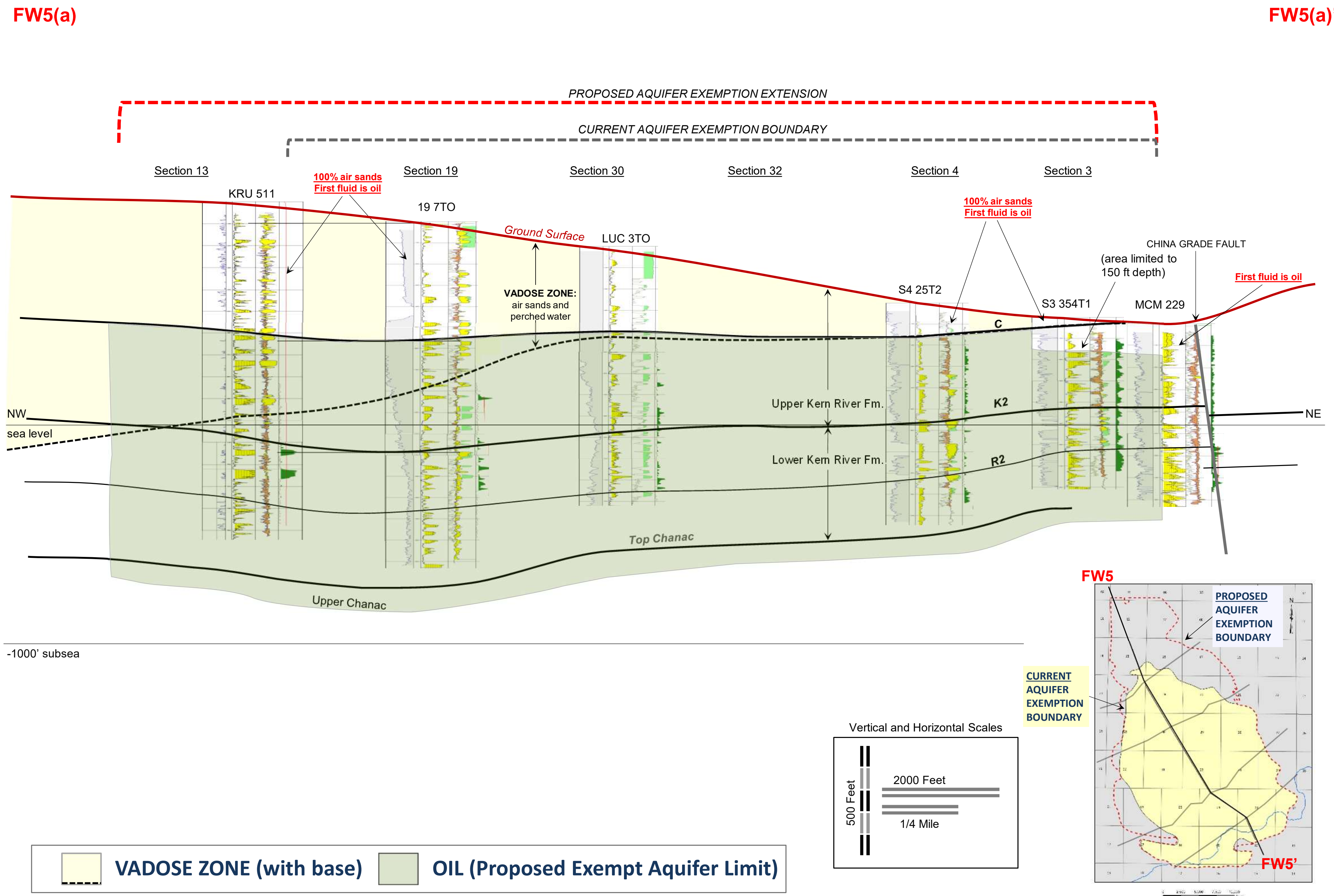
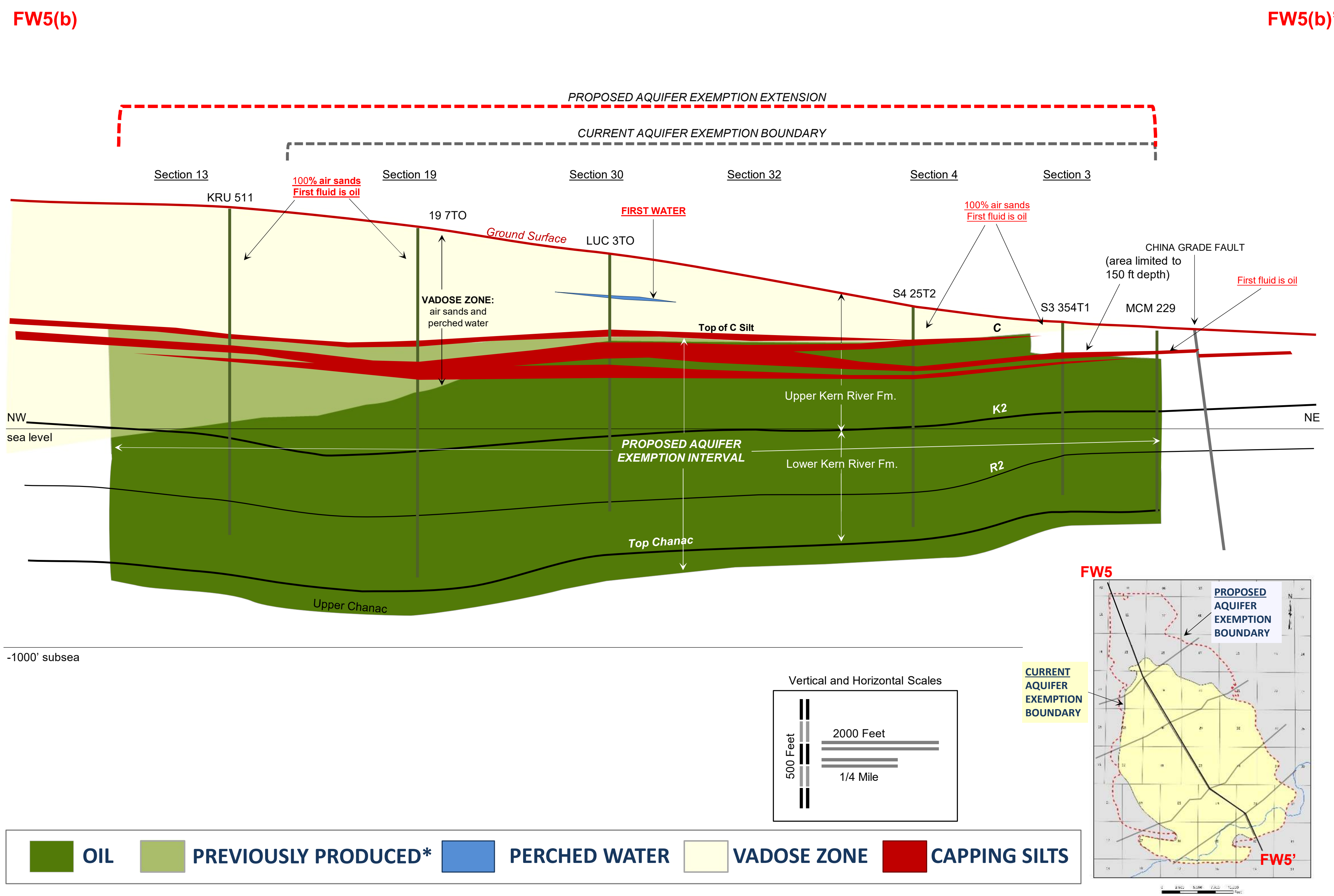



**Exhibit B-16 -** Cross Section FW5-FW5': Proposed Aquifer Exemption Zone




* Zone contains residual oil saturation.

**Exhibit B-17 -** Cross Section FW5-FW5': Proposed Aquifer Exemption Zone and Capping Silt

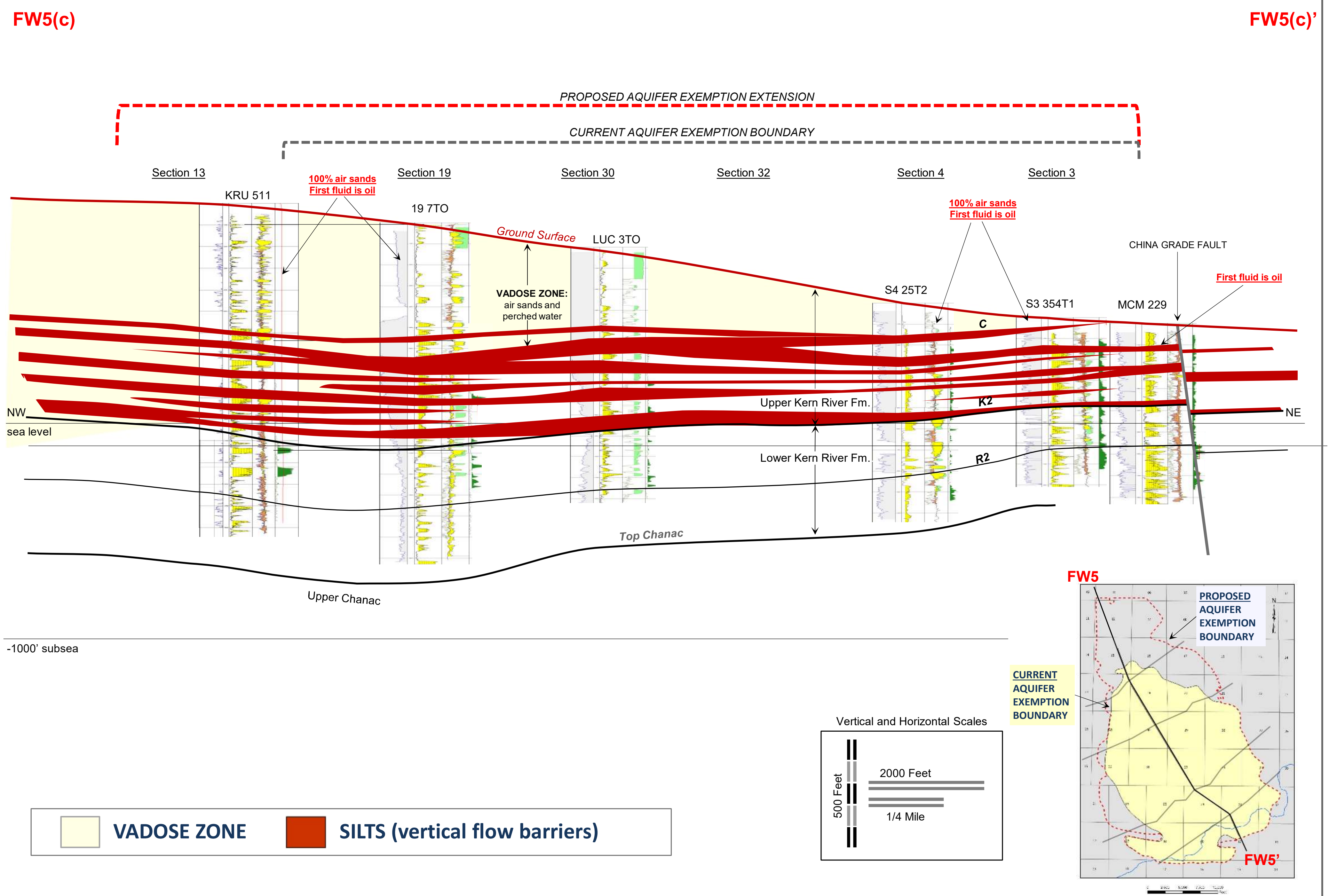
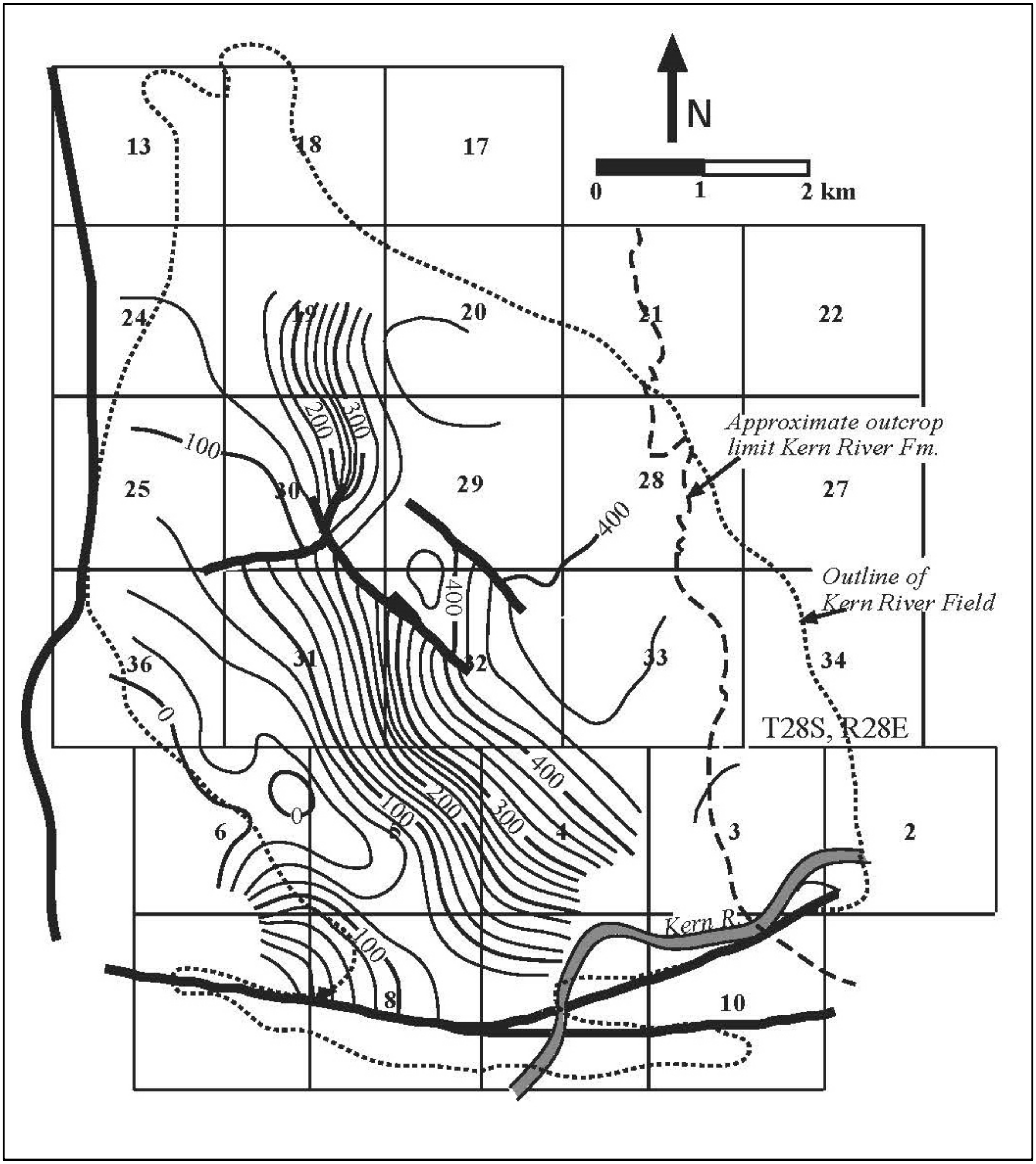



**Exhibit B-18 -** Cross Section FW5-FW5': Correlated Silt/Clay Barriers (upper KR Formation only)

# Appendix C

## Aquifer Hydraulics




Source: Coburn, M.G, Gillespie, J.M. 2002. A Hydrogeologic Study to Optimize Steamflood Performance in a Giant Oilfield: Kern River Field, California. AAPG Bulletin v. 86, no. 8."

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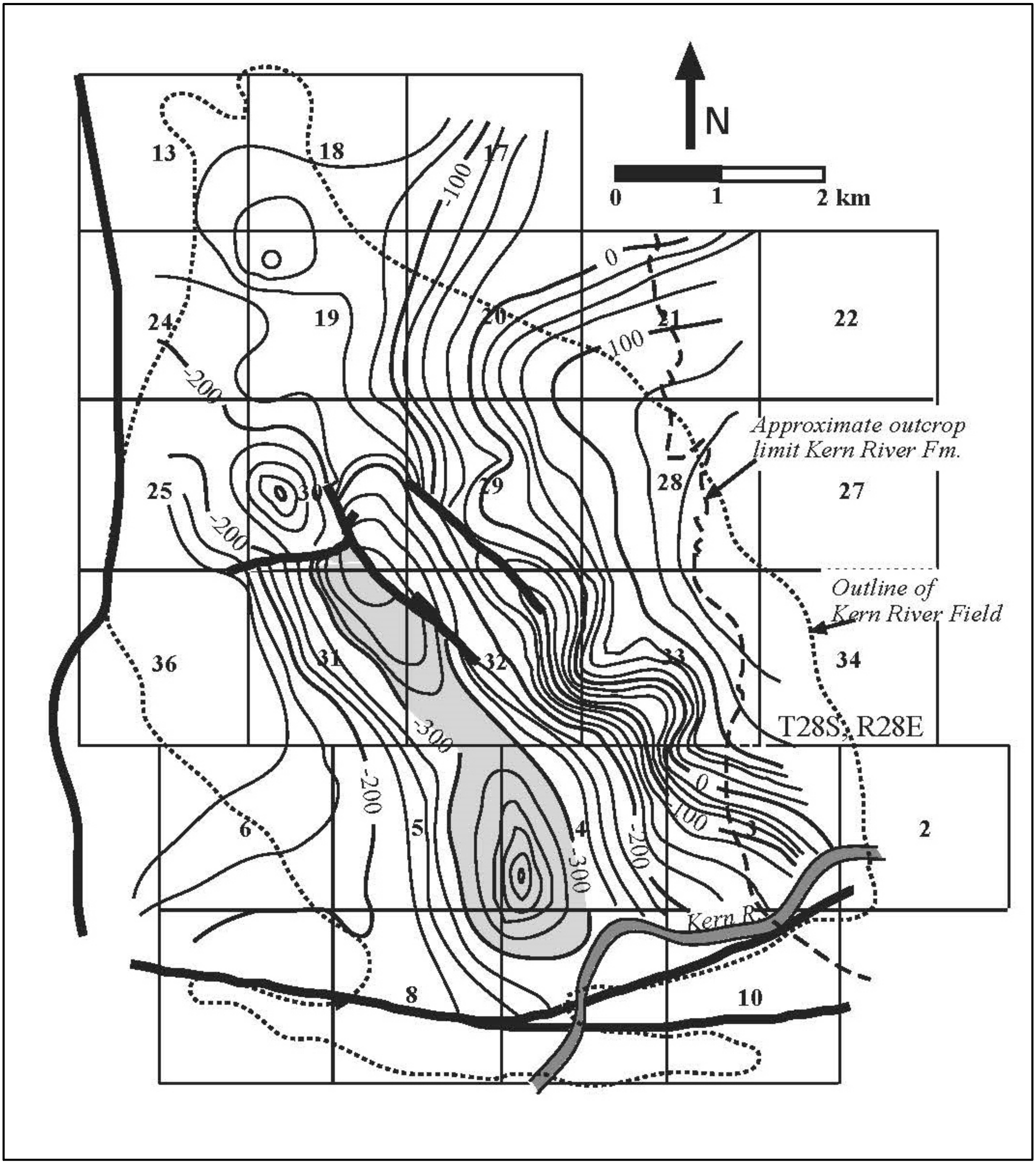
Chevron North America Exploration
and Production Company
Kern River Aquifer Exemption

**1992 Regional Groundwater Potentiometric Surface Map**

K/J 1565005.00
January 2017

**Exhibit C-1**




Source: Coburn, M.G, Gillespie, J.M. 2002. A Hydrogeologic Study to Optimize Steamflood Performance in a Giant Oilfield: Kern River Field, California. AAPG Bulletin v. 86, no. 8."

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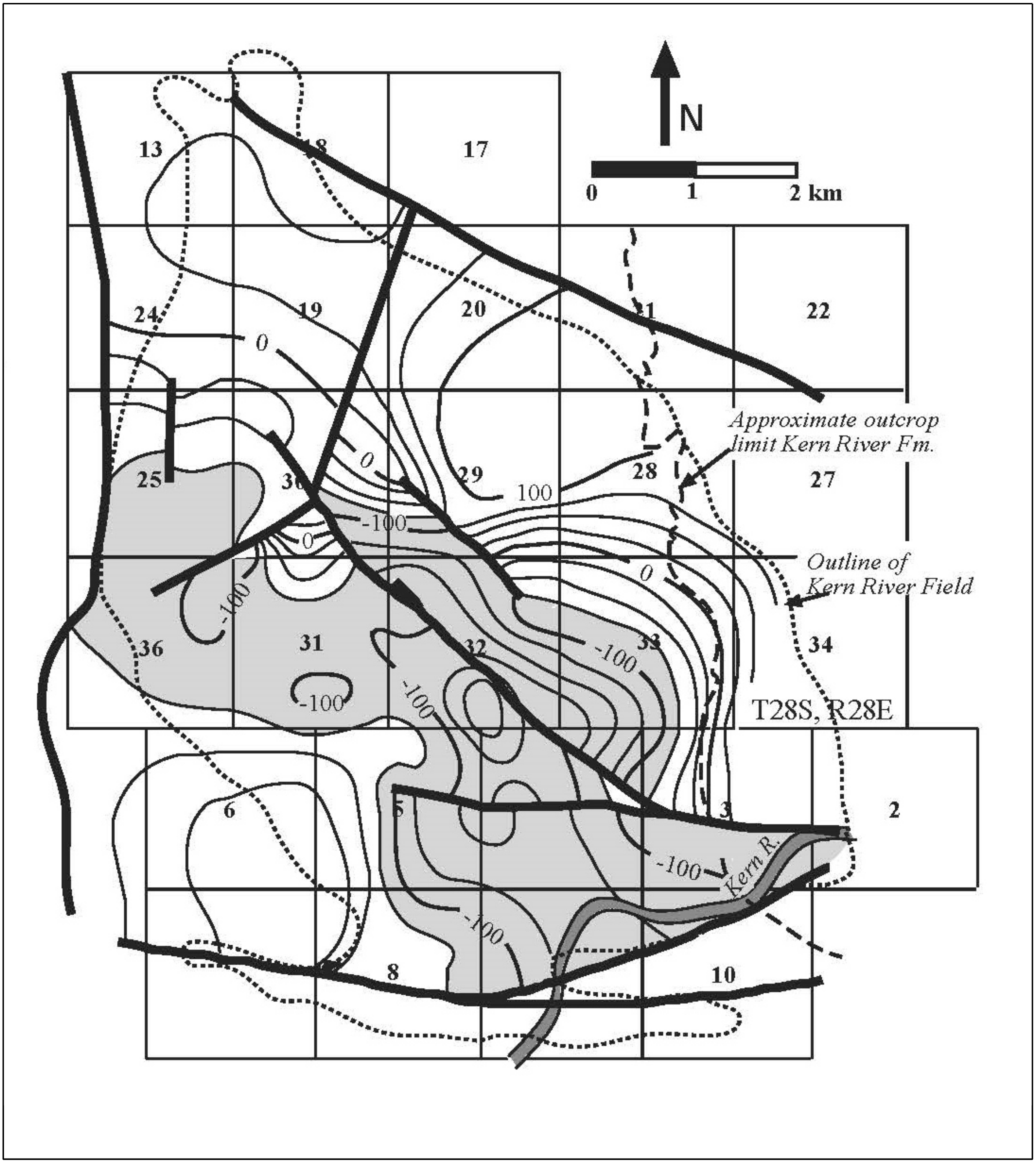
and Production Company
Kern River Aquifer Exemption

**1992 Kern River R1 Unit Groundwater Potentiometric Surface Map**

K/J 1565005.00
January 2017

**Exhibit C-2**




Source: Coburn, M.G, Gillespie, J.M. 2002. A Hydrogeologic Study to Optimize Steamflood Performance in a Giant Oilfield: Kern River Field, California. AAPG Bulletin v. 86, no. 8."

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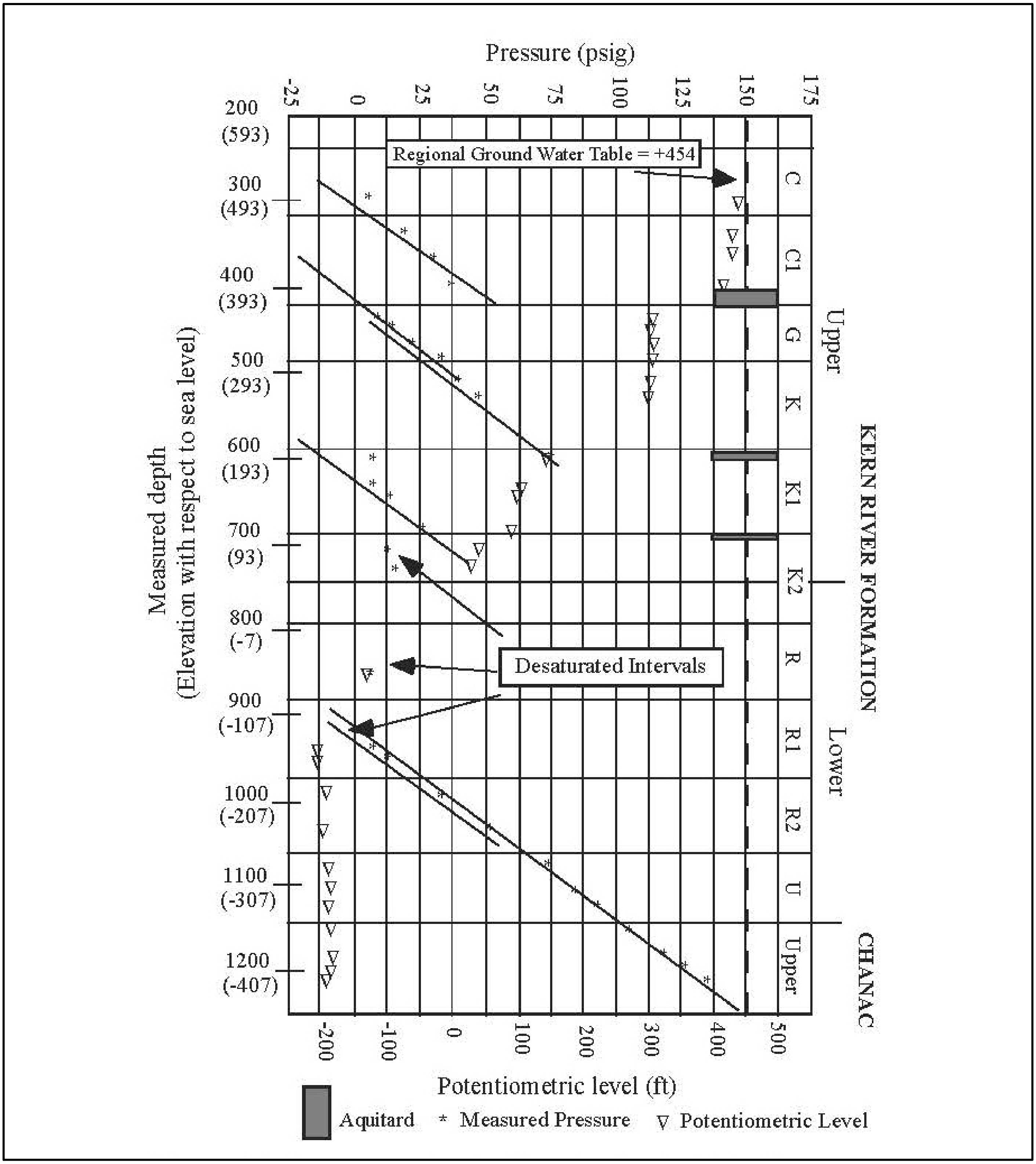
Chevron North America Exploration and Production Company
Kern River Aquifer Exemption

**1992 Chanac C1 Groundwater Potentiometric Surface Map**

K/J 1565005.00
January 2017

**Exhibit C-3**




Source: Coburn, M.G, Gillespie, J.M. 2002. A Hydrogeologic Study to Optimize Steamflood Performance in a Giant Oilfield: Kern River Field, California. AAPG Bulletin v. 86, no. 8."

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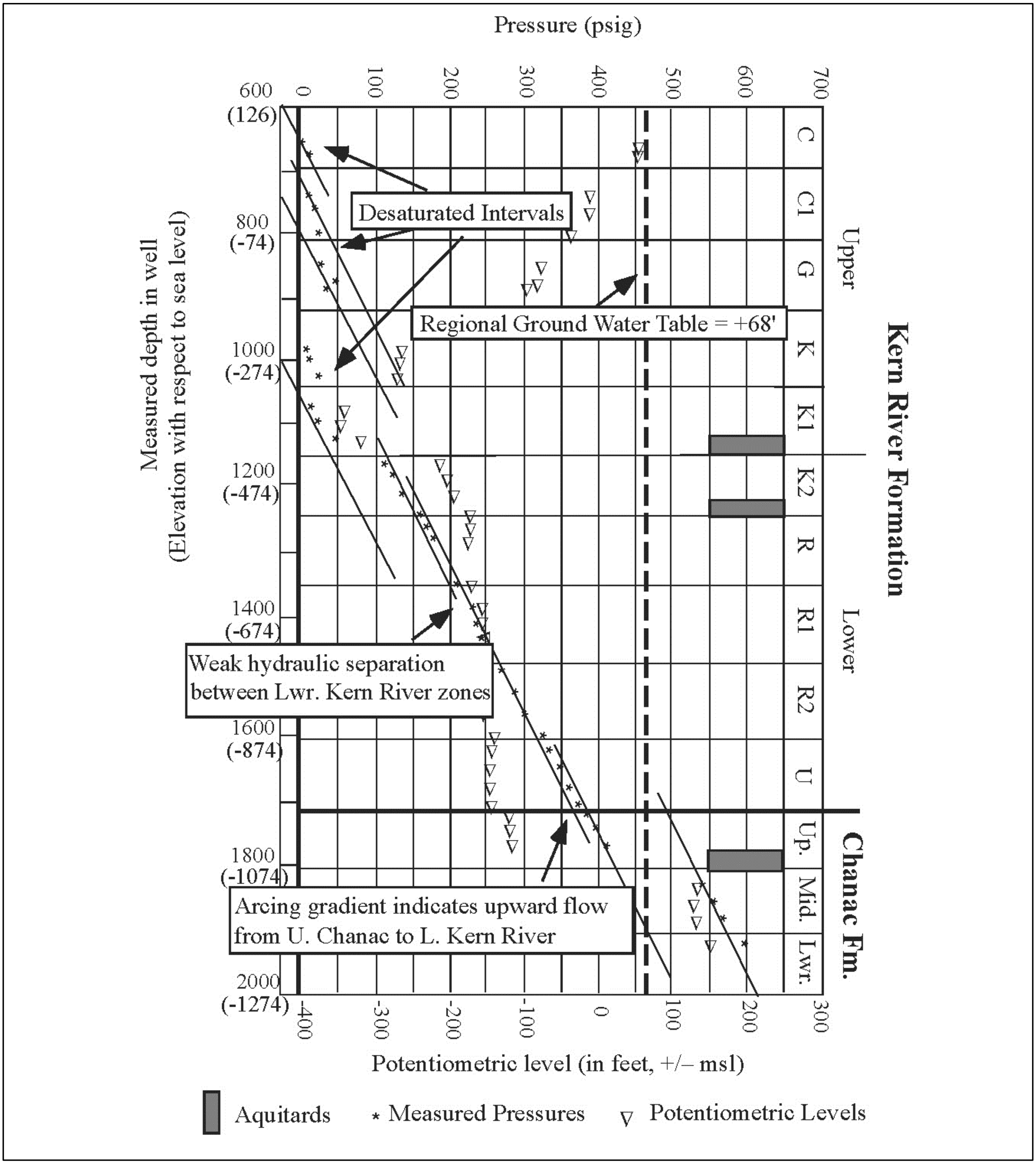
and Production Company
Kern River Aquifer Exemption

**Vertical Pressure Log (Openhole Pressure Tool) for Kern River and Upper Chanac**

K/J 1565005.00
January 2017

**Exhibit C-4**




Source: Coburn, M.G, Gillespie, J.M. 2002. A Hydrogeologic Study to Optimize Steamflood Performance in a Giant Oilfield: Kern River Field, California. AAPG Bulletin v. 86, no. 8."

**Kennedy/Jenks Consultants**

Chevron North America Exploration
and Production Company
Kern River Aquifer Exemption

**Vertical Pressure Log (Openhole Pressure Tool) for Kern River and Upper Chanac**

K/J 1565005.00
January 2017

**Exhibit C-5**

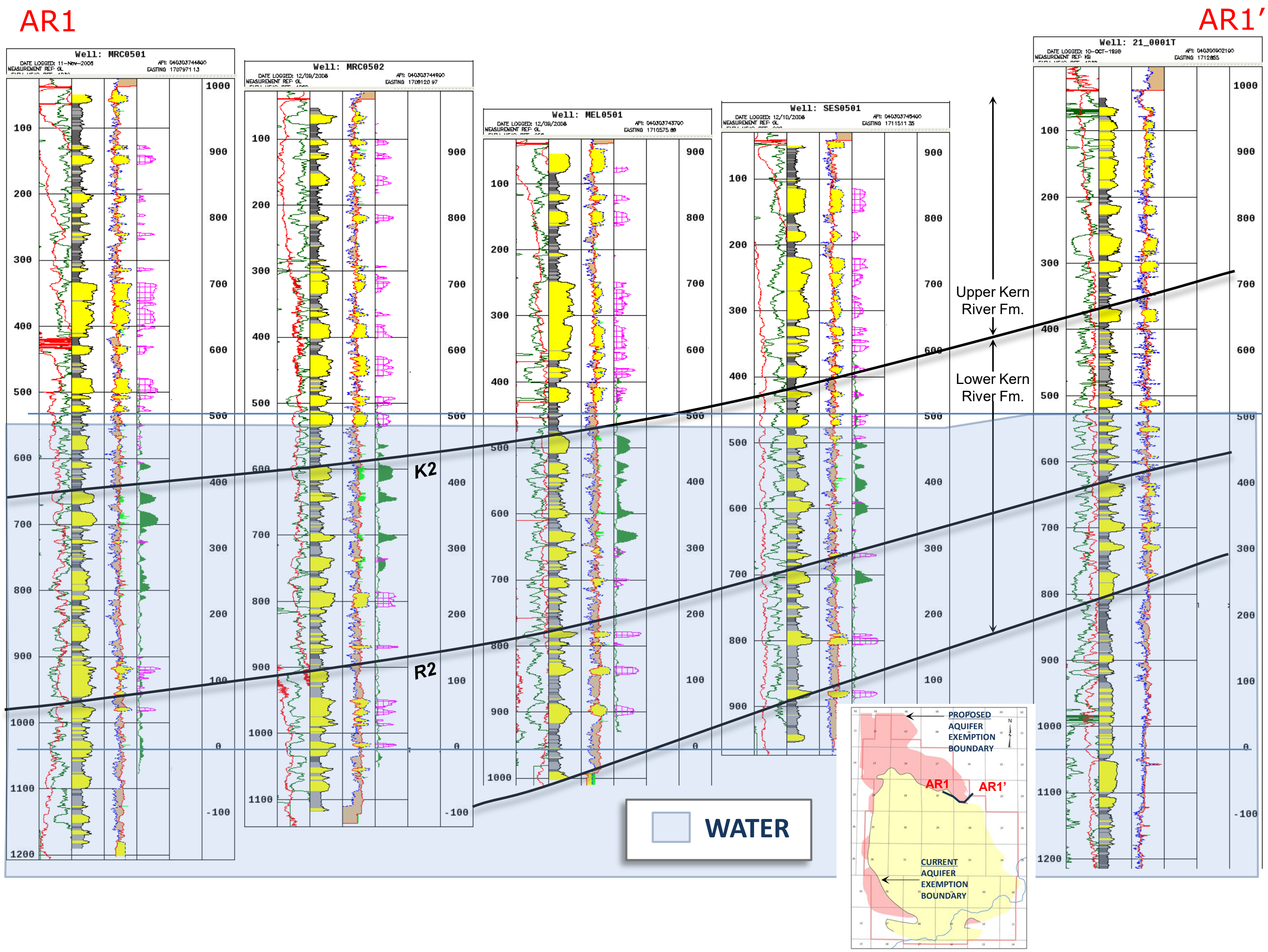
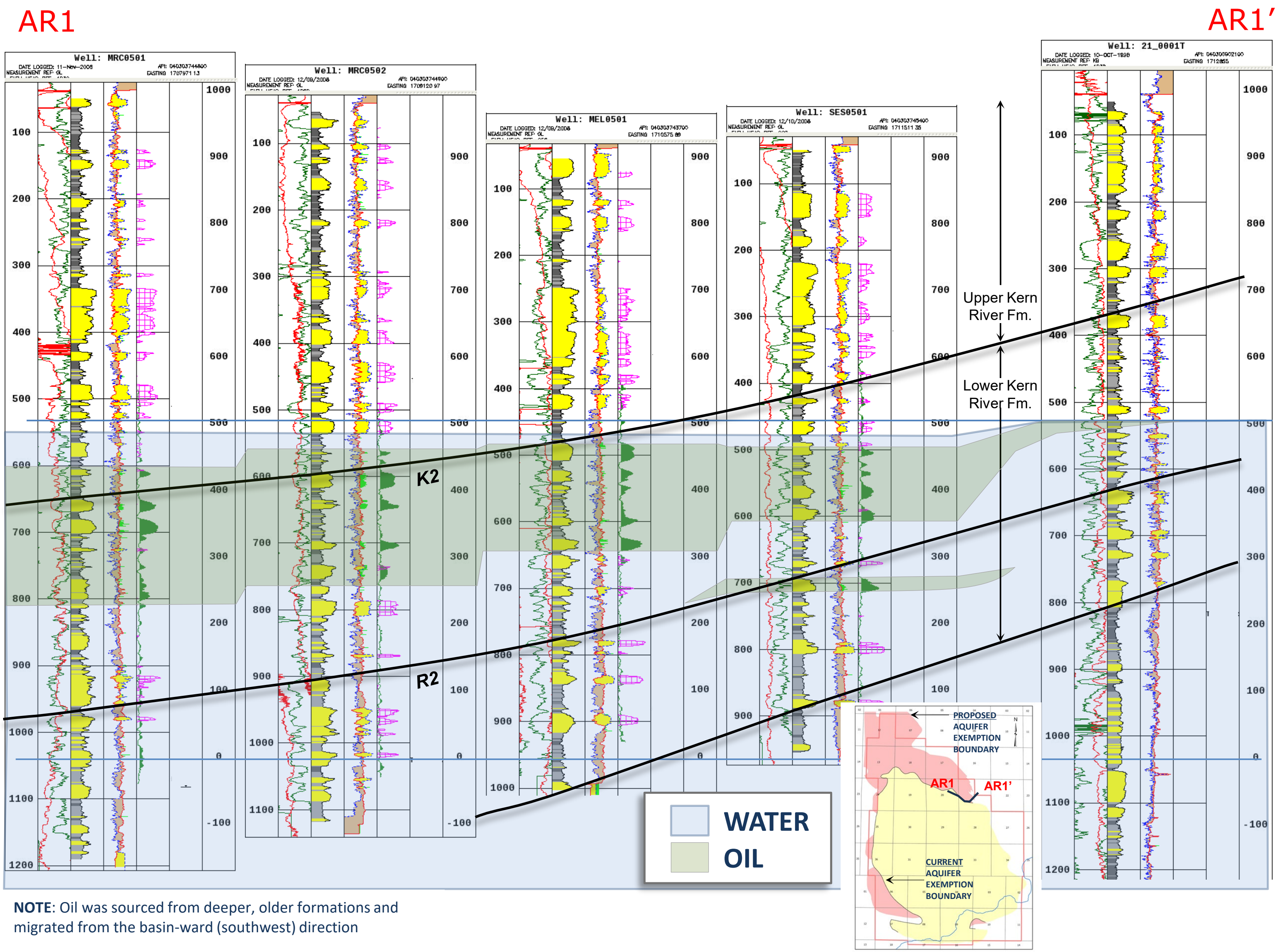



**Exhibit C-6 -** Regional Groundwater Table Before Oil Emplacement




**NOTE**: Oil was sourced from deeper, older formations and migrated from the basin-ward (southwest) direction

**Exhibit C-7 -** Oil floating near the top of the regional groundwater table following oil migration
This represents fluid saturation prior to development of the Kern River oil field (1899)

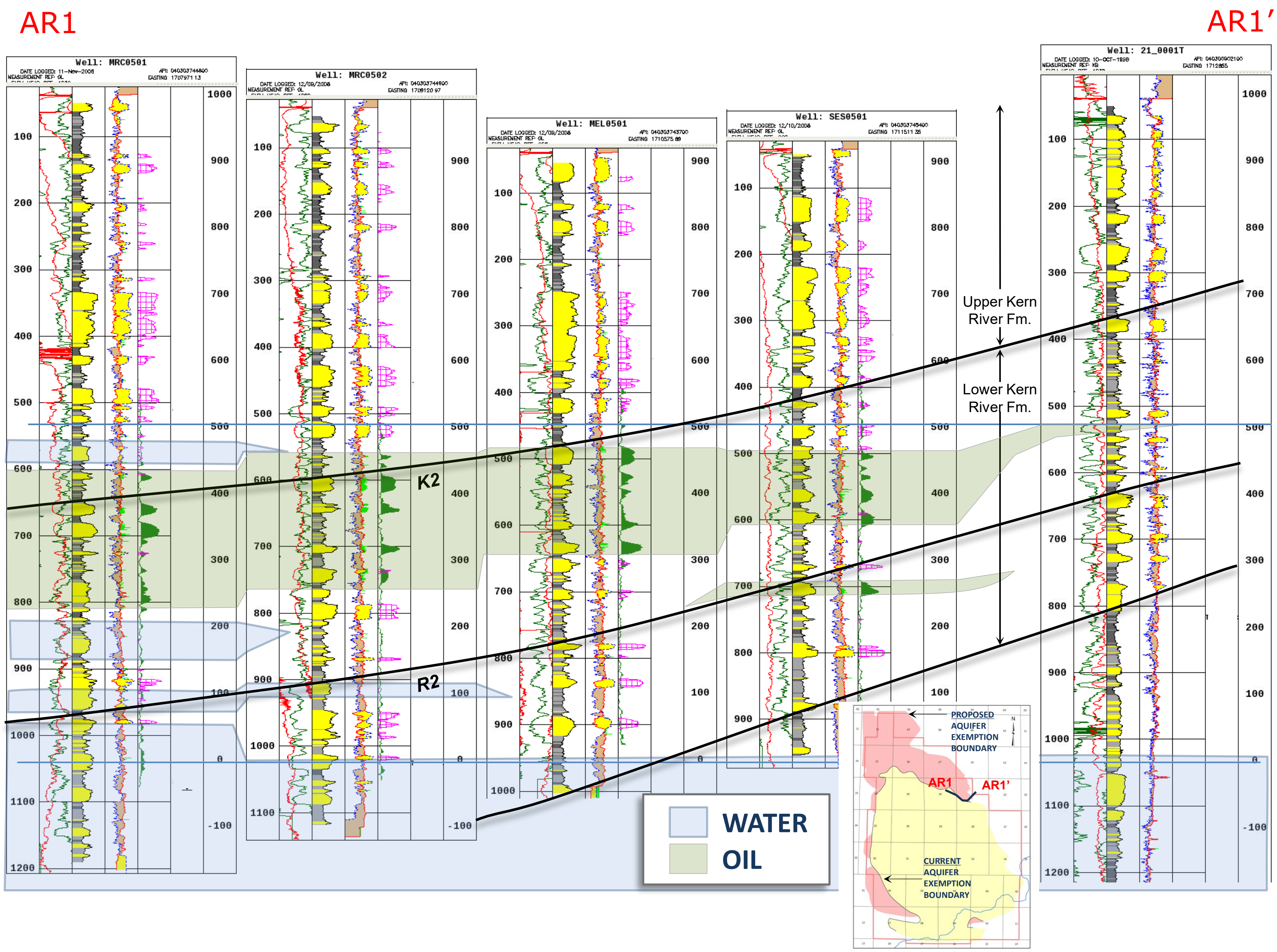



**Exhibit C-8 -** Current level of oil saturation and regional groundwater table following ~115 years of downdip fluid withdrawal
Heavy, perched oil is immobile unless heated by steam

# Appendix D

## Water Quality Data

D-1 Historical Water Quality Data Summary
D-2 Water Quality Analytical Reports
D-3 Stiff and Piper Diagrams – Chevron Interdiction Wells

Laboratory Reports for Water Quality Samples at end of Appendix.

# Exhibit D-1: Water Quality Data Summary for Water Wells within 1/4-Mile of Proposed Exemption Boundary

| Table 3 Well ID | Well[a] Number | Sampling Date | Ca[b] mg/l[j] | Mg[c] mg/l | Na[d] mg/l | K[e] mg/l | Iron µg/l[k] | Mn[f] µg/l | Bicarbonate Alkalinity mg/l | Chloride mg/l | Nitrate ($NO_3$) mg/l | Sulfate mg/l | As[g] µg/l | Boron mg/l | EC[h] umhos/cm[l] | TDS[i] mg/l |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | T28S/R27E-24K01 | 4/30/2003 | 1.4 | 0.06 | 60 | 0.6 | <100[m] | <20 | 83 | 27 | <2.0 | 2.1 | <2.0 | <0.1 | 320 | 230 |
| 6 | 29S28E02F001M | 11/16/1955 | NA[n] | 2 | NA | 3 | NA | NA | NA | 16 | 0.1 | 48 | NA | 0.2 | 378 | NA |
| 11 | 29S28E08F001M | 12/6/1955 | NA | 8 | NA | 3 | NA | NA | NA | 55 | 0[o] | 45 | NA | 0.15 | 530 | NA |
| 14 | 29S/28E-08L01 (RRHOA) | 10/28/2013 | 20 | 3 | 29 | 2 | <100 | <20 | 77 | 17 | 6 | 20 | <2.0 | NA | 270 | 170 |
| 14 | 29S/28E-08L01 (RRHOA) | 12/19/2014 | 19 | 3 | 30 | 2 | 65 | 58 | 100 | 12 | 5.5 | 20 | 0.76J | 0 | 270 | 170 |
| 26 | 1503310-001 | 7/9/1997 | NA | NA | NA | NA | NA | 101 | NA | NA | 0 | NA | NA | NA | NA | NA |
| 26 | 1503310-001 | 4/15/1998 | NA | NA | NA | NA | NA | NA | NA | NA | 1 | NA | NA | NA | NA | NA |
| 26 | 1503310-001 | 3/29/2000 | NA | NA | NA | NA | NA | NA | NA | NA | 1 | NA | NA | NA | NA | NA |
| 26 | 1503310-001 | 9/23/2005 | NA | NA | NA | NA | NA | NA | NA | NA | 1 | NA | NA | NA | NA | NA |
| 26 | 1503310-001 | 6/22/2006 | NA | NA | NA | NA | NA | NA | NA | NA | 2 | NA | NA | NA | NA | NA |
| 26 | 1503310-001 | 5/8/2008 | NA | NA | NA | NA | NA | NA | NA | NA | < 0 | NA | NA | NA | NA | NA |
| 26 | 1503310-001 | 5/21/2010 | NA | NA | NA | NA | NA | NA | NA | NA | < 0 | NA | NA | NA | NA | NA |
| 26 | 1503310-001 | 5/5/2011 | NA | NA | NA | NA | NA | NA | NA | NA | < 0.44 | NA | NA | NA | NA | NA |
| 26 | 1503310-001 | 5/24/2012 | NA | NA | NA | NA | NA | NA | NA | NA | < 0.44 | NA | NA | NA | NA | NA |
| 26 | 1503310-001 | 12/17/2013 | NA | NA | NA | NA | NA | NA | NA | NA | 1 | NA | NA | NA | NA | NA |
| 26 | 1503310-001 | 12/11/2014 | NA | NA | NA | NA | NA | NA | NA | NA | < 0.44 | NA | NA | NA | NA | NA |
| 28 | 1500553-003 | 3/18/2002 | NA | NA | NA | NA | NA | 48 | 0 | 5 | < 0.4 | 13 | < 1 | NA | 210 | 135 |
| 28 | 1500553-003 | 12/8/2005 | NA | NA | NA | NA | NA | 71 | 0 | 5 | < 0.44 | 12 | < 2 | NA | 190 | 120 |
| 28 | 1500553-003 | 6/11/2008 | NA | NA | NA | NA | NA | 44 | 0 | 6 | < 0.44 | 15 | < 2 | NA | 204 | 140 |
| 28 | 1500553-003 | 12/8/2014 | NA | NA | NA | NA | NA | 52 | 0 | 5 | 1 | 14 | < 2 | NA | 211 | 140 |
| - | USGS-352527118594101 | 12/6/1955 | 62 | 7.9 | 40 | 2.7 | NA | NA | NA | 55 | 0 | 45 | NA | 0.15 | 530 | 332 |
| - | USGS-352603118561601 | 7/23/1986 | 58 | 0.5 | 34 | 2.3 | 0 | 0 | 0.085 | 45 | 1.6 | 58 | 1 | 0.19 | 433 | 290 |
| - | KERN-22 | 11/5/2013 | 46 | 0.6 | 150 | 1.9 | 170 | 28 | 71 | 180 | 16 | 130 | <2.0 | NA | 984 | 510 |
| - | 29S/28E-05N03 | average | 270 | 9.8 | 150 | 5.8 | 4.3 | 0.31 | - | 245 | 0.4 | - | <0.001 | - | 1940 | 1380 |
| - | MW-07 | 11/7/2005 | 170 | 28 | 83 | 4.8 | 2800 | 2600 | 0.66 | 260 | NA | 1.4 | NA | 0.56 | NA | 1000 |
| - | MW-16 | 11/7/2005 | 170 | 24 | 54 | 5.3 | 77 | 1800 | 0.12 | 260 | NA | 25 | NA | 0.15 | NA | 1100 |
| - | MW-16 | 5/10/2006 | 170 | 24 | 57 | 5.6 | 120 | 1900 | 0.13 | 230 | NA | 16 | NA | 0.16 | NA | 1000 |
| - | MW-16 | 11/8/2006 | 170 | 25 | 89 | 6 | 2100 | 1600 | 0.05 | 270 | NA | 16 | NA | 0.17 | NA | 930 |
| - | MW-16 | 11/7/2007 | 190 | 27 | 69 | 5.7 | 790 | 1100 | 0.12 | 180 | 0 | 13 | NA | NA | NA | 920 |
| - | MW-16 | 4/30/2008 | 200 | 29 | 60 | 5.6 | 700 | 1500 | 0.14 | 170 | 0 | 4.5 | NA | NA | NA | 910 |
| - | MW-16 | 5/5/2009 | 210 | 30 | 62 | 6 | 240 | 1700 | 0.18 | 160 | 0 | 5.5 | NA | NA | NA | 860 |
| - | MW-16 | 11/4/2009 | 180 | 26 | 60 | 5.4 | 110 | 1500 | 0.18 | 150 | 0 | 6.8 | NA | NA | NA | 800 |
| - | MW-16 | 5/5/2010 | 180 | 25 | 58 | 6 | 96 | 1500 | 0.18 | 160 | 0 | 5.8 | NA | NA | NA | 840 |
| - | MW-16 | 5/4/2011 | 190 | 28 | 56 | 5.5 | 150 | 1000 | 0.17 | 170 | 0.585 | 24 | NA | NA | NA | 880 |
| - | MW-16 | 11/2/2011 | 200 | 29 | 67 | 6.3 | 360 | 1700 | 0.23 | 180 | 0 | 25 | NA | NA | NA | 820 |
| - | MW-16 | 11/29/2012 | 170 | 27 | 54 | 5.5 | 700 | 1600 | NA | 180 | 0 | 16 | NA | NA | NA | 810 |
| - | MW-16 | 10/4/2013 | 200 | 28 | 62 | 5.9 | 450 | 1300 | NA | 180 | 0 | 21 | NA | NA | NA | 920 |
| - | MW-16 | 11/3/2010 | 180 | 28 | 58 | 5.6 | 78 | 1200 | 0.18 | 160 | 0.99 | 11 | NA | NA | NA | 910 |
| - | MW-19 | 5/5/2006 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| - | MW-19 | 11/7/2005 | 160 | 29 | 53 | 3.8 | 0 | 84 | 0.16 | 64 | NA | 43 | NA | 0.2 | NA | 710 |
| - | MW-19 | 11/8/2006 | 180 | 32 | 56 | 3.9 | 0 | 46 | 0.15 | 100 | NA | 120 | NA | 0.18 | NA | 820 |
| - | MW-19 | 11/7/2007 | 160 | 29 | 56 | 3.9 | 0 | 73 | 0.16 | 79 | 5.85 | 84 | NA | NA | NA | 780 |

## Exhibit D-1: Water Quality Data Summary for Water Wells within 1/4-Mile of Proposed Exemption Boundary

| Table 3 Well ID | Well[a] Number | Sampling Date | Ca[b] mg/l[j] | Mg[c] mg/l | Na[d] mg/l | K[e] mg/l | Iron µg/l[k] | Mn[f] µg/l | Bicarbonate Alkalinity mg/l | Chloride mg/l | Nitrate ($NO_3$) mg/l | Sulfate mg/l | As[g] µg/l | Boron mg/l | EC[h] umhos/cm[l] | TDS[i] mg/l |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | MW-19 | 11/4/2009 | 170 | 31 | 54 | 3.9 | 0 | 170 | 0.19 | 140 | 13.95 | 120 | NA | NA | NA | 830 |
| - | MW-19 | 11/1/2011 | 250 | 43 | 64 | 4.9 | 0 | 270 | 0.27 | 290 | 36.45 | 160 | NA | NA | NA | 1200 |
| - | MW-19 | 11/7/2012 | 250 | 43 | 70 | 4.7 | 0 | 120 | NA | 240 | 31.05 | 170 | NA | NA | NA | 1200 |
| - | MW-19 | 10/9/2013 | 210 | 39 | 64 | 4.8 | 0 | 82 | NA | 190 | 28.35 | 160 | NA | NA | NA | 1100 |
| - | MW-19 | 11/2/2010 | 190 | 36 | 57 | 4.4 | 0 | 210 | 0.24 | 200 | 24.3 | 120 | NA | NA | NA | 1000 |
| - | MW-20 | 4/27/2005 | 91 | 14 | 73 | 3.4 | 0 | 51 | 0 | 33 | 0.99 | 57 | NA | 0.26 | NA | NA |
| - | MW-20 | 11/9/2015 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| - | MW-20 | 11/7/2006 | 99 | 14 | 78 | 3.4 | 0 | 130 | 0.1 | 57 | NA | 46 | NA | 0.22 | NA | 560 |
| - | MW-20 | 11/6/2007 | 110 | 16 | 93 | 3.7 | 0 | 170 | 0.13 | 76 | 2.295 | 51 | NA | NA | NA | 610 |
| - | MW-20 | 11/3/2009 | 110 | 17 | 93 | 3.4 | 0 | 100 | 0.17 | 110 | 4.32 | 59 | NA | NA | NA | 670 |
| - | MW-20 | 11/2/2010 | 100 | 17 | 96 | 3.8 | 0 | 88 | 0.19 | 79 | 11.7 | 61 | NA | NA | NA | 650 |
| - | MW-20 | 11/1/2011 | 110 | 16 | 92 | 3.5 | 0 | 130 | 0.18 | 81 | 13.05 | 91 | NA | NA | NA | 650 |
| - | MW-20 | 11/5/2012 | 120 | 19 | 94 | 4.1 | 0 | 200 | NA | 100 | 10.35 | 100 | NA | NA | NA | 690 |
| - | MW-20 | 11/9/2005 | 99 | 14 | 72 | 3.6 | 0 | 77 | 0.08 | 40 | NA | 54 | NA | 0.22 | NA | 520 |
| - | MW-20 | 10/9/2013 | 110 | 17 | 90 | 4.1 | 0 | 140 | NA | 100 | NA | 88 | NA | NA | NA | 680 |
| - | MW-25 | 5/4/2005 | 280 | 32 | 95 | 5.8 | 0 | 29 | 0 | 310 | 3.105 | 440 | NA | 0.3 | NA | NA |
| - | MW-38 | 5/4/2005 | 270 | 28 | 86 | 5.8 | 0 | 0 | 0 | 190 | 0.9 | 380 | NA | 0.26 | NA | NA |
| - | MW-42 | 11/10/2005 | 130 | 18 | 48 | 4 | 730 | 1200 | 0.16 | 150 | NA | 23 | NA | 0.14 | NA | 680 |
| - | MW-42 | 5/17/2006 | 120 | 18 | 47 | 4.1 | 790 | 1200 | 0.16 | 150 | NA | 26 | NA | 0.15 | NA | 700 |
| - | MW-42 | 11/15/2006 | 120 | 18 | 46 | 3.8 | 810 | 1200 | 0.17 | 170 | NA | 26 | NA | 0.14 | NA | 690 |
| - | MW-42 | 5/16/2007 | 130 | 19 | 49 | 4.1 | 850 | 1200 | 0.18 | 160 | 0 | 21 | NA | 0.16 | NA | NA |
| - | MW-42 | 11/14/2007 | 130 | 19 | 50 | 3.9 | 840 | 1200 | 0.18 | 180 | 0 | 23 | NA | NA | NA | 830 |
| - | MW-42 | 5/6/2008 | 140 | 20 | 51 | 4.2 | 890 | 1300 | 0.19 | 190 | NA | 27 | NA | NA | NA | 760 |
| - | MW-42 | 5/13/2009 | 150 | 20 | 54 | 4.4 | 910 | 1400 | 0.22 | 200 | 0 | 22 | NA | NA | NA | 810 |
| - | MW-42 | 5/12/2010 | 140 | 20 | 50 | 4.3 | 570 | 1300 | 0.2 | 200 | NA | 31 | NA | NA | NA | 870 |
| - | MW-42 | 11/10/2010 | 130 | 21 | 49 | 4.3 | 430 | 1200 | 0.18 | 180 | 0 | 24 | NA | NA | NA | 850 |
| - | MW-42 | 5/11/2011 | 150 | 22 | 57 | 4.8 | 590 | 1400 | 0.19 | 190 | 0 | 21 | NA | NA | NA | 800 |
| - | MW-42 | 11/9/2011 | 160 | 23 | 54 | 4.4 | 200 | 1200 | 0.17 | 180 | 0 | 58 | NA | NA | NA | 850 |
| - | MW-42 | 11/9/2011 | 160 | 23 | 54 | 4.4 | 200 | 1200 | 0.17 | 180 | 0 | 58 | NA | NA | NA | 850 |
| - | MW-42 | 11/15/2012 | 140 | 23 | 50 | 4 | 170 | 1200 | NA | 180 | 0 | 31 | NA | NA | NA | 760 |
| - | MW-42 | 10/18/2013 | 150 | 24 | 55 | 4.3 | 200 | 1400 | NA | 190 | 0 | 33 | NA | NA | NA | 830 |
| - | MW-42 | 11/11/2009 | 160 | 25 | 50 | 4.4 | 670 | 1400 | 0.22 | 200 | 0 | 25 | NA | NA | NA | 870 |
| - | MW-43 | 11/8/2012 | 210 | 33 | 65 | 8 | 450 | 5000 | NA | 120 | 0 | 2.2 | NA | NA | NA | 940 |
| - | MW-43 | 10/25/2013 | 210 | 33 | 56 | 8.1 | 170 | 4700 | NA | 130 | 0 | 1.6 | NA | NA | NA | 980 |
| - | MW-48 | 11/15/2005 | 110 | 4.7 | 52 | 4.2 | 85 | 0 | 0.12 | 140 | NA | 41 | NA | 0.2 | NA | 620 |
| - | MW-48 | 11/14/2006 | 110 | 5 | 51 | 4.4 | 0 | 0 | 0.13 | 160 | NA | 49 | NA | 0.21 | NA | 600 |
| - | MW-48 | 11/13/2007 | 110 | 5.1 | 50 | 4.3 | 86 | 0 | 0.14 | 170 | 0 | 45 | NA | NA | NA | 720 |
| - | MW-48 | 11/10/2009 | 120 | 5.6 | 52 | 4.6 | 170 | 0 | 0.15 | 170 | 0 | 46 | NA | NA | NA | 630 |
| - | MW-48 | 11/9/2010 | 110 | 5.3 | 47 | 4.2 | 190 | 0 | 0.13 | 170 | NA | 43 | NA | NA | NA | 670 |
| - | MW-48 | 11/8/2011 | 130 | 5.6 | 55 | 4.5 | 220 | 0 | 0.14 | 180 | 0 | 38 | NA | NA | NA | 730 |
| - | MW-48 | 11/13/2012 | 110 | 4.9 | 48 | 4 | 280 | 18 | NA | 180 | 0 | 45 | NA | NA | NA | 750 |
| - | MW-48 | 10/15/2013 | 110 | 5.5 | 53 | 4.5 | 590 | 18 | NA | 170 | 0 | 39 | NA | NA | NA | 670 |

# Exhibit D-1: Water Quality Data Summary for Water Wells within 1/4-Mile of Proposed Exemption Boundary

| Table 3 Well ID | Well[a] Number | Sampling Date | Ca[b] mg/l[j] | Mg[c] mg/l | Na[d] mg/l | K[e] mg/l | Iron µg/l[k] | Mn[f] µg/l | Bicarbonate Alkalinity mg/l | Chloride mg/l | Nitrate ($NO_3$) mg/l | Sulfate mg/l | As[g] µg/l | Boron mg/l | EC[h] umhos/cm[l] | TDS[i] mg/l |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | MW-52 | 11/10/2005 | 83 | 9.9 | 39 | 3.9 | 53 | 1100 | 0.16 | 120 | NA | 35 | NA | 0.13 | NA | 450 |
| - | MW-52 | 5/17/2006 | 87 | 10 | 44 | 4.4 | 63 | 1200 | 0.16 | 110 | NA | 23 | NA | 0.15 | NA | 470 |
| - | MW-52 | 5/17/2006 | 87 | 10 | 44 | 4.4 | 63 | 1200 | 0.16 | 110 | NA | 23 | NA | 0.15 | NA | 470 |
| - | MW-52 | 11/15/2006 | 96 | 12 | 43 | 4.2 | 140 | 1500 | 0.18 | 120 | NA | 18 | NA | 0.15 | NA | 530 |
| - | MW-52 | 11/15/2006 | 96 | 12 | 43 | 4.2 | 140 | 1500 | 0.18 | 120 | NA | 18 | NA | 0.15 | NA | 530 |
| - | MW-52 | 5/16/2007 | 99 | 13 | 43 | 4.1 | 180 | 1600 | 0.2 | 130 | 0 | 28 | NA | 0.16 | NA | NA |
| - | MW-52 | 11/14/2007 | 100 | 13 | 45 | 3.9 | 230 | 1700 | 0.21 | 130 | 0 | 20 | NA | NA | NA | 630 |
| - | MW-52 | 11/14/2007 | 100 | 13 | 45 | 3.9 | 230 | 1700 | 0.21 | 130 | 0 | 20 | NA | NA | NA | 630 |
| - | MW-52 | 5/7/2008 | 110 | 14 | 46 | 4.2 | 230 | 1700 | 0.23 | 140 | 0 | 23 | NA | NA | NA | 610 |
| - | MW-52 | 5/13/2009 | 140 | 16 | 52 | 4.5 | 190 | 2000 | 0.28 | 180 | 0 | 29 | NA | NA | NA | 780 |
| - | MW-52 | 11/11/2009 | 140 | 19 | 50 | 4.7 | 140 | 2000 | 0.29 | 210 | 0 | 42 | NA | NA | NA | 870 |
| - | MW-52 | 5/12/2010 | 120 | 16 | 47 | 4.5 | 150 | 1900 | 0.27 | 220 | NA | 55 | NA | NA | NA | 890 |
| - | MW-52 | 5/12/2010 | 120 | 16 | 47 | 4.5 | 150 | 1900 | 0.27 | 220 | NA | 55 | NA | NA | NA | 890 |
| - | MW-52 | 11/10/2010 | 120 | 16 | 44 | 4.5 | 130 | 1800 | 0.26 | 200 | 0 | 57 | NA | NA | NA | 930 |
| - | MW-52 | 11/10/2010 | 120 | 16 | 44 | 4.5 | 130 | 1800 | 0.26 | 200 | 0 | 57 | NA | NA | NA | 930 |
| - | MW-52 | 5/11/2011 | 140 | 19 | 56 | 5.3 | 180 | 2100 | 0.29 | 240 | 0 | 69 | NA | NA | NA | 880 |
| - | MW-52 | 5/11/2011 | 140 | 19 | 56 | 5.3 | 180 | 2100 | 0.29 | 240 | 0 | 69 | NA | NA | NA | 880 |
| - | MW-52 | 11/9/2011 | 150 | 19 | 55 | 5.2 | 210 | 2100 | 0.31 | 260 | 0 | 64 | NA | NA | NA | 1100 |
| - | MW-52 | 10/21/2013 | 170 | 21 | 52 | 4.9 | 190 | 2300 | NA | 310 | 0 | 68 | NA | NA | NA | 920 |
| - | MW-52 | 10/21/2013 | 170 | 21 | 52 | 4.9 | 190 | 2300 | NA | 310 | 0 | 68 | NA | NA | NA | 920 |
| - | MW-52 | 11/15/2012 | 160 | 20 | 52 | 5.1 | 170 | 2200 | NA | 310 | 0 | 56 | NA | NA | NA | 1000 |
| - | MW-53 | 11/16/2005 | 190 | 19 | 66 | 5 | 320 | 1500 | 0.1 | 230 | NA | 99 | NA | 0.18 | NA | 1100 |
| - | MW-53 | 11/9/2006 | 170 | 17 | 64 | 4.7 | 250 | 1300 | 0.099 | 200 | NA | 96 | NA | 0.19 | NA | 960 |
| - | MW-53 | 11/9/2006 | 170 | 17 | 64 | 4.7 | 250 | 1300 | 0.099 | 200 | NA | 96 | NA | 0.19 | NA | 960 |
| - | MW-53 | 11/8/2007 | 160 | 17 | 66 | 5 | 260 | 1200 | 0.095 | 150 | 0 | 110 | NA | NA | NA | 900 |
| - | MW-53 | 11/3/2010 | 120 | 14 | 58 | 4.3 | 150 | 1100 | 0.076 | 99 | 0 | 110 | NA | NA | NA | 660 |
| - | MW-53 | 11/2/2011 | 130 | 13 | 69 | 4.4 | 160 | 1200 | 0.082 | 110 | 0 | 130 | NA | NA | NA | 610 |
| - | MW-53 | 11/4/2009 | 130 | 13 | 58 | 4.1 | 170 | 1000 | 0.075 | 95 | 0 | 110 | NA | NA | NA | 630 |
| - | MW-44 | 11/14/2005 | NA | NA | NA | NA | NA | 310 | 0 | 35 | NA | 19 | NA | 0 | NA | 250 |
| - | MW-44 | 5/15/2006 | NA | NA | NA | NA | NA | 280 | 0 | 35 | NA | 16 | NA | 0 | NA | 300 |
| - | MW-44 | 11/13/2006 | NA | NA | NA | NA | NA | 270 | 0 | 40 | NA | 15 | NA | 0 | NA | 300 |
| - | MW-44 | 11/12/2007 | NA | NA | NA | NA | NA | 250 | 0 | 46 | NA | 12 | NA | NA | NA | 320 |
| - | MW-44 | 5/11/2009 | NA | NA | NA | NA | NA | 300 | 0 | 54 | 1 | 9 | NA | NA | NA | 330 |
| - | MW-44 | 11/9/2009 | NA | NA | NA | NA | NA | 290 | 0 | 64 | 0 | 9 | NA | NA | NA | 340 |
| - | MW-44 | 5/10/2010 | NA | NA | NA | NA | NA | 250 | 0 | 73 | 0 | 11 | NA | NA | NA | 350 |
| - | MW-44 | 11/8/2010 | NA | NA | NA | NA | NA | 210 | 0 | 65 | 0 | 12 | NA | NA | NA | 330 |
| - | MW-44 | 5/9/2011 | NA | NA | NA | NA | NA | 230 | 0 | 63 | 0 | 14 | NA | NA | NA | 290 |
| - | MW-44 | 11/8/2011 | NA | NA | NA | NA | NA | 210 | 0 | 69 | 0 | 17 | NA | NA | NA | 320 |
| - | MW-44 | 11/12/2012 | NA | NA | NA | NA | NA | 210 | NA | 70 | 0 | 11 | NA | NA | NA | 310 |
| - | MW-44 | 10/21/2013 | NA | NA | NA | NA | NA | 210 | NA | 67 | 0 | 14 | NA | NA | NA | 290 |
| - | MW-51A | 11/7/2005 | NA | NA | NA | NA | NA | 160 | 0 | 160 | NA | 42 | NA | 0 | NA | 620 |
| - | MW-51A | 5/8/2006 | NA | NA | NA | NA | NA | 180 | 0 | 190 | NA | 48 | NA | 0 | NA | 670 |

## Exhibit D-1: Water Quality Data Summary for Water Wells within 1/4-Mile of Proposed Exemption Boundary

| Table 3 Well ID | Well[a] Number | Sampling Date | Ca[b] mg/l[j] | Mg[c] mg/l | Na[d] mg/l | K[e] mg/l | Iron µg/l[k] | Mn[f] µg/l | Bicarbonate Alkalinity mg/l | Chloride mg/l | Nitrate ($NO_3$) mg/l | Sulfate mg/l | As[g] µg/l | Boron mg/l | EC[h] umhos/cm[l] | TDS[i] mg/l |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | MW-51A | 11/6/2006 | NA | NA | NA | NA | NA | 190 | 0 | 200 | NA | 49 | NA | 0 | NA | 760 |
| - | MW-51A | 11/5/2007 | NA | NA | NA | NA | NA | 150 | 0 | 200 | 0 | 41 | NA | NA | NA | 840 |
| - | MW-51A | 4/28/2008 | NA | NA | NA | NA | NA | 140 | 0 | 210 | 0 | 43 | NA | NA | NA | 760 |
| - | MW-51A | 5/4/2009 | NA | NA | NA | NA | NA | 140 | 0 | 190 | 0 | 42 | NA | NA | NA | 730 |
| - | MW-51A | 11/2/2009 | NA | NA | NA | NA | NA | 130 | 0 | 170 | 0 | 49 | NA | NA | NA | 640 |
| - | MW-51A | 5/3/2010 | NA | NA | NA | NA | NA | 120 | 0 | 170 | 0 | 49 | NA | NA | NA | 680 |
| - | MW-51A | 11/1/2010 | NA | NA | NA | NA | NA | 120 | 0 | 150 | 0 | 50 | NA | NA | NA | 700 |
| - | MW-51A | 5/2/2011 | NA | NA | NA | NA | NA | 110 | 0 | 170 | 0 | 49 | NA | NA | NA | 700 |
| - | MW-51A | 11/28/2011 | NA | NA | NA | NA | NA | 780 | 0 | 91 | 0 | 63 | NA | NA | NA | 470 |
| - | MW-51A | 10/30/2012 | NA | NA | NA | NA | NA | 320 | NA | 97 | 0 | 51 | NA | NA | NA | 420 |
| - | MW-51A | 10/1/2013 | NA | NA | NA | NA | NA | 290 | NA | 83 | 0 | 41 | NA | NA | NA | 430 |
| - | MW-51B | 11/7/2005 | NA | NA | NA | NA | NA | 860 | 0 | 220 | NA | 28 | NA | 0 | NA | 940 |
| - | MW-51B | 5/8/2006 | NA | NA | NA | NA | NA | 840 | 0 | 220 | NA | 30 | NA | 0 | NA | 710 |
| - | MW-51B | 11/6/2006 | NA | NA | NA | NA | NA | 860 | 0 | 230 | NA | 29 | NA | 0 | NA | 920 |
| - | MW-51B | 11/5/2007 | NA | NA | NA | NA | NA | 210 | 0 | 240 | 2 | 420 | NA | NA | NA | 1600 |
| - | MW-51B | 5/4/2009 | NA | NA | NA | NA | NA | 190 | 0 | 220 | 0 | 410 | NA | NA | NA | 1400 |
| - | MW-51B | 11/2/2009 | NA | NA | NA | NA | NA | 830 | 0 | 190 | 0 | 25 | NA | NA | NA | 880 |
| - | MW-51B | 5/3/2010 | NA | NA | NA | NA | NA | 720 | 0 | 200 | 0 | 23 | NA | NA | NA | 830 |
| - | MW-51B | 11/1/2010 | NA | NA | NA | NA | NA | 740 | 0 | 180 | 0 | 22 | NA | NA | NA | 890 |
| - | MW-51B | 5/2/2011 | NA | NA | NA | NA | NA | 720 | 0 | 190 | 0 | 17 | NA | NA | NA | 880 |
| - | MW-51B | 10/31/2011 | NA | NA | NA | NA | NA | 860 | 0 | 240 | NA | 65 | NA | NA | NA | 990 |
| - | MW-51B | 10/30/2012 | NA | NA | NA | NA | NA | 740 | NA | 240 | 0 | 27 | NA | NA | NA | 970 |
| - | MW-51B | 10/1/2013 | NA | NA | NA | NA | NA | 690 | NA | 200 | 1 | 28 | NA | NA | NA | 980 |
| - | MW-51C | 11/8/2005 | NA | NA | NA | NA | NA | 220 | 0 | 250 | NA | 150 | NA | 0 | NA | 990 |
| - | MW-51C | 5/8/2006 | NA | NA | NA | NA | NA | 400 | 0 | 230 | NA | 400 | NA | 0 | NA | 1300 |
| - | MW-51C | 11/6/2006 | NA | NA | NA | NA | NA | 320 | 0 | 260 | NA | 320 | NA | 0 | NA | 1300 |
| - | MW-51C | 11/5/2007 | NA | NA | NA | NA | NA | 830 | 0 | 240 | 0 | 27 | NA | NA | NA | 1000 |
| - | MW-51C | 4/28/2008 | NA | NA | NA | NA | NA | 190 | 0 | 260 | 1 | 370 | NA | NA | NA | 1500 |
| - | MW-51C | 5/4/2009 | NA | NA | NA | NA | NA | 790 | 0 | 190 | 0 | 23 | NA | NA | NA | 830 |
| - | MW-51C | 11/2/2009 | NA | NA | NA | NA | NA | 200 | 0 | 210 | 0 | 400 | NA | NA | NA | 1400 |
| - | MW-51C | 5/3/2010 | NA | NA | NA | NA | NA | 160 | 0 | 230 | 0 | 410 | NA | NA | NA | 1400 |
| - | MW-51C | 11/1/2010 | NA | NA | NA | NA | NA | 150 | 0 | 220 | 1 | 330 | NA | NA | NA | 1500 |
| - | MW-51C | 5/2/2011 | NA | NA | NA | NA | NA | 130 | 0 | 260 | 1 | 370 | NA | NA | NA | 1500 |
| - | MW-51C | 10/31/2011 | NA | NA | NA | NA | NA | 160 | 0 | 210 | NA | 610 | NA | NA | NA | 1400 |
| - | MW-51C | 9/30/2013 | NA | NA | NA | NA | NA | 56 | NA | 200 | 0 | 620 | NA | NA | NA | 1700 |
| - | MW-51C | 10/29/2012 | NA | NA | NA | NA | NA | 66 | NA | 230 | 1 | 670 | NA | NA | NA | 1700 |
| - | MW-55AR | 11/14/2005 | NA | NA | NA | NA | NA | 190 | 0 | 45 | NA | 67 | NA | 0 | NA | 270 |
| - | MW-55AR | 5/15/2006 | NA | NA | NA | NA | NA | 200 | 0 | 48 | NA | 73 | NA | 0 | NA | 300 |
| - | MW-55AR | 11/13/2006 | NA | NA | NA | NA | NA | 180 | 0 | 49 | NA | 71 | NA | 0 | NA | 290 |
| - | MW-55AR | 11/12/2007 | NA | NA | NA | NA | NA | 170 | 0 | 42 | NA | 64 | NA | NA | NA | 270 |
| - | MW-55AR | 11/10/2009 | NA | NA | NA | NA | NA | NA | NA | 29 | NA | 39 | NA | NA | NA | 230 |
| - | MW-55AR | 5/10/2010 | NA | NA | NA | NA | NA | 76 | 0 | 28 | 1 | 33 | NA | NA | NA | 210 |

# Exhibit D-1: Water Quality Data Summary for Water Wells within 1/4-Mile of Proposed Exemption Boundary

| Table 3 Well ID | Well[(a)] Number | Sampling Date | Ca[(b)] mg/l[(j)] | Mg[(c)] mg/l | Na[(d)] mg/l | K[(e)] mg/l | Iron µg/l[(k)] | Mn[(f)] µg/l | Bicarbonate Alkalinity mg/l | Chloride mg/l | Nitrate ($NO_3$) mg/l | Sulfate mg/l | As[(g)] µg/l | Boron mg/l | EC[(h)] umhos/cm[(l)] | TDS[(i)] mg/l |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | MW-55AR | 11/8/2010 | NA | NA | NA | NA | NA | 74 | 0 | 23 | 1 | 27 | NA | NA | NA | 190 |
| - | MW-55AR | 5/9/2011 | NA | NA | NA | NA | NA | 82 | 0 | 22 | 1 | 21 | NA | NA | NA | 150 |
| - | MW-55AR | 11/7/2011 | NA | NA | NA | NA | NA | NA | NA | 27 | 1 | 22 | NA | NA | NA | 180 |
| - | MW-55AR | 11/9/2012 | NA | NA | NA | NA | NA | 84 | NA | 28 | 1 | 18 | NA | NA | NA | 180 |
| - | MW-55AR | 10/14/2013 | NA | NA | NA | NA | NA | 88 | NA | 34 | 1 | 19 | NA | NA | NA | 170 |
| - | MW-55AR | 5/11/2009 | NA | NA | NA | NA | NA | 87 | 0 | 36 | 1 | 51 | NA | NA | NA | 230 |
| - | MW-55B | 11/14/2005 | NA | NA | NA | NA | NA | 76 | 0 | 26 | NA | 28 | NA | 0 | NA | 210 |
| - | MW-55B | 11/13/2006 | NA | NA | NA | NA | NA | 80 | 0 | 29 | NA | 32 | NA | 0 | NA | 200 |
| - | MW-55B | 11/12/2007 | NA | NA | NA | NA | NA | 64 | 0 | 29 | NA | 34 | NA | NA | NA | 210 |
| - | MW-55B | 5/11/2009 | NA | NA | NA | NA | NA | 36 | 0 | 30 | 0 | 36 | NA | NA | NA | 200 |
| - | MW-55B | 11/9/2009 | NA | NA | NA | NA | NA | 31 | 0 | 30 | 0 | 35 | NA | NA | NA | 200 |
| - | MW-55B | 5/15/2006 | NA | NA | NA | NA | NA | 67 | 0 | 26 | NA | 29 | NA | 0 | NA | 160 |
| - | MW-55B | 5/10/2010 | NA | NA | NA | NA | NA | 0 | 0 | 33 | 0 | 29 | NA | NA | NA | 220 |
| - | MW-55B | 11/8/2010 | NA | NA | NA | NA | NA | 0 | 0 | 42 | 0 | 23 | NA | NA | NA | 220 |
| - | MW-55B | 11/7/2011 | NA | NA | NA | NA | NA | 0 | 0 | 56 | 0 | 28 | NA | NA | NA | 250 |
| - | MW-55B | 11/9/2012 | NA | NA | NA | NA | NA | 14 | NA | 48 | 0 | 21 | NA | NA | NA | 230 |
| - | MW-55B | 10/14/2013 | NA | NA | NA | NA | NA | 9 | NA | 55 | 0 | 24 | NA | NA | NA | 210 |
| - | MW-55B | 5/9/2011 | NA | NA | NA | NA | NA | 0 | 0 | 47 | 0 | 23 | NA | NA | NA | 200 |
| - | KERN-37 | 2/15/2006 | NA | NA | NA | NA | NA | 3 | 0 | 10 | 2 | 28 | 2 | 0 | 301 | 195 |
| - | KERNFP-01 | 1/26/2006 | NA | NA | NA | NA | NA | 80 | 0 | 66 | < 0.27 | 147 | 0 | 0 | 677 | 436 |

**Statistics**

| | Ca | Mg | Na | K | Iron | Mn | Bicarbonate Alkalinity | Chloride | Nitrate | Sulfate | As | Boron | EC | TDS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Count | 93 | 95 | 93 | 95 | 90 | 169 | 142 | 175 | 124 | 174 | 3 | 51 | 15 | 168 |
| Average | 142 | 18 | 60 | 4.44 | 278 | 705 | 2.49 | 140 | 1.93 | 75 | 1.09 | 0.19 | 497 | 691 |
| Maximum | 280 | 43 | 150 | 8.1 | 2800 | 5000 | 100 | 310 | 36.45 | 670 | 2 | 0.56 | 1940 | 1700 |
| Minimum | 1.4 | 0.06 | 29 | 0.6 | 0 | 0 | 0 | 4.5 | 0 | 1.4 | 0.26 | 0.11 | 190 | 120 |

**Notes:**

(a) Well number listed as presented in Table 5
(b) Ca = Calcium
(c) Mg = Magnesium
(d) Na = Sodium
(e) K = Potassium
(f) Mn = Manganese
(g) As = Arsenic
(h) EC = Electrical Conductivity
(i) TDS = Total Dissolved Solids
(j) mg/l = milligrams per liter
(k) ug/l = micrograms per liter
(l) umhos/cm = micromhos per centimeter
(m) "<" indicates analyte not detected above listed reporting limit.
(n) "NA" indicates not available or not analyzed.
(o) 0 indicates reporting limit not provided.

# Exhibit D-2: Chevron Interdiction Well Water Quality Summary[(a)]

| API[(a)] Number | Well/Sample ID | Ca[(b)] mg/l[(p)] | Mg[(c)] mg/l | Na[(d)] mg/l | K[(e)] mg/l | Iron mg/l | Mn[(f)] mg/l | $HCO_3$[(g)] mg/l | $CO_3$[(h)] mg/l | OH[(i)] mg/l | Chloride mg/l | Nitrate ($NO_3$) mg/l | Sulfate mg/l | As[(j)] mg/l | Boron mg/l | EC[(k)] umhos/cm[(q)] | TDS[(l)] mg/l |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | Cawelo Discharge | 23.2 | 3.7 | 147.0 | 6.3 | 0.6 | - | 320.7 | 0.2 | - | 122.0 | - | 9.9 | < 0.002 | 1.0 | 900.0 | 634.4 |
| 03035918 | Cortez 1000 | 3.0 | 0.2 | 59.2 | 0.9 | 0.6 | - | 119.4 | 0.2 | - | 25.0 | < 0.010 | 0.0 | < 0.300 | 0.1 | 303.5 | 208.3 |
| 03038875 | Fee B 1000 | 176 | 57 | 203 | 20 | 224 | - | 235 | 0 | - | 1285 | - | 2 | 0.209 | 2 | 3663 | 2084 |
| 02983025 | Fee B 2 WD | 6.5 | 0.2 | 172.3 | 1.2 | 0.6 | - | 117.3 | 2.4 | 0.0 | 230.9 | < 0.010 | 2.1 | 0.153 | 0.3 | 888.5 | 536.3 |
| 03090007 | Fee B, WSW 1 | 20.9 | 0.6 | 134.2 | 6.0 | - | - | 205.0 | 0.0 | - | 119.1 | 0.47 | 13.3 | - | - | - | 393.5 |
| 02984447 | MI-DI-5 | 30.3 | 3.3 | 109.5 | 5.5 | 0.4 | - | 329.1 | 0.2 | - | 131.6 | < 0.010 | 0.3 | < 0.005 | 0.5 | 955.0 | 610.7 |
| 03003310 | Producers 1000 | 29.0 | 7.2 | 114.7 | 2.2 | 0.3 | - | 339.2 | 0.1 | 0.0 | 81.7 | 0.14 | 0.2 | < 0.034 | 0.2 | 855.7 | 589.3 |
| 03038726 | Producers 1002 | 26.7 | 6.3 | 80.3 | 3.3 | 0.4 | - | 275.3 | 0.2 | - | 84.5 | < 0.010 | 0.4 | 5.379 | 0.1 | 700.4 | 480.6 |
| 03006660 | San Joaquin 1001/Reservoir B Outfall | 33.2 | 8.9 | 80.5 | 4.3 | 1.8 | - | 240.8 | 1.0 | 1.0 | 67.0 | 1.53 | 16.5 | - | - | 662.0 | 445.9 |
| 03006661 | San Joaquin 1002 | 5.9 | 0.6 | 42.0 | 0.7 | 0.1 | - | 79.9 | 0.2 | - | 41.1 | < 0.010 | 5.6 | < 0.201 | 0.1 | 258.3 | 176.1 |
| 03035919 | San Joaquin 1003 | 31.6 | 3.8 | 71.7 | 2.3 | 0.3 | - | 157.6 | 0.2 | - | 141.2 | < 0.010 | 0.4 | 0.123 | 0.2 | 623.7 | 409.1 |
| 02930257 | San Joaquin 102 | 270 | 9.8 | 150 | 5.8 | 4.3 | 0.31 | 369 | 6 | 3.3 | 245 | 0.40 | 459 | < 0.001 | - | 1940 | 1380 |
| 03003458 | Sec. 25 1000 | 5.2 | 0.4 | 126.0 | 0.9 | 0.0 | - | 146.2 | 0.6 | 0.0 | 115.5 | 0.00 | 0.1 | 0.000 | - | 633.5 | 407.9 |
| 03007478 | Sec. 25 1003 | 94.8 | 19.3 | 115.0 | 13.8 | 65.2 | - | 45.3 | 0.0 | 0.0 | 530.0 | 0.00 | 0.0 | 0.000 | - | 1750.0 | 941.6 |
| 03006331 | T&M 1001 | 6.5 | 0.8 | 38.4 | 0.5 | 0.0 | - | 79.3 | 0.0 | 0.0 | 25.8 | - | 3.6 | - | - | 226.0 | 186.6 |
| 03002969 | Tejon 1000 | 28.7 | 5.3 | 104.8 | 2.6 | 0.1 | - | 310.0 | 0.1 | 0.0 | 83.9 | < 0.008 | 0.0 | 0.193 | 0.4 | 779.5 | 543.3 |
| 03003311 | Tejon 1001 | 28.7 | 5.6 | 123.0 | 2.8 | 0.0 | - | 313.3 | 0.0 | 0.0 | 77.0 | - | 0.0 | - | - | 850.0 | 591.5 |
| 03007170 | Winspear 1000 | 37.8 | 9.9 | 96.0 | 3.1 | 0.5 | - | 353.1 | 0.1 | 0.0 | 54.2 | 0.03 | 0.3 | 0.147 | 0.3 | 765.2 | 555.6 |
| 02998807 | WW #2 Sec. 1 29S/27E | 2.3 | 1.0 | 82.0 | - | - | - | 117.4 | 10.7 | 0.0 | 50.4 | - | 2.6 | - | - | - | - |
| - | Total Interdiction Water (Comingled point) 24" Pipe | 23.5 | 7.0 | 135.0 | 1.8 | 1.0 | - | 334.1 | 0.2 | - | 81.4 | 0.01 | 0.5 | 0.100 | 0.1 | 850.0 | 583.3 |
| | **Median** | **26.7** | **3.8** | **114.7** | **2.7** | **0.4** | **0.3** | **234.9** | **0.2** | **0.0** | **84.5** | **0.0** | **0.5** | **0.1** | **0.3** | **779.5** | **539.8** |
| | **Minimum** | **2.3** | **0.2** | **38.4** | **0.5** | **0.0** | **0.3** | **45.3** | **0.0** | **0.0** | **25.0** | **0.0** | **0.0** | **0.0** | **0.1** | **226.0** | **176.1** |
| | **Maximum** | **270** | **57** | **203** | **20** | **224** | **0** | **369** | **11** | **3** | **1285** | **2** | **459** | **5** | **2** | **3663** | **2084** |

**Notes:**

(a) All values are averages of available data collected from each well.

Data plotted on Exhibit D-3

(a) API = American Petroleum Institute
(b) Ca = Calcium
(c) Mg = Magnesium
(d) Na = Sodium
(e) K = Potassium
(f) Mn = Manganese
(g) HCO3 = Bicarbonate
(h) CO3 = Carbonate
(i) OH = Hydroxide
(j) As = Arsenic
(k) EC = Electrical Conductivity
(l) TDS = Total Dissolved Solids
(m) Alkalinity as Calcium Carbonate
(n) Cd = Cadmium
(o) Cr = Chromium
(p) mg/l = Milligrams per liter
(q) umhos/cm = micromhos per centimeter
(r) If "0" is reported, the sample is assumed to be non-detect and the reporting limit was not available.

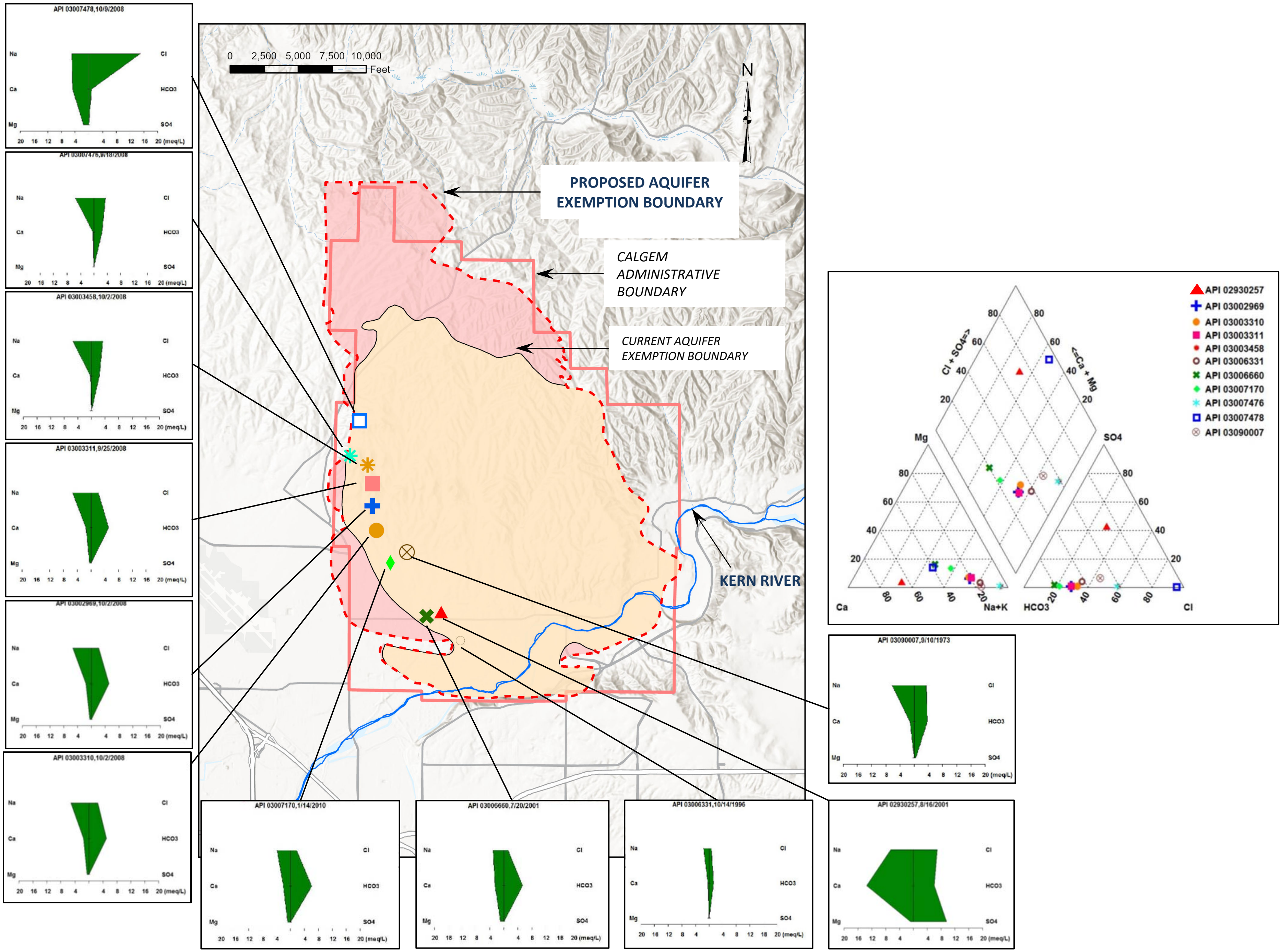



**Exhibit D-3 - Water Quality Data From Water Supply Wells and Interdiction Wells**

# *Laboratory Report*

*ELAP Cert. 1398A*

## *Geochemical Water Analysis*

| | | | | |
|---|---|---|---|---|
| ***Customer:*** | Chevron Corporation | | ***Log # :*** | 16399-5 |
| ***Address:*** | 9525 Camino Media | | ***Date In:*** | 5/7/09 |
| | Bakersfield, CA 93311 | | ***Date out:*** | 5/12/09 |
| ***Attention:*** | Ray Franze, Carla S | | | |
| ***Sample Description:*** | Fee B 2 WD | | | Rev 10-3-08 |

| Anions | mg/L | meq/L | Method #. | PQL(mg/L) | Calculations | Results | Units | Method # | PQL(mg/L) |
|---|---|---|---|---|---|---|---|---|---|
| Bicarbonate, $HCO_3$ | 110.1 | 1.80 | SM2320 B | 0.20 | Alkalinity, as $CaCO_3$ (Total) | 90.3 | mg/l | SM 3320 B | 0.10 |
| Carbonate, $CO_3$ | 0.00 | 0.00 | SM2320 B | 0.20 | Hardness, as $CaCO_3$ (Total) | 11.0 | mg/l | SM 2340 B | 0.10 |
| Chloride, Cl | 218.0 | 6.15 | EPA 300.0 | 0.01 | Salinity, as NaCl | 393.8 | mg/l | (Calc.) | 1.00 |
| Hydroxide, OH | 0.00 | 0.00 | SM2320 B | 0.20 | ***Calcium Carbonate*** | | | | |
| Nitrate, NO3 | 0.00 | 0.00 | EPA 300.0 | 0.01 | Stability Index (Stiff Davis) | -1.10 | (Notes) | SM 2230 B | N.A. |
| Sulfate, $SO_4$ | 2.10 | 0.04 | EPA 300.0 | 0.02 | Langelier Saturation Index | -1.01 | (Notes) | SM 203 | N.A. |

| Cations | mg/L | meq/L | Method #. | PQL(mg/L) | Physical Data | Results | Units | Method # | PQL |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia, NH2 | 0.00 | 0.00 | EPA 200.7 | 0.01 | | | | | |
| Arsenic, As | 0.312 | NA | ASTM D 6919 | 0.005 | | | | | |
| Barium, Ba | 0.00 | 0.00 | EPA 200.7 | 0.01 | Conductivity (Measured) | 806.0 | µmho's | SM 2510 B | 0.100 |
| Boron, B | 1.05 | 0.29 | EPA 200.7 | 0.01 | Resistivity | 12.4069 | ohm's | (Calc.) | 0.0005 |
| Calcium, Ca | 4.40 | 0.22 | EPA 200.7 | 0.01 | Specific Gravity (60/60) | 1.0009 | units | API RP 45 | 0.0005 |
| Iron, Fe | 0.48 | 0.03 | EPA 200.7 | 0.01 | Ionic strength | 0.008 | IS (µ) | (Calc.) | 0.001 |
| Magnesiumn, Mg | 0.00 | 0.00 | EPA 200.7 | 0.01 | pH | 8.09 | units | SM 4500 H B | ± 0.01 |
| Potassium, K | 0.99 | 0.03 | EPA 200.7 | 0.01 | Temperature | 68.0 | °F | SM 2550 B | ± 0.1 |
| Sodium, Na | 164.0 | 7.13 | EPA 200.7 | 0.01 | Total Diss. Solids (TDS)* | 501.5 | mg/L | (Calc.) | 0.1 |
| Strontium, Sr | 0.00 | 0.00 | EPA 200.7 | 0.01 | Total Susp. Solids (TSS) | NA | mg/L | SM 2540 D | 5.0 |

| Other | | | | QC | Results | | Range | Limits |
|---|---|---|---|---|---|---|---|---|
| | | | | Meas EC - Calc EC | 0.9 | | (0.9-1.1 ) EC | |
| Silica, as $SiO_2$ | 21.8 | N.A. | SM 3500-SI B | TDS - EC Ratio | 0.62 | | (0.55-0.70) | >2500 TDS |
| Sodium, Na (Calc.) | 164.4 | 7.15 | API RP-45 2.10 | Measured EC - Ion Sum | 1.0 | Cation | (0.9-1.1) EC | |
| | | | | | 1.0 | Anion | (0.9-1.1) EC | |

***Notes***

PQL - Praactical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of prcision and accuracy of the analytical methodology.

N.D. - Not Detected (below PQL)

TDS* - Cation and anion summation.

N.A. - Not applicable to report.

QC____________Date___________

***Calcium Carbonate Stability Index***

(+) =CaCO3 will tend to precipitate.

(-) = CaCO3 will tend to dissolve

(±) = CaCO3 is at equilibrium

***References:***


1. APHA-AWWA; "Standard Methods for the Examination of Water and Waste Water," 18-20 th Ed. 1992-98
2. ASTM; "Water," 1983 American Society for Testing and Material Vol11 01-02
3. EPA,"Methods for Chemical Analysis of Water and Wastes," 1983 EPA-600/4-79-020
4. API; "Analysis of Oil-Field Waters," 1981 2nd Ed. American Petroleum Institute, API RP 45.
5. Patton, C.C.; "Applied Water Technology," 1986 C. C. Patton & Associates, Campbell Petroleum Series.


Kurt R. Buckle

Laboratory Director

Midway Laboratory, Inc.

_______________Date__________

## *Laboratory Report*

ELAP Cert. 1396A — Rev 7-10-09

### *Geo-Chemical Water Analysis*

| | | | |
|---|---|---|---|
| ***Customer:*** | Chevron Corporation | **Log # :** | 16681-5 |
| ***Address:*** | 9525 Camino Media | **Date In:** | 7/9/09 |
| | Bakersfield, CA 93311 | **Date Completed:** | 7/14/09 |
| ***Attention:*** | Ray Franze | **Date Reported:** | 7/15/09 |
| ***Sample Description:*** | Fee B WDW - 2 | | |

| Anions | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Bicarbonate, $HCO_3^{-1}$ | 97.9 | . | 1.60 | SM2320 B | 0.20 |
| Bromide, Br | 0.0 | X | 0.00 | EPA 300.0 | 0.05 |
| Carbonate, $CO_3^{-1}$ | 0.0 | X | 0.00 | SM2320 B | 0.20 |
| Chloride, $Cl^{-1}$ | 313.0 | . | 8.83 | EPA 300.0 | 0.05 |
| Fluoride, $F^{-1}$ | 0.00 | X | 0.00 | EPA 300.0 | 0.20 |
| Hydroxide, $OH^{-1}$ | 0.0 | X | 0.00 | SM2320 B | 0.20 |
| Iodide, $I^{-1}$ (Iodine) | 0.0 | X | 0.00 | EPA 300.1 | 0.05 |
| Sulfate, $SO_4^{-2}$ | 1.90 | . | 0.04 | EPA 300.0 | 0.05 |
| Sulfide, $S^{-1}$ | 0.0 | X | 0.00 | SM4500-$S^{-2}$ | 1.00 |
| Sulfite, $SO_3^{-2}$ | 0.0 | X | 0.00 | SM4500-$SO3^{-2}$ | 1.00 |

| Calculations | Results | Units | Method # | PQL |
|---|---|---|---|---|
| Alkalinity, as CaCO3 (Total) | 80.3 | mg/l | SM 3320 B | NA |
| as CaCO3 (less Org. Alk.) | 80.3 | mg/l | SM 3320 B | NA |
| Hardness, as CaCO3 (Calc.) | 12.3 | mg/l | SM 2340 B | NA |
| Refractive Index | NA | NA | NA | NA |
| Salinity, as NaCl | 565.5 | mg/l | (Calc.) | 1.00 |
| ***Calcium Carbonate*** | | | | |
| Stability Index (Langlier) | -1.02 | (Notes) | SM 2230 B | NA |
| Stability Index (Stiff Davis) | -1.10 | NA | Ref. 4 | NA |

| Cations | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Ammonium, $NH4^{+1}$ | 0.00 | X | 0.00 | ASTM D 6919 | 0.10 |
| Barium, $Ba^{+2}$ | 0.00 | . | 0.00 | EPA 200.7 | 0.10 |
| Boron, $B^{+3}$ | 0.14 | . | 0.04 | EPA 200.7 | 0.02 |
| Calcium, $Ca^{+2}$ | 4.67 | . | 0.23 | EPA 200.7 | 0.05 |
| Iron, $Fe^{+3}$ | 0.29 | . | 0.02 | EPA 200.7 | 0.05 |
| Magnesiumn, $Mg^{+2}$ | 0.14 | . | 0.01 | EPA 200.7 | 0.10 |
| Manganese, $Mn^{+2}$ | 0.00 | X | 0.00 | EPA 200.7 | 0.05 |
| Potassium, $K^{+1}$ | 1.28 | . | 0.03 | EPA 200.7 | 0.10 |
| Sodium, $Na^{+1}$ | 169.0 | . | 7.35 | EPA 200.7 | 0.10 |
| Strontium, $Sr^{+2}$ | 0.00 | X | 0.00 | EPA 200.7 | 0.10 |
| Zinc, $Zn^{+2}$ | 0.00 | X | 0.00 | EPA 200.7 | 0.02 |

| Physical Data | Results | Units | Method # | PQL |
|---|---|---|---|---|
| Conductivity (Measured) | 1070.0 | µmho's | SM 2510 B | 1000 |
| Resistivity | 9.346 | ohm's | (Calc.) | NA |
| Specific Gravity (60/60) | 1.0001 | units | API RP 45 | ±0.0001 |
| Ionic strength | 0.01 | IS (µ) | (Calc.) | NA |
| pH | 8.11 | units | SM 4500 H B | ± 0.01 |
| Temperature | 60.0 | °F | SM 2550 B | ± 0.2 |
| Total Diss. Solids (TDS)* | 588.3 | mg/L | (An-Cat Sum.) | NA |
| Total Diss. Solids @ 180 °c | NA | mg/L | Chevron | NA |

| Other | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Acetate | 0.0 | X | 0.0 | ASTM D 4327 | 1.00 |
| Formate | 0.0 | X | 0.0 | ASTM D 4327 | 1.00 |
| Propionate | 0.0 | X | 0.0 | ASTM D 4327 | 1.00 |
| Organic Alkalinity | 0 | X | 0.0 | Chevron Pub. | NA |
| Lithium, Li | 0.0 | X | 0.0 | EPA 200.7 | 0.02 |
| Silica, as SiO2 | 19.3 | . | 2.79 | EPA 200.7 | 0.01 |
| Sodium, $Na^{+1}$ (Calc.) | 169.1 | | 7.35 | API RP 45 | NA |

| QC (Quality Control) | Results | | Criteria | Limits |
|---|---|---|---|---|
| Meas EC - Calc EC = | 0.8 | *Note | (0.9 - 1.1) EC | >2500 |
| TDS - EC Ratio = | 0.55 | **Note | (0.55 - 0.70) | >2500 |
| Measured EC - Ion Sum = | 1.0 | Cation | (0.9 - 1.1) EC | |
| | 1.0 | Anion | (0.9 - 1.1) EC | |
| Calc. Na - Actual Na = | 1.00 | Na/Na | (0.98 - 1.02) | |
| NaCl/(NaCl Calc.) = | 1.00 | Na:Cl | (0.98 - 1.02) | |

**QC - Anion - Cation Balance Criteria**

| Anion Sum meq/L | meq/L SUM | Acceptable % Difference |
|---|---|---|
| 0 - 3.0 | NA | ± 0.2 meq |
| 3.0 - 10.0 | NA | ± 2 % |
| 10.0 - 800 | 21 | ± 2 - 5 % |
| Anion - Cation Balance = | 0.0 | % |

**Notes:**

MDL - Method Detection Limit.
PQL - Practical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of precision and accuracy of the analytical methodology (5X MDL).
N.D. - Not Detected (below PQL)
TDS* - Cation and anion sum.
NA - Not applicable to report.
Σ = Sum
** Dissociated Ions may elevate this value ($Ca^{+2}$, $SO4^{-2}$ etc.)
X = Not Analyzed for

***Calcium Carbonate***

***Stability Index***

(+) =CaCO3 will tend to precipitate.
(-) = CaCO3 will tend to dissolve.
(±) = CaCO3 is at equilibrium.

**Comments:**


**References:**

1. APHA-AWWA, "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM; "Water," 2007 American Society for Testing and Material Vol. 11.01-02
3. EPA;"Methods for Chemical Analysis of Water and Waste," 1983 EPA-600/4-79-020
4. API; "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Institute, API RP 45.
5. Patton, C.C.; "Applied Water Technology," 1986 Campbell Petroleum Series.


**The Quality of the Analysis is Only as Good as the Quality of the Sample**

QC ____________________ Date ____________________

____________________ Date: ____________________

Kurt R. Buckle, B.S. Vice-President, Laboratory Director Midway Laboratory, Inc

## *Laboratory Report*

*ELAP Cert. 1398A*

### *Geochemical Water Analysis*

| | | | |
|---|---|---|---|
| ***Customer:*** | Chevron Corporation | ***Log # :*** | 16989-4 |
| ***Address:*** | 9525 Camino Media | ***Date In:*** | 9/10/09 |
| | Bakersfield, CA 93311 | ***Date out:*** | 9/15/09 |
| ***Attention:*** | Ray Franze, Carla S | | |
| ***Sample Description:*** | Fee B WDW - 2 | | Rev 10-3-08 |

| Anions | mg/L | meq/L | Method #. | PQL(mg/L) | Calculations | Results | Units | Method # | PQL(mg/L) |
|---|---|---|---|---|---|---|---|---|---|
| Bicarbonate, $HCO_3$ | 79.5 | 1.30 | SM2320 B | 0.20 | Alkalinity, as $CaCO_3$ (Total) | 79.2 | mg/l | SM 3320 B | 0.10 |
| Carbonate, $CO_3$ | 8.70 | 0.29 | SM2320 B | 0.20 | Hardness, as $CaCO_3$ (Total) | 13.6 | mg/l | SM 2340 B | 0.10 |
| Chloride, Cl | 225.0 | 6.35 | EPA 300.0 | 0.01 | Salinity, as NaCl | 406.5 | mg/l | (Calc.) | 1.00 |
| Hydroxide, OH | 0.00 | 0.00 | SM2320 B | 0.20 | ***Calcium Carbonate*** | | | | |
| Nitrate, NO3 | 0.00 | 0.00 | EPA 300.0 | 0.01 | Stability Index (Stiff Davis) | -0.52 | (Notes) | SM 2230 B | N.A. |
| Sulfate, $SO_4$ | 3.50 | 0.07 | EPA 300.0 | 0.02 | Langelier Saturation Index | -0.43 | (Notes) | SM 203 | N.A. |

| Cations | mg/L | meq/L | Method #. | PQL(mg/L) | Physical Data | Results | | Method # | PQL |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia, NH2 | 0.00 | 0.00 | EPA 200.7 | 0.01 | | | | | |
| Arsenic, As | 0.00 | NA | ASTM D 6919 | 0.50 | | | | | |
| Barium, Ba | 0.00 | 0.00 | EPA 200.7 | 0.05 | Conductivity (Measured) | 833.0 | µmho's | SM 2510 B | 0.100 |
| Boron, B | 0.20 | 0.05 | EPA 200.7 | 0.10 | Resistivity | 12.0048 | ohm's | (Calc.) | 0.0005 |
| Calcium, Ca | 5.11 | 0.25 | EPA 200.7 | 0.05 | Specific Gravity (60/60) | 0.9975 | units | API RP 45 | 0.0005 |
| Iron, Fe | 0.29 | 0.02 | EPA 200.7 | 0.10 | Ionic strength | 0.008 | IS (µ) | (Calc.) | 0.001 |
| Magnesiumn, Mg | 0.20 | 0.02 | EPA 200.7 | 0.05 | pH | 8.66 | units | SM 4500 H B | ± 0.01 |
| Potassium, K | 1.06 | 0.03 | EPA 200.7 | 0.50 | Temperature | 68.0 | °F | SM 2550 B | ± 0.1 |
| Sodium, Na | 172 | 7.48 | EPA 200.7 | 5.00 | Total Diss. Solids (TDS)* | 495.6 | mg/L | (Calc.) | 0.1 |
| Strontium, Sr | 0.00 | 0.00 | EPA 200.7 | 0.01 | Total Susp. Solids (TSS) | NA | mg/L | SM 2540 D | 5.0 |

| Other | mg/L | meq/L | Method | QC | Results | | Range | Limits |
|---|---|---|---|---|---|---|---|---|
| | | | | Meas EC - Calc EC | 0.9 | | (0.9-1.1) EC | |
| Silica, as $SiO_2$ | 20.2 | N.A. | SM 3500-SI B | TDS - EC Ratio | 0.59 | | (0.55-0.70) | >2500 TDS |
| Sodium, Na (Calc.) | 172.2 | 7.49 | API RP-45 2.10 | Measured EC - Ion Sum | 0.9 | Cation | (0.9-1.1) EC | |
| | | | | | 1.0 | Anion | (0.9-1.1) EC | |

***Notes***

PQL - Praactical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of prcision and accuracy of the analytical methodology.

N.D. - Not Detected (below PQL)

TDS* - Cation and anion summation.

N.A. - Not applicable to report.

***Calcium Carbonate Stability Index***

(+) =CaCO3 will tend to precipitate.

(-) = CaCO3 will tend to dissolve.

(±) = CaCO3 is at equilibrium.

QC____________Date____________

***References:***


1. APHA-AWWA; "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM; "Water," 1983 American Society for Testing and Material Vol11.01-02
3. EPA,"Methods for Chemical Analysis of Water and Wastes," 1983 EPA-600/4-79-020
4. API; "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Insitute, API RP 45.
5. Patton, C.C.; "Applied Water Technology," 1986 C. C. Patton & Associates, Campbell Petroleum Series.


Kurt R. Buckle
Laboratory Director
Midway Laboratory, Inc.

________________Date__________

# *Laboratory Report*

***ELAP Cert. 1398A***

## *Geochemical Water Analysis*

| | | | |
|---|---|---|---|
| ***Customer:*** | Chevron Corporation | ***Log # :*** | 17104-5 |
| ***Address:*** | 9525 Camino Media | ***Date In:*** | 10/1/09 |
| | Bakersfield, CA 93311 | ***Date out:*** | 10/13/09 |
| ***Attention:*** | Ray Franze, Carla S | | |
| ***Sample Description:*** | Fee B 2 WD | | Rev 10-3-08 |

| Anions | mg/L | meq/L | Method #. | PQL(mg/L) | Calculations | Results | Units | Method # | PQL(mg/L) |
|---|---|---|---|---|---|---|---|---|---|
| Bicarbonate, $HCO_3$ | 90.6 | 1.48 | SM2320 B | 0.20 | Alkalinity, as $CaCO_3$ (Total) | 74.2 | mg/l | SM 2320 B | 0.10 |
| Carbonate, $CO_3$ | 0.00 | 0.00 | SM2320 B | 0.20 | Hardness, as $CaCO_3$ (Total) | 13.8 | mg/l | SM 2340 B | 0.10 |
| Chloride, Cl | 225.0 | 6.35 | EPA 300.0 | 0.01 | Salinity, as NaCl | 406.5 | mg/l | (Calc.) | 1.00 |
| Hydroxide, OH | 0.00 | 0.00 | SM2320 B | 0.20 | ***Calcium Carbonate*** | | | | |
| Nitrate, NO3 | 0.00 | 0.00 | EPA 300.0 | 0.01 | Stability Index (Stiff Davis) | -1.02 | (Notes) | SM 2230 B | N.A. |
| Sulfate, $SO_4$ | 6.30 | 0.13 | EPA 300.0 | 0.02 | Langelier Saturation Index | -0.94 | (Notes) | SM 203 | N.A. |

| Cations | mg/L | meq/L | Method #. | PQL(mg/L) | Physical Data | Results | Units | Method # | PQL |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia, NH2 | 0.00 | 0.00 | EPA 200.7 | 0.01 | | | | | |
| Arsenic, As | 0.00 | NA | ASTM D 6919 | 0.10 | | | | | |
| Barium, Ba | 0.00 | 0.00 | EPA 200.7 | 0.05 | Conductivity (Measured) | 837.0 | μmho's | SM 2510 B | 0.100 |
| Boron, B | 0.16 | 0.04 | EPA 200.7 | 0.10 | Resistivity | 11.9474 | ohm's | (Calc.) | 0.0005 |
| Calcium, Ca | 5.17 | 0.26 | EPA 200.7 | 0.05 | Specific Gravity (60/60) | 1.0002 | units | API RP 45 | 0.0005 |
| Iron, Fe | 0.82 | 0.04 | EPA 200.7 | 0.10 | Ionic strength | 0.008 | IS (μ) | (Calc.) | 0.001 |
| Magnesiumn, Mg | 0.22 | 0.02 | EPA 200.7 | 0.05 | pH | 8.18 | units | SM 4500 H B | ± 0.01 |
| Potassium, K | 1.17 | 0.03 | EPA 200.7 | 0.50 | Temperature | 68.0 | °F | SM 2550 B | ± 0.1 |
| Sodium, Na | 165 | 7.16 | EPA 200.7 | 5.00 | Total Diss. Solids (TDS)* | 494.1 | mg/L | (Calc.) | 0.1 |
| Strontium, Sr | 0.00 | 0.00 | EPA 200.7 | 0.01 | Total Susp. Solids (TSS) | NA | mg/L | SM 2540 D | 5.0 |

| Other | mg/L | meq/L | Method | PQL | QC | Results | | Range | Limits |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Meas EC - Calc EC | 0.9 | | (0.9-1.1 ) EC | |
| Silica, as $SiO_2$ | 19.8 | N.A. | SM 3500-SI B | | TDS - EC Ratio | 0.59 | | (0.55-0.70) | >2500 TDS |
| Sodium, Na (Calc.) | 165.2 | 7.18 | API RP-45 | 2.10 | Measured EC - Ion Sum | 0.9 | Cation | (0.9-1.1) EC | |
| | | | | | | 1.0 | Anion | (0.9-1.1) EC | |

***Notes***

PQL - Praactical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of precision and accuracy of the analytical methodology.

N.D. - Not Detected (below PQL)

TDS* - Cation and anion summation.

N.A. - Not applicable to report.

***Calcium Carbonate Stability Index***

(+) =CaCO3 will tend to precipitate

(-) = CaCO3 will tend to dissolve

(±) = CaCO3 is at equilibrium

QC____________Date___________

***References:***


1. APHA-AWWA, "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM; "Water," 1983 American Society for Testing and Material Vol11 01-02
3. EPA,"Methods for Chemical Analysis of Water and Wastes," 1983 EPA-600/4-79-020
4. API, "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Institute, API RP 45
5. Patton, C.C., "Applied Water Technology," 1986 C. C. Patton & Associates, Campbell Petroleum Series


Kurt R. Buckle
Laboratory Director
Midway Laboratory, Inc.

________________Date__________

# *Laboratory Report*

*ELAP Cert. 1398A*

## *Geochemical Water Analysis*

| | | | |
|---|---|---|---|
| ***Customer:*** | Chevron Corporation | ***Log #:*** | 17104-5 |
| ***Address:*** | 9525 Camino Media | ***Date in:*** | 10/1/09 |
| | Bakersfield, CA 93311 | ***Date out:*** | 10/13/09 |
| ***Attention:*** | Ray Franze, Carla S | | |
| ***Sample Description:*** | Fee B 2 WD | | Rev 10-3-08 |

| Anions | mg/L | meq/L | Method #. | PQL(mg/L) | Calculations | Results | Units | Method # | PQL(mg/L) |
|---|---|---|---|---|---|---|---|---|---|
| Bicarbonate, $HCO_3$ | 90.6 | 1.48 | SM2320 B | 0.20 | Alkalinity, as $CaCO_3$ (Total) | 74.2 | mg/l | SM 2320 B | 0.10 |
| Carbonate, $CO_3$ | 0.00 | 0.00 | SM2320 B | 0.20 | Hardness, as $CaCO_3$ (Total) | 13.8 | mg/l | SM 2340 B | 0.10 |
| Chloride, Cl | 225.0 | 6.35 | EPA 300.0 | 0.01 | Salinity, as NaCl | 406.5 | mg/l | (Calc.) | 1.00 |
| Hydroxide, OH | 0.00 | 0.00 | SM2320 B | 0.20 | ***Calcium Carbonate*** | | | | |
| Nitrate, NO3 | 0.00 | 0.00 | EPA 300.0 | 0.01 | Stability Index (Stiff Davis) | -1.02 | (Notes) | SM 2230 B | N.A. |
| Sulfate, $SO_4$ | 6.30 | 0.13 | EPA 300.0 | 0.02 | Langelier Saturation Index | -0.94 | (Notes) | SM 203 | N.A. |

| Cations | mg/L | meq/L | Method #. | PQL(mg/L) | Physical Data | Results | Units | Method # | PQL |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia, NH2 | 0.00 | 0.00 | EPA 200.7 | 0.01 | | | | | |
| Arsenic, As | 0.00 | NA | ASTM D 6919 | 0.10 | | | | | |
| Barium, Ba | 0.00 | 0.00 | EPA 200.7 | 0.05 | Conductivity (Measured) | 837.0 | µmho's | SM 2510 B | 0.100 |
| Boron, B | 0.16 | 0.04 | EPA 200.7 | 0.10 | Resistivity | 11.9474 | ohm's | (Calc.) | 0.0005 |
| Calcium, Ca | 5.17 | 0.26 | EPA 200.7 | 0.05 | Specific Gravity (60/60) | 1.0002 | units | API RP 45 | 0.0005 |
| Iron, Fe | 0.82 | 0.04 | EPA 200.7 | 0.10 | Ionic strength | 0.008 | IS (µ) | (Calc.) | 0.001 |
| Magnesiumn, Mg | 0.22 | 0.02 | EPA 200.7 | 0.05 | pH | 8.18 | units | SM 4500 H B | ± 0.01 |
| Potassium, K | 1.17 | 0.03 | EPA 200.7 | 0.50 | Temperature | 68.0 | °F | SM 2550 B | ± 0.1 |
| Sodium, Na | 165 | 7.16 | EPA 200.7 | 5.00 | Total Diss. Solids (TDS)* | 494.1 | mg/L | (Calc.) | 0.1 |
| Strontium, Sr | 0.00 | 0.00 | EPA 200.7 | 0.01 | Total Susp. Solids (TSS) | NA | mg/L | SM 2540 D | 5.0 |

| Other | | | | QC | Results | | Range | Limits |
|---|---|---|---|---|---|---|---|---|
| | | | | Meas EC - Calc EC | 0.9 | | (0.9-1.1 ) EC | |
| Silica, as $SiO_2$ | 19.8 | N.A. | SM 3500-Si B | TDS - EC Ratio | 0.59 | | (0.55-0.70) | >2500 TDS |
| Sodium, Na (Calc.) | 165.2 | 7.18 | API RP-45 2.10 | Measured EC - Ion Sum | 0.9 | Cation | (0.9-1.1) EC | |
| | | | | | 1.0 | Anion | (0.9-1.1) EC | |

***Notes***

PQL - Praactical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of precision and accuracy of the analytical methodology.

N.D. - Not Detected (below PQL)

TDS* - Cation and anion summation.

N.A. - Not applicable to report.

***Calcium Carbonate***
***Stability Index***

(+) =CaCO3 will tend to precipitate.
(-) = CaCO3 will tend to dissolve.
(±) = CaCO3 is at equilibrium.

QC____________Date____________

***References:***


1. APHA-AWWA; "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM; "Water," 1983 American Society for Testing and Material Vol11.01-02
3. EPA,"Methods for Chemical Analysis of Water and Wastes," 1983 EPA-600/4-79-020
4. API; "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Institute, API RP 45
5. Patton, C.C.; "Applied Water Technology," 1986 C. C. Patton & Associates, Campbell Petroleum Series.



Kurt R. Buckle
Laboratory Director
Midway Laboratory, Inc.


________________Date__________

## *Laboratory Report*

*ELAP Cert. 1396A*

### *Geochemical Water Analysis*

| | | | |
|---|---|---|---|
| *Customer:* | Chevron Corporation | *Log # :* | 17288-4 |
| *Address:* | 9525 Camino Media | *Date In:* | 11/5/09 |
| | Bakersfield, CA 93311 | *Date out:* | 11/18/09 |
| *Attention:* | Ray Franze, Carla S | | |
| *Sample Description:* | Fee B WDW-2 | | Rev 10-3-08 |

| Anions | mg/L | meq/L | Method #. | PQL(mg/L) | Calculations | Results | Units | Method # | PQL(mg/L) |
|---|---|---|---|---|---|---|---|---|---|
| Bicarbonate, $HCO_3$ | 99 | 1.62 | SM2320 B | 0.20 | Alkalinity, as $CaCO_3$ (Total) | 83.3 | mg/l | SM 2320 B | 0.10 |
| Carbonate, $CO_3$ | 1.24 | 0.04 | SM2320 B | 0.20 | Hardness, as $CaCO_3$ (Total) | 13.3 | mg/l | SM 2340 B | 0.10 |
| Chloride, Cl | 226 | 6.38 | EPA 300.0 | 0.01 | Salinity, as NaCl | 408.3 | mg/l | (Calc.) | 1.00 |
| Hydroxide, OH | 0.00 | 0.00 | SM2320 B | 0.20 | ***Calcium Carbonate*** | | | | |
| Nitrate, NO3 | 0.00 | 0.00 | EPA 300.0 | 0.01 | Stability Index (Stiff Davis) | -0.77 | (Notes) | SM 2230 B | N.A. |
| Sulfate, $SO_4$ | 1.80 | 0.04 | EPA 300.0 | 0.02 | Langelier Saturation Index | -0.69 | (Notes) | SM 203 | N.A. |

| Cations | mg/L | meq/L | Method #. | PQL(mg/L) | Physical Data | Results | | Method # | PQL |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia, NH2 | 0.00 | 0.00 | EPA 200.7 | 0.01 | | | | | |
| Arsenic, As | 0.000 | 0.00 | ASTM D 6919 | 0.002 | | | | | |
| Barium, Ba | 0.00 | 0.00 | EPA 200.7 | 0.05 | Conductivity (Measured) | 830.0 | µmho's | SM 2510 B | 0.100 |
| Boron, B | 0.17 | 0.05 | EPA 200.7 | 0.10 | Resistivity | 12.0482 | ohm's | (Calc.) | 0.0005 |
| Calcium, Ca | 5.05 | 0.25 | EPA 200.7 | 0.05 | Specific Gravity (60/60) | 0.9998 | units | API RP 45 | 0.0005 |
| Iron, Fe | 0.61 | 0.03 | EPA 200.7 | 0.10 | Ionic strength | 0.008 | IS (µ) | (Calc.) | 0.001 |
| Magnesiumn, Mg | 0.15 | 0.01 | EPA 200.7 | 0.05 | pH | 8.39 | units | SM 4500 H B | ± 0.01 |
| Potassium, K | 0.99 | 0.03 | EPA 200.7 | 0.50 | Temperature | 68.0 | °F | SM 2550 B | ± 0.1 |
| Sodium, Na | 156 | 6.79 | EPA 200.7 | 5.00 | Total Diss. Solids (TDS)* | 491.2 | mg/L | (Calc.) | 0.1 |
| Strontium, Sr | 0.00 | 0.00 | EPA 200.7 | 0.01 | Total Susp. Solids (TSS) | NA | mg/L | SM 2540 D | 5.0 |

| Other | | | | QC | Results | | Range | Limits |
|---|---|---|---|---|---|---|---|---|
| | | | | Meas EC - Calc EC | 0.9 | | (0.9-1.1 ) EC | |
| Silica, as $SiO_2$ | 20.3 | N.A. | SM 3500-SI B | TDS - EC Ratio | 0.59 | | (0.55-0.70) | >2500 TDS |
| Sodium, Na (Calc.) | 157 | 6.83 | API RP-45 2.10 | Measured EC - Ion Sum | 0.9 | Cation | (0.9-1.1) EC | |
| | | | | | 1.0 | Anion | (0.9-1.1) EC | |

**Notes**

PQL - Praactical Quantitation Limt - The lowest level that can be reliably achieved within specific limits of prcision and accuracy of the analytical methodology.

N.D. - Not Detected (below PQL)

TDS* - Cation and anion summation.

N.A. - Not applicable to report.

QC____________ Date____________

***Calcium Carbonate Stability Index***

(+) =CaCO3 will tend to precipitate.

(-) = CaCO3 will tend to dissolve.

(±) = CaCO3 is at equilibrium.


**References:**

1. APHA-AWWA; "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM; "Water," 1983 American Society for Testing and Material Vol11 01-02
3. EPA;"Methods for Chemical Analysis of Water and Wastes," 1983 EPA-600/4-79-020
4. API; "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Institute, API RP 45.
5. Patton, C.C.; "Applied Water Technology," 1986 C. C. Patton & Associates, Campbell Petroleum Series.


Laboratory Director
Midway Laboratory, Inc.

____________________Date__________

# *Laboratory Report*

**ELAP Cert. 1396A**

## *Geo-Chemical Water Analysis*

Rev 12-16-09

| | | | |
|---|---|---|---|
| ***Customer:*** | Chevron Corporation | **Log #:** | 17433-9 |
| ***Address:*** | 9525 Camino Media | **Date In:** | 12/3/09 |
| | Bakersfield, CA 93311 | **Date Completed:** | 12/7/09 |
| ***Attention:*** | Ray Franze, Carla Semprun | **Date Reported:** | 12/14/09 |
| ***Sample Description:*** | Fee B WDW 2 | | |

| Anions | mg/L | meq/L | Method #. | PQL |
|---|---|---|---|---|
| Bicarbonate, $HCO_3^{-1}$ | 88.1 . | 1.44 | SM2320 B | 0.20 |
| Carbonate, $CO_3^{-1}$ | 0.0 . | 0.00 | SM2320 B | 0.20 |
| Chloride, $Cl^{-1}$ | 239 . | 6.74 | SM4500-$Cl^{-1}$ | 0.05 |
| Hydroxide, $OH^{-1}$ | 0.0 . | 0.00 | SM2320 B | 0.20 |
| Sulfate, $SO_4^{-2}$ | 1.1 . | 0.02 | SM4500-$SO_4^{-2}$ | 1.0 |
| Sulfide, $S^{-1}$ | 0.0 X | 0.00 | SM4500-$S^{-2}$ | 1.0 |
| Sulfite, $SO_3^{-2}$ | 0.0 X | 0.00 | SM4500-$SO_3^{-2}$ | 1.0 |

| Calculations | Results | Units | Method # | PQL |
|---|---|---|---|---|
| Alkalinity, as CaCO3 (Total) | 72.2 | mg/l | SM 2320 B | NA |
| as CaCO3 (less Org. Alk.) | 72.2 | mg/l | SM 2320 B | NA |
| Hardness, as CaCO3 (Calc.) | 12.4 | mg/l | SM 2340 B | NA |
| Salinity, calc. Na+Cl | 479.4 | mg/l | (Calc.) | NA |
| Salinity, from Chlorosity | 431.8 | mg/l | (Calc.) | NA |
| ***Calcium Carbonate*** | | | | |
| Stability Index (Langlier) | -1.04 | (Notes) | SM 2330 B | NA |
| Stability Index (Stiff Davis) | -1.12 | NA | Ref. 4 | NA |

| Cations | mg/L | meq/L | Method #. | PQL |
|---|---|---|---|---|
| Ammonium, $NH_4^{+1}$ | 0.00 X | 0.00 | ASTM D 6919 | 0.10 |
| Barium, $Ba^{+2}$ | 0.00 X | 0.00 | EPA 200.7 | 0.05 |
| Boron, $B^{+3}$ | 0.14 . | 0.04 | EPA 200.7 | 0.10 |
| Calcium, $Ca^{+2}$ | 4.66 . | 0.23 | EPA 200.7 | 0.05 |
| Iron, $Fe^{+3}$ | 1.83 . | 0.10 | EPA 200.7 | 0.10 |
| Magnesium, $Mg^{+2}$ | 0.17 . | 0.01 | EPA 200.7 | 0.05 |
| Potassium, $K^{+1}$ | 0.93 . | 0.02 | EPA 200.7 | 0.50 |
| Sodium, $Na^{+1}$ | 179 . | 7.79 | EPA 200.7 | 5.00 |
| Strontium, $Sr^{+2}$ | 0.00 X | 0.00 | EPA 200.7 | 0.10 |

| Physical Data | Results | Units | Method # | PQL |
|---|---|---|---|---|
| Conductivity (Measured) | 829.0 | μmho's | SM 2510 B | 1000 |
| Resistivity | 12.063 | ohm's | (Calc.) | NA |
| Specific Gravity (60/60) | 1.0007 | units | API RP 45 | ±0.0001 |
| Ionic strength | 0.01 | IS (μ) | (Calc.) | NA |
| pH | 8.14 | units | SM 4500 H B | ± 0.01 |
| Temperature | 68.0 | °F | SM 2550 B | ± 0.2 |
| Total Diss. Solids (TDS)* | 514.9 | mg/L | (An-Cat Sum.) | NA |
| Total Diss. Solids @ 180 °c | NA | mg/L | Chevron | NA |

| Other | mg/L | meq/L | Method #. | PQL |
|---|---|---|---|---|
| Arsenic, As+3 | 0.000 . | 0.00 | EPA 200.7 | 0.002 |
| Silica, as SiO2 | 15.5 . | 2.24 | EPA 200.7 | 0.10 |
| Sodium, $Na^{+1}$ (Calc.) | 179.1 | 7.79 | API RP 45 | NA |
| Chloride, $Cl^{-1}$ (Calc.) | 238.5 | 6.73 | API RP 45 | NA |
| Organic Alkalinity | 0.0 X | 0.00 | Chevron Calc. | NA |

| QC (Quality Control) | Results | | Criteria | Limits |
|---|---|---|---|---|
| Meas EC - Calc EC = | 1.0 | *Note | (0.9 - 1.1) EC | >2500 |
| TDS - EC Ratio = | 0.62 | **Note | (0.55 - 0.70) | >2500 |
| Measured EC - Ion Sum = | 1.0 | Cation | (0.9 - 1.1) EC | |
| | 1.0 | Anion | (0.9 - 1.1) EC | |
| Calc. Na - Actual Na = | 1.00 | Na/Na | (0.98 - 1.02) | |
| NaCl/(NaCl Calc.) = | 1.00 | Na:Cl | (0.98 - 1.02) | |

**QC - Anion - Cation Balance Criteria**

| Anion Sum meq/L | meq/L SUM | Acceptable % Difference |
|---|---|---|
| 0 - 3.0 | NA | ± 0.2 meq |
| 3.0 - 10.0 | NA | ± 2 % |
| 10.0 - 800 | 16 | ± 2 - 5 % |
| Anion - Cation Balance = | -0.1 | % |

**Notes:**

MDL - Method Detection Limit.

PQL - Practical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of precision and accuracy of the analytical methodology (5X MDL).

N.D. - Not Detected (below PQL)

TDS* - Cation and anion sum.

NA - Not applicable to report.

Σ = Sum

** Dissociated ions may elevate this value ($Ca^{+2}$, $SO_4^{-2}$ etc.)

X = Not Analyzed for

***Calcium Carbonate***

***Stability Index***

(+) =CaCO3 will tend to precipitate.

(-) = CaCO3 will tend to dissolve.

(±) = CaCO3 is at equilibrium.

**Comments:**

**References:**

1. APHA-AWWA; "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM; "Water," 2007 American Society for Testing and Material Vol. 11.01-02
3. EPA;"Methods for Chemical Analysis of Water and Waste," 1983 EPA-600/4-73-020
4. API; "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Insitute, API RP 45.
5. Patton, C.C.; "Applied Water Technology," 1986 Campbell Petroleum Series.

**The Quality of the Analysis is Only as Good as the Quality of the Sample**

QC ____________ Date ____________

____________ Date: ____________

**Laboratory Director** **Midway Laboratory, Inc**

# *Laboratory Report*

**ELAP Cert. 1396A**

***Geo-Chemical Water Analysis***

**Rev 12-16-09**

| | | | |
|---|---|---|---|
| ***Customer:*** | Chevron Corporation | **Log # :** | 17630-9 |
| ***Address:*** | 9525 Camino Media | **Date In:** | 1/14/10 |
| | Bakersfield, CA 93311 | **Date Completed:** | 1/20/10 |
| ***Attention:*** | Ray Franze, Carla Semprun | **Date Reported:** | 1/21/10 |
| ***Sample Description:*** | **Fee B WDW 2** | | |

| Anions | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Bicarbonate, $HCO_3^{-1}$ | 203.0 | . | 3.32 | SM2320 B | 0.20 |
| Carbonate, $CO_3^{-1}$ | 6.2 | . | 0.21 | SM2320 B | 0.20 |
| Chloride, $Cl^{-1}$ | 145 | . | 4.09 | SM4500-Cl$^{-1}$ | 0.05 |
| Hydroxide, $OH^{-1}$ | 0.0 | . | 0.00 | SM2320 B | 0.20 |
| Sulfate, $SO_4^{-2}$ | 0.1 | . | 0.00 | SM4500-SO4$^{-2}$ | 1.0 |
| Sulfide, $S^{-1}$ | 0.0 | X | 0.00 | SM4500-S$^{-2}$ | 1.0 |
| Sulfite, $SO_3^{-2}$ | 0.0 | X | 0.00 | SM4500-SO3$^{-2}$ | 1.0 |

| Calculations | Results | Units | Method # | PQL |
|---|---|---|---|---|
| Alkalinity, as CaCO3 (Total) | 166.4 | mg/l | SM 2320 B | NA |
| as CaCO3 (less Org. Alk.) | 166.4 | mg/l | SM 2320 B | NA |
| Hardness, as CaCO3 (Calc.) | 15.8 | mg/l | SM 2340 B | NA |
| Salinity, calc. Na+Cl | 444.7 | mg/l | (Calc.) | NA |
| Salinity, from Chlorosity | 261.9 | mg/l | (Calc.) | NA |
| ***Calcium Carbonate*** | | | | |
| Stability Index (Langlier) | -0.16 | (Notes) | SM 2330 B | NA |
| Stability Index (Stiff Davis) | -0.25 | NA | Ref. 4 | NA |

| Cations | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Ammonium, $NH4^{+1}$ | 0.00 | X | 0.00 | ASTM D 6919 | 0.10 |
| Barium, $Ba^{+2}$ | 0.00 | . | 0.00 | EPA 200.7 | 0.05 |
| Boron, $B^{+3}$ | 0.17 | . | 0.05 | EPA 200.7 | 0.10 |
| Calcium, $Ca^{+2}$ | 6.04 | . | 0.30 | EPA 200.7 | 0.05 |
| Iron, $Fe^{+3}$ | 0.29 | . | 0.02 | EPA 200.7 | 0.10 |
| Magnesium, $Mg^{+2}$ | 0.18 | . | 0.01 | EPA 200.7 | 0.05 |
| Potassium, $K^{+1}$ | 1.03 | . | 0.03 | EPA 200.7 | 0.50 |
| Sodium, $Na^{+1}$ | 165 | . | 7.18 | EPA 200.7 | 5.00 |
| Strontium, $Sr^{+2}$ | 0.00 | X | 0.00 | EPA 200.7 | 0.10 |

| Physical Data | Results | | Method # | PQL |
|---|---|---|---|---|
| Conductivity (Measured) | 853.0 | µmho's | SM 2510 B | 1000 |
| Resistivity | 11.723 | ohm's | (Calc.) | NA |
| Specific Gravity (60/60) | 1.0009 | units | API RP 45 | ±0.0001 |
| Ionic strength | 0.01 | IS (µ) | (Calc.) | NA |
| pH | 8.54 | units | SM 4500 H B | ± 0.01 |
| Temperature | 68.0 | °F | SM 2550 B | ± 0.2 |
| Total Diss. Solids (TDS)* | 527.1 | mg/L | (An-Cat Sum.) | NA |
| Total Diss. Solids @ 180 °c | NA | mg/L | Chevron | NA |

| Other | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Arsenic, As+3 | 0.000 | . | 0.00 | EPA 200.7 | 0.002 |
| Silica, as SiO2 | 18.8 | . | 2.71 | EPA 200.7 | 0.10 |
| Sodium, $Na^{+1}$ (Calc.) | 165.1 | | 7.18 | API RP 45 | NA |
| Chloride, $Cl^{-1}$ (Calc.) | 143.5 | | 4.05 | API RP 45 | NA |
| Organic Alkalinity | 0.0 | X | 0.00 | Chevron Calc. | NA |

| QC (Quality Control) | Results | | Criteria | Limits |
|---|---|---|---|---|
| Meas EC - Calc EC = | 1.1 | *Note | (0.9 - 1.1 ) EC | >2500 |
| TDS - EC Ratio = | 0.62 | **Note | (0.55 - 0.70) | >2500 |
| Measured EC - Ion Sum = | 0.9 | Cation | (0.9 - 1.1) EC | |
| | 0.9 | Anion | (0.9 - 1.1) EC | |
| Calc. Na - Actual Na = | 1.00 | Na/Na | (0.98 - 1.02) | |
| NaCl/(NaCl Calc.) = | 1.00 | Na:Cl | (0.98 - 1.02) | |

**QC - Anion - Cation Balance Criteria**

| Anion Sum meq/L | meq/L SUM | Acceptable % Difference |
|---|---|---|
| 0 - 3.0 | NA | ± 0.2 meq |
| 3.0 - 10.0 | NA | ± 2 % |
| 10.0 - 800 | 15 | ± 2 - 5 % |
| Anion - Cation Balance = | -0.3 | % |

**Notes:**

MDL - Method Detection Limit .

PQL - Practical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of precision and accuracy of the analytical methodology (5X MDL).

N.D. - Not Detected (below PQL)

TDS* - Cation and anion sum.

NA - Not applicable to report.

Σ = Sum

** Dissociated ions may elevate this value ($Ca^{+2}$, $SO4^{-2}$ etc.)

X = Not Analyzed for

***Calcium Carbonate***

***Stability Index***

(+) =CaCO3 will tend to precipitate.

(-) = CaCO3 will tend to dissolve.

(±) = CaCO3 is at equilibrium.

**Comments:**

______________________

______________________


**References:**

1. APHA-AWWA; "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM; "Water," 2007 American Society for Testing and Material Vol. 11.01-02
3. EPA;"Methods for Chemical Analysis of Water and Waste," 1983 EPA-600/4-73-020
4. API; "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Institute, API RP 45.
5. Patton, C.C.; "Applied Water Technology," 1986 Campbell Petroleum Series.


**The Quality of the Analysis is Only as Good as the Quality of the Sample**

QC ______________ Date ______________

______________________________ Date: ______________

**Laboratory Director** **Midway Laboratory, Inc**

# Laboratory Report
ELAP Cert. 1396A

## Geo-Chemical Water Analysis

Rev 12-16-09

**Customer:** Chevron Corporation
**Address:** 9525 Camino Media
Bakersfield, CA 93311
**Attention:** Ray Franze, Carla Semprun
**Sample Description:** Cawella Discharge

**Log #:** 17666-4
**Date In:** 1/21/10
**Date Completed:** 2/1/10
**Date Reported:** 2/2/10

| Anions | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Bicarbonate, $HCO_3^{-1}$ | 320.7 | . | 5.25 | SM2320 B | 0.20 |
| Carbonate, $CO_3^{-1}$ | 0.0 | . | 0.00 | SM2320 B | 0.20 |
| Chloride, $Cl^{-1}$ | 122 | . | 3.44 | SM4500-Cl$^{-1}$ | 0.05 |
| Hydroxide, $OH^{-1}$ | 0.0 | . | 0.00 | SM2320 B | 0.20 |
| Sulfate, $SO_4^{-2}$ | 9.90 | . | 0.21 | SM4500-SO4$^{-2}$ | 1.0 |
| Sulfide, $S^{-1}$ | 0.0 | X | 0.00 | SM4500-S$^{-2}$ | 1.0 |
| Sulfite, $SO_3^{-2}$ | 0.0 | X | 0.00 | SM4500-SO3$^{-2}$ | 1.0 |

| Calculations | Results | Units | Method # | PQL |
|---|---|---|---|---|
| Alkalinity, as CaCO3 (Total) | 262.8 | mg/l | SM 2320 B | NA |
| as CaCO3 (less Org. Alk.) | 262.8 | mg/l | SM 2320 B | NA |
| Hardness, as CaCO3 (Calc.) | 73.2 | mg/l | SM 2340 B | NA |
| Salinity, calc. Na+Cl | 506.7 | mg/l | (Calc.) | NA |
| Salinity, from Chlorosity | 220.4 | mg/l | (Calc.) | NA |
| ***Calcium Carbonate*** | | | | |
| Stability Index (Langlier) | -0.94 | (Notes) | SM 2330 B | NA |
| Stability Index (Stiff Davis) | -1.02 | NA | Ref. 4 | NA |

| Cations | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Ammonium, $NH4^{+1}$ | 0.00 | X | 0.00 | ASTM D 6919 | 0.10 |
| Barium, $Ba^{+2}$ | 0.08 | . | 0.00 | EPA 200.7 | 0.05 |
| Boron, $B^{+3}$ | 0.95 | . | 0.26 | EPA 200.7 | 0.10 |
| Calcium, $Ca^{+2}$ | 23.2 | . | 1.16 | EPA 200.7 | 0.05 |
| Iron, $Fe^{+3}$ | 0.55 | . | 0.03 | EPA 200.7 | 0.10 |
| Magnesium, $Mg^{+2}$ | 3.70 | . | 0.30 | EPA 200.7 | 0.05 |
| Potassium, $K^{+1}$ | 6.34 | . | 0.16 | EPA 200.7 | 0.50 |
| Sodium, $Na^{+1}$ | 147 | . | 6.39 | EPA 200.7 | 5.00 |
| Strontium, $Sr^{+2}$ | 0.00 | X | 0.00 | EPA 200.7 | 0.10 |

| Physical Data | Results | | Method # | PQL |
|---|---|---|---|---|
| Conductivity (Measured) | 900 | µmho's | SM 2510 B | 1000 |
| Resistivity | 11.111 | ohm's | (Calc.) | NA |
| Specific Gravity (60/60) | 1.0005 | units | API RP 45 | ±0.0001 |
| Ionic strength | 0.01 | IS (µ) | (Calc.) | NA |
| pH | 6.98 | units | SM 4500 H B | ± 0.01 |
| Temperature | 68.0 | °F | SM 2550 B | ± 0.2 |
| Total Diss. Solids (TDS)* | 634.4 | mg/L | (An-Cat Sum.) | NA |
| Total Diss. Solids @ 180 °c | NA | mg/L | Chevron | NA |

| Other | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Arsenic, As+3 | 0.000 | . | 0.00 | EPA 200.7 | 0.002 |
| Silica, as SiO2 | 85.3 | . | 12.30 | EPA 200.7 | 0.10 |
| Sodium, $Na^{+1}$ (Calc.) | 147.1 | | 6.40 | API RP 45 | NA |
| Chloride, $Cl^{-1}$ (Calc.) | 101 | | 2.86 | API RP 45 | NA |
| Organic Alkalinity | 0.0 | X | 0.00 | Chevron Calc. | NA |

| QC (Quality Control) | Results | | Criteria | Limits |
|---|---|---|---|---|
| Meas EC - Calc EC = | 1.1 | *Note | (0.9 - 1.1) EC | >2500 |
| TDS - EC Ratio = | 0.70 | **Note | (0.55 - 0.70) | >2500 |
| Measured EC - Ion Sum = | 0.9 | Cation | (0.9 - 1.1) EC | |
| | 1.0 | Anion | (0.9 - 1.1) EC | |
| Calc. Na - Actual Na = | 1.00 | Na/Na | (0.98 - 1.02) | |
| NaCl/(NaCl Calc.) = | 1.00 | Na:Cl | (0.98 - 1.02) | |

QC - Anion - Cation Balance Criteria

| Anion Sum meq/l | meq/L SUM | Acceptable % Difference |
|---|---|---|
| 0 - 3.0 | NA | ± 0.2 meq |
| 3.0 - 10.0 | NA | ± 2 % |
| 10.0 - 800 | 17 | ± 2 - 5 % |
| Anion - Cation Balance = | -3.4 | % |

**Notes:**
MDL - Method Detection Limit .
PQL - Practical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of precision and accuracy of the analytical methodology (5X MDL).
N.D. - Not Detected (below PQL)
TDS* - Cation and anion sum..
NA - Not applicable to report.
Σ = Sum
** Dissociated ions may elevate this value ($Ca^{+2}$, SO4$^{-2}$ etc.)
X = Not Analyzed for
***Calcium Carbonate Stability Index***
(+) =CaCO3 will tend to precipitate.
(-) = CaCO3 will tend to dissolve.
(±) = CaCO3 is at equilibrium.


**References:**
1. APHA-AWWA; "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM; "Water," 2007 American Society for Testing and Material Vol. 11.01-02
3. EPA;"Methods for Chemical Analysis of Water and Waste," 1983 EPA-600/4-73-020
4. API; "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Institute, API RP 45.
5. Patton, C.C.; "Applied Water Technology," 1986 Campbell Petroleum Series.


The Quality of the Analysis Is Only as Good as the Quality of the Sample

Comments:

QC ____________ Date ____________

Date: ____________

Laboratory Director    Midway Laboratory, Inc

## *Laboratory Report*

*ELAP Cert. 1396A*

### *Geochemical Water Analysis*

| | | | |
|---|---|---|---|
| *Customer:* | Chevron Corporation | *Log # :* | 16958-4 |
| *Address:* | 9525 Camino Media | *Date in:* | 9/3/09 |
| | Bakersfield, CA 93311 | *Date out:* | 9/14/09 |
| *Attention:* | Ray Franze, Carla S | | |
| *Sample Description:* | Cortez 1000 | | Rev 10-3-08 |

| Anions | mg/L | meq/L | Method #. | PQL(mg/L) | Calculations | Results | Units | Method # | PQL(mg/L) |
|---|---|---|---|---|---|---|---|---|---|
| Bicarbonate, $HCO_3$ | 116.3 | 1.91 | SM2320 B | 0.20 | Alkalinity, as $CaCO_3$ (Total) | 95.3 | mg/l | SM 3320 B | 0.10 |
| Carbonate, $CO_3$ | 0.00 | 0.00 | SM2320 B | 0.20 | Hardness, as $CaCO_3$ (Total) | 6.8 | mg/l | SM 2340 B | 0.10 |
| Chloride, Cl | 21.8 | 0.61 | EPA 300.0 | 0.01 | Salinity, as NaCl | 39.4 | mg/l | (Calc.) | 1.00 |
| Hydroxide, OH | 0.00 | 0.00 | SM2320 B | 0.20 | *Calcium Carbonate* | | | | |
| Nitrate, NO3 | 0.00 | 0.00 | EPA 300.0 | 0.01 | Stability Index (Stiff Davis) | -1.51 | (Notes) | SM 2230 B | N.A. |
| Sulfate, $SO_4$ | 0.00 | 0.00 | EPA 300.0 | 0.02 | Langelier Saturation Index | -1.42 | (Notes) | SM 203 | N.A. |

| Cations | mg/L | meq/L | Method #. | PQL(mg/L) | Physical Data | Results | | Method # | PQL |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia, NH2 | 0.00 | 0.00 | EPA 200.7 | 0.01 | | | | | |
| Arsenic, As | 0.00 | NA | ASTM D 6919 | 0.500 | | | | | |
| Barium, Ba | 0.00 | 0.00 | EPA 200.7 | 0.05 | Conductivity (Measured) | 295.0 | µmho's | SM 2510 B | 0.100 |
| Boron, B | 0.19 | 0.05 | EPA 200.7 | 0.10 | Resistivity | 33.8983 | ohm's | (Calc.) | 0.0005 |
| Calcium, Ca | 2.42 | 0.12 | EPA 200.7 | 0.05 | Specific Gravity (60/60) | 0.9969 | units | API RP 45 | 0.0005 |
| Iron, Fe | 0.54 | 0.03 | EPA 200.7 | 0.10 | Ionic strength | 0.003 | IS (µ) | (Calc.) | 0.001 |
| Magnesiumn, Mg | 0.19 | 0.02 | EPA 200.7 | 0.05 | pH | 7.92 | units | SM 4500 H B | ± 0.01 |
| Potassium, K | 1.07 | 0.03 | EPA 200.7 | 0.50 | Temperature | 68.0 | °F | SM 2550 B | ± 0.1 |
| Sodium, Na | 60.4 | 2.63 | EPA 200.7 | 5.00 | Total Diss. Solids (TDS)* | 202.9 | mg/L | (Calc.) | 0.1 |
| Strontium, Sr | 0.00 | 0.00 | EPA 200.7 | 0.01 | Total Susp. Solids (TSS) | NA | mg/L | SM 2540 D | 5.0 |

| Other | | | | QC | Results | | Range | Limits |
|---|---|---|---|---|---|---|---|---|
| | | | | Meas EC - Calc EC | 1.1 | | (0.9-1.1 ) EC | |
| Silica, as $SiO_2$ | 68.4 | N.A. | SM 3500-Si B | TDS - EC Ratio | 0.69 | | (0.55-0.70) | >2500 TDS |
| Sodium, Na (Calc.) | 60.1 | 2.61 | API RP-45 2.10 | Measured EC - Ion Sum | 1.0 | Cation | (0.9-1.1) EC | |
| | | | | | 0.9 | Anion | (0.9-1.1) EC | |

***Notes***

PQL - Practical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of prcision and accuracy of the analytical methodology

N.D. - Not Detected (below PQL)

TDS* - Cation and anion summation.

N.A. - Not applicable to report.

***Calcium Carbonate Stability Index***

(+) =CaCO3 will tend to precipitate

(-) = CaCO3 will tend to dissolve.

(±) = CaCO3 is at equilibrium.

QC____________ Date____________

***References:***


1. APHA-AWWA: "Standard Methods for the Examination of Water and Waste Water." 18-20 th Ed. 1992-98
2. ASTM, "Water," 1983 American Society for Testing and Material Vol11 01-02
3. EPA,"Methods for Chemical Analysis of Water and Wastes," 1983 EPA-600/4-79-020
4. API: "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Institute, API RP 45
5. Patton, C.C.; "Applied Water Technology," 1986 C. C. Patton & Associates, Campbell Petroleum Series.


Kurt R. Buckle
Laboratory Director
Midway Laboratory, Inc.

____________________ Date____________

## *Laboratory Report*

*ELAP Cert. 1396A*

### *Geochemical Water Analysis*

| | | | | |
|---|---|---|---|---|
| ***Customer:*** | Chevron Corporation | | ***Log # :*** | 17104-8 |
| ***Address:*** | 9525 Camino Media | | ***Date In:*** | 10/1/09 |
| | Bakersfield, CA 93311 | | ***Date out:*** | 10/13/09 |
| ***Attention:*** | Ray Franze, Carla S | | | |
| ***Sample Description:*** | Cortez 1000 | | **Rev 10-3-08** | |

| **Anions** | **mg/L** | **meq/L** | **Method #.** | **PQL(mg/L)** | **Calculations** | **Results** | **Units** | **Method #** | **PQL(mg/L)** |
|---|---|---|---|---|---|---|---|---|---|
| Bicarbonate, $HCO_3$ | 122.4 | 2.01 | SM2320 B | 0.20 | Alkalinity, as $CaCO_3$ (Total) | 100.3 | mg/l | SM 2320 B | 0.10 |
| Carbonate, $CO_3$ | 0.00 | 0.00 | SM2320 B | 0.20 | Hardness, as $CaCO_3$ (Total) | 9.4 | mg/l | SM 2340 B | 0.10 |
| Chloride, Cl | 28.1 | 0.79 | EPA 300.0 | 0.01 | Salinity, as NaCl | 50.8 | mg/l | (Calc.) | 1.00 |
| Hydroxide, OH | 0.00 | 0.00 | SM2320 B | 0.20 | ***Calcium Carbonate*** | | | | |
| Nitrate, NO3 | 0.00 | 0.00 | EPA 300.0 | 0.01 | Stability Index (Stiff Davis) | -1.06 | (Notes) | SM 2230 B | N.A. |
| Sulfate, $SO_4$ | 0.00 | 0.00 | EPA 300.0 | 0.02 | Langelier Saturation Index | -0.97 | (Notes) | SM 203 | N.A. |

| **Cations** | **mg/L** | **meq/L** | **Method #.** | **PQL(mg/L)** | **Physical Data** | **Results** | | **Method #** | **PQL** |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia, NH2 | 0.00 | 0.00 | EPA 200.7 | 0.01 | | | | | |
| Arsenic, As | 0.00 | NA | ASTM D 6919 | 0.10 | | | | | |
| Barium, Ba | 0.00 | 0.00 | EPA 200.7 | 0.05 | Conductivity (Measured) | 312.0 | µmho's | SM 2510 B | 0.100 |
| Boron, B | 0.10 | 0.03 | EPA 200.7 | 0.10 | Resistivity | 32.0513 | ohm's | (Calc.) | 0.0005 |
| Calcium, Ca | 3.56 | 0.18 | EPA 200.7 | 0.05 | Specific Gravity (60/60) | 1.0002 | units | API RP 45 | 0.0005 |
| Iron, Fe | 0.61 | 0.03 | EPA 200.7 | 0.10 | Ionic strength | 0.003 | IS (µ) | (Calc.) | 0.001 |
| Magnesiumn, Mg | 0.12 | 0.01 | EPA 200.7 | 0.05 | pH | 8.18 | units | SM 4500 H B | ± 0.01 |
| Potassium, K | 0.81 | 0.02 | EPA 200.7 | 0.50 | Temperature | 68.0 | °F | SM 2550 B | ± 0.1 |
| Sodium, Na | 58.0 | 2.52 | EPA 200.7 | 5.00 | Total Diss. Solids (TDS)* | 213.7 | mg/L | (Calc.) | 0.1 |
| Strontium, Sr | 0.00 | 0.00 | EPA 200.7 | 0.01 | Total Susp. Solids (TSS) | NA | mg/L | SM 2540 D | 5.0 |

| ***Other*** | | | | **QC** | **Results** | | **Range** | **Limits** |
|---|---|---|---|---|---|---|---|---|
| | | | | Meas EC - Calc EC | 1.1 | | (0.9-1.1 ) EC | |
| Silica, as $SiO_2$ | 30.6 | N.A. | SM 3500-SI B | TDS - EC Ratio | 0.68 | | (0.55-0.70) | >2500 TDS |
| Sodium, Na (Calc.) | 58.0 | 2.52 | API RP-45 2.10 | Measured EC - Ion Sum | 0.9 | Cation | (0.9-1.1) EC | |
| | | | | | 0.9 | Anion | (0.9-1.1) EC | |

***Notes***

PQL - Praactical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of prcision and accuracy of the analytical methodology

N.D. - Not Detected (below PQL)

TDS* - Cation and anion summation.

N.A. - Not applicable to report.

QC____________Date____________

***Calcium Carbonate***
***Stability Index***

(+) =CaCO3 will tend to precipitate.

(-) = CaCO3 will tend to dissolve.

(±) = CaCO3 is at equilibrium.

***References:***


1. APHA-AWWA; "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM, "Water," 1983 American Society for Testing and Material Vol11 01-02
3. EPA,"Methods for Chemical Analysis of Water and Wastes," 1983 EPA-600/4-79-020
4. API; "Analysis of Oil-Field Waters," 1981 2nd. Ed American Petroleum Institute, API RP 45
5. Patton, C.C.; "Applied Water Technology," 1986 C. C. Patton & Associates, Campbell Petroleum Series.


Kurt R. Buckle
Laboratory Director
Midway Laboratory, Inc.

________________Date__________

# *Laboratory Report*

**ELAP Cert. 1398A**

## *Geo-Chemical Water Analysis*

**Rev 12-16-09**

| | | | |
|---|---|---|---|
| ***Customer:*** | Chevron Corporation | **Log # :** | 17433-10 |
| ***Address:*** | 9525 Camino Media | **Date In:** | 12/3/09 |
| | Bakersfield, CA 93311 | **Date Completed:** | 12/7/09 |
| ***Attention:*** | Ray Franze, Carla Semprun | **Date Reported:** | 12/14/09 |
| ***Sample Description:*** | **Fee B 1000** | | |

| Anions | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Bicarbonate, $HCO_3^{-1}$ | 0.0 | . | 0.00 | SM2320 B | 0.20 |
| Carbonate, $CO_3^{-1}$ | 0.0 | . | 0.00 | SM2320 B | 0.20 |
| Chloride, $Cl^{-1}$ | 2440 | . | 68.82 | SM4500-$Cl^{-1}$ | 0.05 |
| Hydroxide, $OH^{-1}$ | 0.0 | . | 0.00 | SM2320 B | 0.20 |
| Sulfate, $SO_4^{-2}$ | 2.2 | . | 0.05 | SM4500-$SO4^{-2}$ | 1.0 |
| Sulfide, $S^{-1}$ | 0.0 | X | 0.00 | SM4500-$S^{-2}$ | 1.0 |
| Sulfite, $SO_3^{-2}$ | 0.0 | X | 0.00 | SM4500-$SO3^{-2}$ | 1.0 |

| Calculations | Results | Units | Method # | PQL |
|---|---|---|---|---|
| Alkalinity, as CaCO3 (Total) | 0.0 | mg/l | SM 2320 B | NA |
| as CaCO3 (less Org. Alk.) | 0.0 | mg/l | SM 2320 B | NA |
| Hardness, as CaCO3 (Calc.) | 1217.5 | mg/l | SM 2340 B | NA |
| Salinity, calc. Na+Cl | 3908.4 | mg/l | (Calc.) | NA |
| Salinity, from Chlorosity | 4408.0 | mg/l | (Calc.) | NA |
| ***Calcium Carbonate*** | | | | |
| Stability Index (Langlier) | -7.95 | (Notes) | SM 2330 B | NA |
| Stability Index (Stiff Davis) | -8.03 | NA | Ref. 4 | NA |

| Cations | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Ammonium, $NH4^{+1}$ | 0.00 | X | 0.00 | ASTM D 6919 | 0.10 |
| Barium, $Ba^{+2}$ | 0.00 | X | 0.00 | EPA 200.7 | 0.05 |
| Boron, $B^{+3}$ | 4.24 | . | 1.18 | EPA 200.7 | 0.10 |
| Calcium, $Ca^{+2}$ | 319 | . | 15.92 | EPA 200.7 | 0.05 |
| Iron, $Fe^{+3}$ | 445 | . | 23.90 | EPA 200.7 | 0.10 |
| Magnesium, $Mg^{+2}$ | 102 | . | 8.40 | EPA 200.7 | 0.05 |
| Potassium, $K^{+1}$ | 35.9 | . | 0.92 | EPA 200.7 | 0.50 |
| Sodium, $Na^{+1}$ | 310 | . | 13.47 | EPA 200.7 | 5.00 |
| Strontium, $Sr^{+2}$ | 0.00 | X | 0.00 | EPA 200.7 | 0.10 |

| Physical Data | Results | | Method # | PQL |
|---|---|---|---|---|
| Conductivity (Measured) | 6510.0 | µmho's | SM 2510 B | 1000 |
| Resistivity | 1.536 | ohm's | (Calc.) | NA |
| Specific Gravity (60/60) | 1.0031 | units | API RP 45 | ±0.0001 |
| Ionic strength | 0.07 | IS (µ) | (Calc.) | NA |
| pH | 4.25 | units | SM 4500 H B | ± 0.01 |
| Temperature | 68.0 | °F | SM 2550 B | ± 0.2 |
| Total Diss. Solids (TDS)* | 3657.9 | mg/L | (An-Cat Sum.) | NA |
| Total Diss. Solids @ 180 °c | NA | mg/L | Chevron | NA |

| Other | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Arsenic, As+3 | 0.000 | . | 0.00 | EPA 200.7 | 0.002 |
| Silica, as SiO2 | 93.8 | . | 13.51 | EPA 200.7 | 0.10 |
| Sodium, $Na^{+1}$ (Calc.) | 309.7 | | 13.47 | API RP 45 | NA |
| Chloride, $Cl^{-1}$ (Calc.) | 2259.3 | | 63.73 | API RP 45 | NA |
| Organic Alkalinity | 0.0 | X | 0.00 | Chevron Calc. | NA |

| QC (Quality Control) | Results | | Criteria | Limits |
|---|---|---|---|---|
| Meas EC - Calc EC = | 0.9 | *Note | (0.9 - 1.1 ) EC | >2500 |
| TDS - EC Ratio = | 0.56 | **Note | (0.55 - 0.70) | >2500 |
| Measured EC - Ion Sum = | 1.0 | Cation | (0.9 - 1.1) EC | |
| | 1.1 | Anion | (0.9 - 1.1) EC | |
| Calc. Na - Actual Na = | 1.00 | Na/Na | (0.98 - 1.02) | |
| NaCl/(NaCl Calc.) = | 1.00 | Na:Cl | (0.98 - 1.02) | |

**QC - Anion - Cation Balance Criteria**

| Anion Sum meq/L | meq/L SUM | Acceptable % Difference |
|---|---|---|
| 0 - 3.0 | NA | ± 0.2 meq |
| 3.0 - 10.0 | NA | ± 2 % |
| 10.0 - 800 | 133 | ± 2 - 5 % |
| Anion - Cation Balance = | -3.8 | % |

**Notes:**

MDL - Method Detection Limit .

PQL - Practical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of precision and accuracy of the analytical methodology (5X MDL).

N.D. - Not Detected (below PQL)

TDS* - Cation and anion sum .

NA - Not applicable to report.

Σ = Sum

** Dissociated ions may elevate this value ($Ca^{+2}$, $SO4^{-2}$ etc.)

X = Not Analyzed for

***Calcium Carbonate***

***Stability Index***

(+) =CaCO3 will tend to precipitate.

(-) = CaCO3 will tend to dissolve.

(±) = CaCO3 is at equilibrium.

**Comments:**


**References:**

1. APHA-AWWA; "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM; "Water," 2007 American Society for Testing and Material Vol. 11.01-02
3. EPA;"Methods for Chemical Analysis of Water and Waste," 1983 EPA-600/4-73-020
4. API; "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Institute, API RP 45.
5. Patton, C.C.; "Applied Water Technology," 1986 Campbell Petroleum Series.


**The Quality of the Analysis is Only as Good as the Quality of the Sample**

QC ____________ Date ____________

____________________ Date: ____________

**Laboratory Director** **Midway Laboratory, Inc**

## *Laboratory Report*
ELAP Cert. 1396A

### *Geo-Chemical Water Analysis*

Rev 12-16-09

| | | | |
|---|---|---|---|
| ***Customer:*** | Chevron Corporation | **Log # :** | 17630-4 |
| ***Address:*** | 9525 Camino Media | **Date In:** | 1/14/10 |
| | Bakersfield, CA 93311 | **Date Completed:** | 1/20/10 |
| ***Attention:*** | Ray Franze, Carla Semprun | **Date Reported:** | 1/21/10 |
| ***Sample Description:*** | Fee B 1000 | | |

| Anions | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Bicarbonate, $HCO_3^{-1}$ | 234.9 | . | 3.85 | SM2320 B | 0.20 |
| Carbonate, $CO_3^{-1}$ | 0.0 | . | 0.00 | SM2320 B | 0.20 |
| Chloride, $Cl^{-1}$ | 129 | . | 3.64 | SM4500-Cl$^{-1}$ | 0.05 |
| Hydroxide, $OH^{-1}$ | 0.0 | . | 0.00 | SM2320 B | 0.20 |
| Sulfate, $SO_4^{-2}$ | 0.0 | . | 0.00 | SM4500-SO4$^{-2}$ | 1.0 |
| Sulfide, $S^{-1}$ | 0.0 | X | 0.00 | SM4500-S$^{-2}$ | 1.0 |
| Sulfite, $SO_3^{-2}$ | 0.0 | X | 0.00 | SM4500-SO3$^{-2}$ | 1.0 |

| Calculations | Results | Units | Method # | PQL |
|---|---|---|---|---|
| Alkalinity, as CaCO3 (Total) | 192.5 | mg/l | SM 2320 B | NA |
| as CaCO3 (less Org. Alk.) | 192.5 | mg/l | SM 2320 B | NA |
| Hardness, as CaCO3 (Calc.) | 126.2 | mg/l | SM 2340 B | NA |
| Salinity, calc. Na+Cl | 425.8 | mg/l | (Calc.) | NA |
| Salinity, from Chlorosity | 233.0 | mg/l | (Calc.) | NA |
| ***Calcium Carbonate*** | | | | |
| Stability Index (Langlier) | -0.39 | (Notes) | SM 2330 B | NA |
| Stability Index (Stiff Davis) | -0.48 | NA | Ref. 4 | NA |

| Cations | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Ammonium, $NH4^{+1}$ | 0.00 | X | 0.00 | ASTM D 6919 | 0.10 |
| Barium, $Ba^{+2}$ | 0.06 | . | 0.00 | EPA 200.7 | 0.05 |
| Boron, $B^{+3}$ | 0.13 | . | 0.04 | EPA 200.7 | 0.10 |
| Calcium, $Ca^{+2}$ | 32.2 | . | 1.61 | EPA 200.7 | 0.05 |
| Iron, $Fe^{+3}$ | 3.04 | . | 0.16 | EPA 200.7 | 0.10 |
| Magnesium, $Mg^{+2}$ | 11.1 | . | 0.91 | EPA 200.7 | 0.05 |
| Potassium, $K^{+1}$ | 4.78 | . | 0.12 | EPA 200.7 | 0.50 |
| Sodium, $Na^{+1}$ | 95.0 | . | 4.13 | EPA 200.7 | 5.00 |
| Strontium, $Sr^{+2}$ | 0.00 | X | 0.00 | EPA 200.7 | 0.10 |

| Physical Data | Results | Units | Method # | PQL |
|---|---|---|---|---|
| Conductivity (Measured) | 816.0 | µmho's | SM 2510 B | 1000 |
| Resistivity | 12.255 | ohm's | (Calc.) | NA |
| Specific Gravity (60/60) | 1.0009 | units | API RP 45 | ±0.0001 |
| Ionic strength | 0.01 | IS (µ) | (Calc.) | NA |
| pH | 7.52 | units | SM 4500 H B | ± 0.01 |
| Temperature | 68.0 | °F | SM 2550 B | ± 0.2 |
| Total Diss. Solids (TDS)* | 510.2 | mg/L | (An-Cat Sum.) | NA |
| Total Diss. Solids @ 180 °c | NA | mg/L | Chevron | NA |

| Other | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Arsenic, As+3 | 0.415 | . | 0.02 | EPA 200.7 | 0.002 |
| Silica, as SiO2 | 90.7 | . | 13.07 | EPA 200.7 | 0.10 |
| Sodium, $Na^{+1}$ (Calc.) | 95.0 | | 4.13 | API RP 45 | NA |
| Chloride, $Cl^{-1}$ (Calc.) | 111 | | 3.13 | API RP 45 | NA |
| Organic Alkalinity | 0.0 | X | 0.00 | Chevron Calc. | NA |

| QC (Quality Control) | Results | | Criteria | Limits |
|---|---|---|---|---|
| Meas EC - Calc EC = | 1.1 | *Note | (0.9 - 1.1 ) EC | >2500 |
| TDS - EC Ratio = | 0.63 | **Note | (0.55 - 0.70) | >2500 |
| Measured EC - Ion Sum = | 0.9 | Cation | (0.9 - 1.1) EC | |
| | 0.9 | Anion | (0.9 - 1.1) EC | |
| Calc. Na - Actual Na = | 1.00 | Na/Na | (0.98 - 1.02) | |
| NaCl/(NaCl Calc.) = | 1.00 | Na:Cl | (0.98 - 1.02) | |

**QC - Anion - Cation Balance Criteria**

| Anion Sum meq/L | meq/L SUM | Acceptable % Difference |
|---|---|---|
| 0 - 3.0 | NA | ± 0.2 meq |
| 3.0 - 10.0 | NA | ± 2 % |
| 10.0 - 800 | 14 | ± 2 - 5 % |
| Anion - Cation Balance = | -3.5 | % |

**Notes:**

MDL - Method Detection Limit.

PQL - Practical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of precision and accuracy of the analytical methodology (5X MDL).

N.D. - Not Detected (below PQL)

TDS* - Cation and anion sum.

NA - Not applicable to report.

∑ = Sum

** Dissociated ions may elevate this value ($Ca^{+2}$, $SO4^{-2}$ etc.)

X = Not Analyzed for

***Calcium Carbonate***

***Stability Index***

(+) =CaCO3 will tend to precipitate.

(-) = CaCO3 will tend to dissolve.

(±) = CaCO3 is at equilibrium.

**Comments:**


**References:**

1. APHA-AWWA; "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM; "Water," 2007 American Society for Testing and Material Vol. 11.01-02
3. EPA;"Methods for Chemical Analysis of Water and Waste," 1983 EPA-600/4-73-020
4. API; "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Institute, API RP 45.
5. Patton, C.C.; "Applied Water Technology," 1986 Campbell Petroleum Series.


**The Quality of the Analysis is Only as Good as the Quality of the Sample**

QC ____________ Date ____________

Date: ____________

Laboratory Director    Midway Laboratory, Inc

## *Laboratory Report*

*ELAP Cert. 1396A*

### *Geochemical Water Analysis*

| | | | |
|---|---|---|---|
| *Customer:* | Chevron Corporation | *Log # :* | 16584-9 |
| *Address:* | 9525 Camino Media | *Date in:* | 6/18/09 |
| | Bakersfield, CA 93311 | *Date out:* | 6/22/09 |
| *Attention:* | Ray Franze, Carla S | | |
| *Sample Description:* | MI-DI-5 | | Rev 10-3-08 |

| Anions | mg/L | meq/L | Method #. | PQL(mg/L) | Calculations | Results | Units | Method # | PQL(mg/L) |
|---|---|---|---|---|---|---|---|---|---|
| Bicarbonate, $HCO_3$ | 330.4 | 5.41 | SM2320 B | 0.20 | Alkalinity, as $CaCO_3$ (Total) | 270.8 | mg/l | SM 3320 B | 0.10 |
| Carbonate, $CO_3$ | 0.00 | 0.00 | SM2320 B | 0.20 | Hardness, as $CaCO_3$ (Total) | 90.3 | mg/l | SM 2340 B | 0.10 |
| Chloride, Cl | 56.2 | 1.59 | EPA 300.0 | 0.01 | Salinity, as NaCl | 101.5 | mg/l | (Calc.) | 1.00 |
| Hydroxide, OH | 0.00 | 0.00 | SM2320 B | 0.20 | *Calcium Carbonate* | | | | |
| Nitrate, NO3 | 0.00 | 0.00 | EPA 300.0 | 0.01 | Stability Index (Stiff Davis) | 0.06 | (Notes) | SM 2230 B | N.A. |
| Sulfate, $SO_4$ | 0.00 | 0.00 | EPA 300.0 | 0.02 | Langelier Saturation Index | 0.15 | (Notes) | SM 203 | N.A. |

| Cations | mg/L | meq/L | Method #. | PQL(mg/L) | Physical Data | Results | | Method # | PQL |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia, NH2 | 0.00 | 0.00 | EPA 200.7 | 0.01 | | | | | |
| Arsenic, As | 0.000 | NA | ASTM D 6919 | 0.005 | | | | | |
| Barium, Ba | 0.16 | 0.00 | EPA 200.7 | 0.01 | Conductivity (Measured) | 810.0 | µmho's | SM 2510 B | 0.100 |
| Boron, B | 0.56 | 0.16 | EPA 200.7 | 0.01 | Resistivity | 12.3457 | ohm's | (Calc.) | 0.0005 |
| Calcium, Ca | 30.80 | 1.54 | EPA 200.7 | 0.01 | Specific Gravity (60/60) | 0.9964 | units | API RP 45 | 0.0005 |
| Iron, Fe | 0.35 | 0.02 | EPA 200.7 | 0.01 | Ionic strength | 0.008 | IS (µ) | (Calc.) | 0.001 |
| Magnesiumn, Mg | 3.22 | 0.27 | EPA 200.7 | 0.01 | pH | 7.93 | units | SM 4500 H B | ± 0.01 |
| Potassium, K | 4.95 | 0.13 | EPA 200.7 | 0.01 | Temperature | 68.0 | °F | SM 2550 B | ± 0.1 |
| Sodium, Na | 110.0 | 4.78 | EPA 200.7 | 0.01 | Total Diss. Solids (TDS)* | 536.6 | mg/L | (Calc.) | 0.1 |
| Strontium, Sr | 0.00 | 0.00 | EPA 200.7 | 0.01 | Total Susp. Solids (TSS) | NA | mg/L | SM 2540 D | 5.0 |

| Other | | | | | QC | Results | | Range | Limits |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Meas EC - Calc EC | 1.1 | | (0.9-1.1 ) EC | |
| Silica, as $SiO_2$ | 40.0 | N.A. | SM 3500-Si B | | TDS - EC Ratio | 0.66 | | (0.55-0.70) | >2500 TDS |
| Sodium, Na (Calc.) | 110.1 | 4.79 | API RP-45 2.10 | | Measured EC - Ion Sum | 0.9 | Cation | (0.9-1.1) EC | |
| | | | | | | 0.9 | Anion | (0.9-1.1) EC | |

***Notes***

PQL - Praactical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of prcision and accuracy of the analytical methodology.

N.D. - Not Detected (below PQL)

TDS* - Cation and anion summation.

N.A. - Not applicable to report.

*Calcium Carbonate*
*Stability Index*

(+) =CaCO3 will tend to precipitate.

(-) = CaCO3 will tend to dissolve.

(±) = CaCO3 is at equilibrium.

QC____________Date____________


***References:***

1. APHA-AWWA; "Standard Methods for the Examination of Water and Waste Water." 18-20 th. Ed. 1992-98
2. ASTM; "Water," 1983 American Society for Testing and Material Vol11.01-02
3. EPA;"Methods for Chemical Analysis of Water and Wastes," 1983 EPA-600/4-79-020
4. API; "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Institute, API RP 45.
5. Patton, C.C., "Applied Water Technology," 1986 C. C. Patton & Associates, Campbell Petroleum Series.


Kurt R. Buckle
Laboratory Director
Midway Laboratory, Inc.

________________Date__________

## *Laboratory Report*

ELAP Cert. 1396A

Rev 7-10-09

### *Geo-Chemical Water Analysis*

| | | | |
|---|---|---|---|
| ***Customer:*** | Chevron Corporation | **Log # :** | 16681-6 |
| ***Address:*** | 9525 Camino Media | **Date In:** | 7/9/09 |
| | Bakersfield, CA 93311 | **Date Completed:** | 7/14/09 |
| ***Attention:*** | Ray Franze | **Date Reported:** | 7/15/09 |
| ***Sample Description:*** | MI - DI - 6 | | |

| Anions | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Bicarbonate, $HCO_3^{-1}$ | 327.8 | . | 5.37 | SM2320 B | 0.20 |
| Bromide, Br | 0.0 | X | 0.00 | EPA 300.0 | 0.05 |
| Carbonate, $CO_3^{-1}$ | 0.0 | X | 0.00 | SM2320 B | 0.20 |
| Chloride, $Cl^{-1}$ | 207.0 | . | 5.84 | EPA 300.0 | 0.05 |
| Fluoride, $F^{-1}$ | 0.00 | X | 0.00 | EPA 300.0 | 0.20 |
| Hydroxide, $OH^{-1}$ | 0.0 | X | 0.00 | SM2320 B | 0.20 |
| Iodide, $I^{-1}$ (Iodine) | 0.0 | X | 0.00 | EPA 300.1 | 0.05 |
| Sulfate, $SO_4^{-2}$ | 0.60 | . | 0.01 | EPA 300.0 | 0.05 |
| Sulfide, $S^{-1}$ | 0.0 | X | 0.00 | SM4500-$S^{-2}$ | 1.00 |
| Sulfite, $SO_3^{-2}$ | 0.0 | X | 0.00 | SM4500-$SO3^{-2}$ | 1.00 |

| Calculations | Results | Units | Method # | PQL |
|---|---|---|---|---|
| Alkalinity, as CaCO3 (Total) | 268.7 | mg/l | SM 3320 B | NA |
| as CaCO3 (less Org. Alk.) | 268.7 | mg/l | SM 3320 B | NA |
| Hardness, as CaCO3 (Calc.) | 88.1 | mg/l | SM 2340 B | NA |
| Refractive Index | NA | NA | NA | NA |
| Salinity, as NaCl | 374.0 | mg/l | (Calc.) | 1.00 |
| ***Calcium Carbonate*** | | | | |
| Stability Index (Langlier) | 0.12 | (Notes) | SM 2330 B | NA |
| Stability Index (Stiff Davis) | 0.04 | NA | Ref. 4 | NA |

| Cations | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Ammonium, $NH4^{+1}$ | 0.00 | X | 0.00 | ASTM D 6919 | 0.10 |
| Barium, $Ba^{+2}$ | 0.19 | . | 0.00 | EPA 200.7 | 0.10 |
| Boron, $B^{+3}$ | 0.38 | . | 0.11 | EPA 200.7 | 0.02 |
| Calcium, $Ca^{+2}$ | 29.80 | . | 1.49 | EPA 200.7 | 0.05 |
| Iron, $Fe^{+3}$ | 0.44 | . | 0.02 | EPA 200.7 | 0.05 |
| Magnesiumn, $Mg^{+2}$ | 3.30 | . | 0.27 | EPA 200.7 | 0.10 |
| Manganese, $Mn^{+2}$ | 0.00 | X | 0.00 | EPA 200.7 | 0.05 |
| Potassium, $K^{+1}$ | 6.14 | . | 0.16 | EPA 200.7 | 0.10 |
| Sodium, $Na^{+1}$ | 109.0 | . | 4.74 | EPA 200.7 | 0.10 |
| Strontium, $Sr^{+2}$ | 0.00 | X | 0.00 | EPA 200.7 | 0.10 |
| Zinc, $Zn^{+2}$ | 0.00 | X | 0.00 | EPA 200.7 | 0.02 |

| Physical Data | Results | Units | Method # | PQL |
|---|---|---|---|---|
| Conductivity (Measured) | 1100.0 | µmho's | SM 2510 B | 1000 |
| Resistivity | 9.091 | ohm's | (Calc.) | NA |
| Specific Gravity (60/60) | 1.0004 | units | API RP 45 | ±0.0001 |
| Ionic strength | 0.01 | IS (µ) | (Calc.) | NA |
| pH | 7.92 | units | SM 4500 H B | ± 0.01 |
| Temperature | 60.0 | °F | SM 2550 B | ± 0.2 |
| Total Diss. Solids (TDS)* | 684.7 | mg/L | (An-Cat Sum.) | NA |
| Total Diss. Solids @ 180 °c | NA | mg/L | Chevron | NA |

| Other | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Acetate | 0.0 | X | 0.0 | ASTM D 4327 | 1.00 |
| Formate | 0.0 | X | 0.0 | ASTM D 4327 | 1.00 |
| Propionate | 0.0 | X | 0.0 | ASTM D 4327 | 1.00 |
| Organic Alkalinity | 0 | X | 0.0 | Chevron Pub. | NA |
| Lithium, Li | 0.0 | X | 0.0 | EPA 200.7 | 0.02 |
| Silica, as SiO2 | 30.8 | . | 4.44 | EPA 200.7 | 0.01 |
| Sodium, $Na^{+1}$ (Calc.) | 109.0 | | 4.74 | API RP 45 | NA |

| QC (Quality Control) | Results | | Criteria | Limits |
|---|---|---|---|---|
| Meas EC - Calc EC = | 1.0 | *Note | (0.9 - 1.1 ) EC | >2500 |
| TDS - EC Ratio = | 0.62 | **Note | (0.55 - 0.70) | >2500 |
| Measured EC - Ion Sum = | 1.0 | Cation | (0.9 - 1.1) EC | |
| | 1.0 | Anion | (0.9 - 1.1) EC | |
| Calc. Na - Actual Na = | 1.00 | Na/Na | (0.98 - 1.02) | |
| NaCl/(NaCl Calc.) = | 1.00 | Na:Cl | (0.98 - 1.02) | |

**QC - Anion - Cation Balance Criteria**

| Anion Sum meq/L | meq/L SUM | Acceptable % Difference |
|---|---|---|
| 0 - 3.0 | NA | ± 0.2 meq |
| 3.0 - 10.0 | NA | ± 2 % |
| 10.0 - 800 | 22 | ± 2 - 5 % |
| Anion - Cation Balance = | 0.0 | % |

**Notes:**

MDL - Method Detection Limit .

PQL - Practical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of precision and accuracy of the analytical methodology (5X MDL).

N.D. - Not Detected (below PQL)

TDS* - Cation and anion sum..

NA - Not applicable to report.

Σ = Sum

** Dissociated ions may elevate this value ($Ca^{+2}$, $SO4^{-2}$ etc.)

X = Not Analyzed for

***Calcium Carbonate***

***Stability Index***

(+) =CaCO3 will tend to precipitate.

(-) = CaCO3 will tend to dissolve.

(±) = CaCO3 is at equilibrium.

**Comments:**

**References:**


1. APHA-AWWA; "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM; "Water," 2007 American Society for Testing and Material Vol. 11.01-02
3. EPA:"Methods for Chemical Analysis of Water and Waste," 1983 EPA-600/4-73-020
4. API; "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Insitute, API RP 45.
5. Patton, C.C.; "Applied Water Technology," 1986 Campbell Petroleum Series.


**The Quality of the Analysis is Only as Good as the Quality of the Sample**

QC ____________ Date ____________

____________________ Date: ____________

**Kurt R. Buckle, B.S. Vice-President, Laboratory Director Midway Laboratory, Inc**

## *Laboratory Report*

**ELAP Cert. 1394A** — **Rev 7-10-09**

### *Geo-Chemical Water Analysis*

| | | | |
|---|---|---|---|
| ***Customer:*** | Chevron Corporation | **Log # :** | 16812-3 |
| ***Address:*** | 9525 Camino Media | **Date In:** | 8/5/09 |
| | Bakersfield, CA 93311 | **Date Completed:** | 8/10/09 |
| ***Attention:*** | Ray Franze | **Date Reported:** | 8/10/09 |
| ***Sample Description:*** | **Producers 1000** | | |

| Anions | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Bicarbonate, $HCO_3^{-1}$ | 281.5 | . | 4.61 | SM2320 B | 0.20 |
| Bromide, Br | 0.0 | X | 0.00 | EPA 300.0 | 0.05 |
| Carbonate, $CO_3^{-1}$ | 0.00 | X | 0.00 | SM2320 B | 0.20 |
| Chloride, $Cl^{-1}$ | 73.7 | . | 2.08 | EPA 300.0 | 0.05 |
| Fluoride, $F^{-1}$ | 0.00 | X | 0.00 | EPA 300.0 | 0.20 |
| Hydroxide, $OH^{-1}$ | 0.0 | X | 0.00 | SM2320 B | 0.20 |
| Iodide, $I^{-1}$ (Iodine) | 0.0 | X | 0.00 | EPA 300.1 | 0.05 |
| Sulfate, $SO_4^{-2}$ | 0.00 | . | 0.00 | EPA 300.0 | 0.05 |
| Sulfide, $S^{-1}$ | 0.0 | X | 0.00 | SM4500-$S^{-2}$ | 1.00 |
| Sulfite, $SO_3^{-2}$ | 0.0 | X | 0.00 | SM4500-$SO_3^{-2}$ | 1.00 |

| Calculations | Results | Units | Method # | PQL |
|---|---|---|---|---|
| Alkalinity, as CaCO3 (Total) | 230.7 | mg/l | SM 3320 B | NA |
| as CaCO3 (less Org. Alk.) | 230.7 | mg/l | SM 3320 B | NA |
| Hardness, as CaCO3 (Calc.) | 88.8 | mg/l | SM 2340 B | NA |
| Refractive Index | NA | NA | NA | NA |
| Salinity, as NaCl | 133.1 | mg/l | (Calc.) | 1.00 |
| ***Calcium Carbonate*** | | | | |
| Stability Index (Langlier) | 0.04 | (Notes) | SM 2230 B | NA |
| Stability Index (Stiff Davis) | -0.05 | NA | Ref. 4 | NA |

| Cations | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Ammonium, $NH_4^{+1}$ | 0.00 | X | 0.00 | ASTM D 6919 | 0.10 |
| Barium, $Ba^{+2}$ | 0.00 | . | 0.00 | EPA 200.7 | 0.05 |
| Boron, $B^{+3}$ | 0.17 | . | 0.05 | EPA 200.7 | 0.10 |
| Calcium, $Ca^{+2}$ | 26.3 | . | 1.31 | EPA 200.7 | 0.05 |
| Iron, $Fe^{+3}$ | 0.18 | . | 0.01 | EPA 200.7 | 0.10 |
| Magnesiumn, $Mg^{+2}$ | 5.59 | . | 0.46 | EPA 200.7 | 0.05 |
| Manganese, $Mn^{+2}$ | 0.00 | X | 0.00 | EPA 200.7 | 0.05 |
| Potassium, $K^{+1}$ | 1.97 | . | 0.05 | EPA 200.7 | 0.50 |
| Sodium, $Na^{+1}$ | 16.3 | . | 0.71 | EPA 200.7 | 5.00 |
| Strontium, $Sr^{+2}$ | 0.00 | X | 0.00 | EPA 200.7 | 0.10 |
| Zinc, $Zn^{+2}$ | 0.00 | X | 0.00 | EPA 200.7 | 0.02 |

| Physical Data | Results | Units | Method # | PQL |
|---|---|---|---|---|
| Conductivity (Measured) | 599.0 | µmho's | SM 2510 B | 1000 |
| Resistivity | 16.694 | ohm's | (Calc.) | NA |
| Specific Gravity (60/60) | 1.0020 | units | API RP 45 | ±0.0001 |
| Ionic strength | 0.01 | IS (µ) | (Calc.) | NA |
| pH | 7.96 | units | SM 4500 H B | ± 0.01 |
| Temperature | 60.0 | °F | SM 2550 B | ± 0.2 |
| Total Diss. Solids (TDS)* | 405.7 | mg/L | (An-Cat Sum.) | NA |
| Total Diss. Solids @ 180 °c | NA | mg/L | Chevron | NA |

| Other | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Acetate | 0.0 | X | 0.0 | ASTM D 4327 | 1.00 |
| Formate | 0.0 | X | 0.0 | ASTM D 4327 | 1.00 |
| Propionate | 0.0 | X | 0.0 | ASTM D 4327 | 1.00 |
| Organic Alkalinity | 0 | X | 0.0 | Chevron Pub. | NA |
| Lithium, Li | 0.0 | X | 0.0 | EPA 200.7 | 0.02 |
| Silica, as SiO2 | 28.4 | . | 4.10 | EPA 200.7 | 0.50 |
| Sodium, $Na^{+1}$ (Calc.) | 16.3 | | 0.71 | API RP 45 | NA |

| QC (Quality Control) | Results | | Criteria | Limits |
|---|---|---|---|---|
| Meas EC - Calc EC = | 1.1 | *Note | (0.9 - 1.1 ) EC | >2500 |
| TDS - EC Ratio = | 0.68 | **Note | (0.55 - 0.70) | >2500 |
| Measured EC - Ion Sum = | 1.1 | Cation | (0.9 - 1.1) EC | |
| | 1.1 | Anion | (0.9 - 1.1) EC | |
| Calc. Na - Actual Na = | 1.00 | Na/Na | (0.98 - 1.02) | |
| NaCl/(NaCl Calc.) = | 1.00 | Na:Cl | (0.98 - 1.02) | |

**QC - Anion - Cation Balance Criteria**

| Anion Sum meq/L | meq/L SUM | Acceptable % Difference |
|---|---|---|
| 0 - 3.0 | NA | ± 0.2 meq |
| 3.0 - 10.0 | NA | ± 2 % |
| 10.0 - 800 | 13 | ± 2 - 5 % |
| Anion - Cation Balance = | 0.0 | % |

**Notes:**

MDL - Method Detection Limit

PQL - Practical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of precision and accuracy of the analytical methodology (5X MDL).

N.D. - Not Detected (below PQL)

TDS* - Cation and anion sum.

NA - Not applicable to report.

Σ = Sum

** Dissociated ions may elevate this value ($Ca^{+2}$, $SO4^{-2}$ etc.)

X = Not Analyzed for

***Calcium Carbonate***

***Stability Index***

(+) =CaCO3 will tend to precipitate.

(-) = CaCO3 will tend to dissolve.

(±) = CaCO3 is at equilibrium.

**Comments:**


**References:**

1. APHA-AWWA; "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM; "Water," 2007 American Society for Testing and Material Vol. 11.01-02
3. EPA;"Methods for Chemical Analysis of Water and Waste," 1983 EPA-600/4-73-020
4. API; "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Institute, API RP 45.
5. Patton, C.C.; "Applied Water Technology." 1986 Campbell Petroleum Series.


**The Quality of the Analysis is Only as Good as the Quality of the Sample**

QC ____________ Date ____________

Date: ____________

**Kurt R. Buckle, B.S. Vice-President, Laboratory Director Midway Laboratory, Inc**

## *Laboratory Report*

*ELAP Cert. 1398A*

### *Geochemical Water Analysis*

| | | | |
|---|---|---|---|
| ***Customer:*** | Chevron Corporation | ***Log #:*** | 17179-3 |
| ***Address:*** | 9525 Camino Media | ***Date In:*** | 10/15/09 |
| | Bakersfield, CA 93311 | ***Date out:*** | 11/9/09 |
| ***Attention:*** | Ray Franze, Carla S | | |
| ***Sample Description:*** | Producers 1000 | | **Rev 10-3-08** |

| Anions | mg/L | meq/L | Method #. | PQL(mg/L) | Calculations | Results | Units | Method # | PQL(mg/L) |
|---|---|---|---|---|---|---|---|---|---|
| Bicarbonate, $HCO_3$ | 397.8 | 6.52 | SM2320 B | 0.20 | Alkalinity, as $CaCO_3$ (Total) | 326.1 | mg/l | SM 2320 B | 0.10 |
| Carbonate, $CO_3$ | 0.00 | 0.00 | SM2320 B | 0.20 | Hardness, as $CaCO_3$ (Total) | 104.2 | mg/l | SM 2340 B | 0.10 |
| Chloride, Cl | 67.5 | 1.90 | EPA 300.0 | 0.01 | Salinity, as NaCl | 121.9 | mg/l | (Calc.) | 1.00 |
| Hydroxide, OH | 0.00 | 0.00 | SM2320 B | 0.20 | ***Calcium Carbonate*** | | | | |
| Nitrate, NO3 | 0.00 | 0.00 | EPA 300.0 | 0.01 | Stability Index (Stiff Davis) | 0.13 | (Notes) | SM 2230 B | N.A. |
| Sulfate, $SO_4$ | 0.00 | 0.00 | EPA 300.0 | 0.02 | Langelier Saturation Index | 0.21 | (Notes) | SM 203 | N.A. |

| Cations | mg/L | meq/L | Method #. | PQL(mg/L) | Physical Data | Results | | Method # | PQL |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia, NH2 | 0.00 | 0.00 | EPA 200.7 | 0 01 | | | | | |
| Arsenic, As | 0.00 | NA | ASTM D 6919 | 0.10 | | | | | |
| Barium, Ba | 0.00 | 0.00 | SM3500-Ba B | 0.50 | Conductivity (Measured) | 950.0 | µmho's | SM 2510 B | 0.100 |
| *Boron, B | | | | | Resistivity | 10.5263 | ohm's | (Calc.) | 0.0005 |
| Calcium, Ca | 26.3 | 1.31 | SM3500-Ca B | 0.50 | Specific Gravity (60/60) | 0.9996 | units | API RP 45 | 0.0005 |
| Iron, Fe | 0.00 | 0.00 | SM3500-Fe B | 1.00 | Ionic strength | 0.010 | IS (µ) | (Calc.) | 0.001 |
| Magnesiumn, Mg | 9.33 | 0.77 | SM3500-Mg B | 0.50 | pH | 7.98 | units | SM 4500 H B | ± 0.01 |
| Potassium, K | 1.87 | 0.05 | SM3500-K B | 0.50 | Temperature | 68.0 | °F | SM 2550 B | ± 0.1 |
| Sodium, Na | 158 | 6.87 | SM3500-Na B | 5.00 | Total Diss. Solids (TDS)* | 660.8 | mg/L | (Calc.) | 0.1 |
| Strontium, Sr | 0.00 | 0.00 | EPA 200.7 | 0.01 | Total Susp. Solids (TSS) | NA | mg/L | SM 2540 D | 5.0 |

| Other | | | | QC | Results | | Range | Limits |
|---|---|---|---|---|---|---|---|---|
| | | | | Meas EC - Calc EC | 1.1 | | (0.9-1.1 ) EC | |
| Silica, as $SiO_2$ | 38.7 | N.A. | SM 3500-Si B | TDS - EC Ratio | 0.70 | | (0.55-0.70) | >2500 TDS |
| Sodium, Na (Calc.) | 157.5 | 6.85 | API RP-45 2.10 | Measured EC - Ion Sum | 0.9 | Cation | (0.9-1.1) EC | |
| | | | | | 0.9 | Anion | (0.9-1.1) EC | |

***Notes***

PQL - Practical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of precision and accuracy of the analytical methodology.

N.D. - Not Detected (below PQL)

TDS* - Cation and anion summation.

N.A. - Not applicable to report.

***Calcium Carbonate Stability Index***

(+) =CaCO3 will tend to precipitate.

(-) = CaCO3 will tend to dissolve

(±) = CaCO3 is at equilibrium.

QC____________Date____________


***References:***

1. APHA-AWWA, "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM; "Water," 1983 American Society for Testing and Material Vol11.01-02
3. EPA,"Methods for Chemical Analysis of Water and Wastes," 1983 EPA-600/4-79-020
4. API; "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Institute, API RP 45
5. Patton, C.C., "Applied Water Technology," 1986 C. C. Patton & Associates, Campbell Petroleum Series


* Boron not analyzed

Laboratory Director
Midway Laboratory, Inc.

_______________Date__________

## *Laboratory Report*

ELAP Cert. 1396A

### *Geo-Chemical Water Analysis*

Rev 12-16-09

| | | | |
|---|---|---|---|
| ***Customer:*** | Chevron Corporation | **Log # :** | 17630-7 |
| ***Address:*** | 9525 Camino Media | **Date In:** | 1/14/10 |
| | Bakersfield, CA 93311 | **Date Completed:** | 1/20/10 |
| ***Attention:*** | Ray Franze, Carla Semprun | **Date Reported:** | 1/21/10 |
| ***Sample Description:*** | **Producers 1000** | | |

| Anions | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Bicarbonate, $HCO_3^{-1}$ | 379.3 | . | 6.21 | SM2320 B | 0.20 |
| Carbonate, $CO_3^{-1}$ | 0.0 | . | 0.00 | SM2320 B | 0.20 |
| Chloride, $Cl^{-1}$ | 86.3 | . | 2.43 | SM4500-$Cl^{-1}$ | 0.05 |
| Hydroxide, $OH^{-1}$ | 0.0 | . | 0.00 | SM2320 B | 0.20 |
| Sulfate, $SO_4^{-2}$ | 0.0 | . | 0.00 | SM4500-$SO4^{-2}$ | 1.0 |
| Sulfide, $S^{-1}$ | 0.0 | X | 0.00 | SM4500-$S^{-2}$ | 1.0 |
| Sulfite, $SO_3^{-2}$ | 0.0 | X | 0.00 | SM4500-$SO3^{-2}$ | 1.0 |

| Calculations | Results | Units | Method # | PQL |
|---|---|---|---|---|
| Alkalinity, as CaCO3 (Total) | 310.9 | mg/l | SM 2320 B | NA |
| as CaCO3 (less Org. Alk.) | 310.9 | mg/l | SM 2320 B | NA |
| Hardness, as CaCO3 (Calc.) | 119.8 | mg/l | SM 2340 B | NA |
| Salinity, calc. Na+Cl | 491.2 | mg/l | (Calc.) | NA |
| Salinity, from Chlorosity | 155.9 | mg/l | (Calc.) | NA |
| ***Calcium Carbonate*** | | | | |
| Stability Index (Langlier) | 0.41 | (Notes) | SM 2330 B | NA |
| Stability Index (Stiff Davis) | 0.32 | NA | Ref. 4 | NA |

| Cations | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Ammonium, $NH4^{+1}$ | 0.00 | X | 0.00 | ASTM D 6919 | 0.10 |
| Barium, $Ba^{+2}$ | 0.00 | . | 0.00 | EPA 200.7 | 0.05 |
| Boron, $B^{+3}$ | 0.16 | . | 0.04 | EPA 200.7 | 0.10 |
| Calcium, $Ca^{+2}$ | 33.9 | . | 1.69 | EPA 200.7 | 0.05 |
| Iron, $Fe^{+3}$ | 0.23 | . | 0.01 | EPA 200.7 | 0.10 |
| Magnesium, $Mg^{+2}$ | 8.50 | . | 0.70 | EPA 200.7 | 0.05 |
| Potassium, $K^{+1}$ | 2.16 | . | 0.06 | EPA 200.7 | 0.50 |
| Sodium, $Na^{+1}$ | 127 | . | 5.52 | EPA 200.7 | 5.00 |
| Strontium, $Sr^{+2}$ | 0.00 | X | 0.00 | EPA 200.7 | 0.10 |

| Physical Data | Results | Units | Method # | PQL |
|---|---|---|---|---|
| Conductivity (Measured) | 920.0 | µmho's | SM 2510 B | 1000 |
| Resistivity | 10.870 | ohm's | (Calc.) | NA |
| Specific Gravity (60/60) | 1.0012 | units | API RP 45 | ±0.0001 |
| Ionic strength | 0.01 | IS (µ) | (Calc.) | NA |
| pH | 8.09 | units | SM 4500 H B | ± 0.01 |
| Temperature | 60.0 | °F | SM 2550 B | ± 0.2 |
| Total Diss. Solids (TDS)* | 637.6 | mg/L | (An-Cat Sum.) | NA |
| Total Diss. Solids @ 180 °c | NA | mg/L | Chevron | NA |

| Other | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Arsenic, As | 0.000 | . | 0.00 | EPA 200.7 | 0.002 |
| Silica, as SiO2 | 38.1 | . | 5.49 | EPA 200.7 | 0.10 |
| Sodium, $Na^{+1}$ (Calc.) | 127.0 | | 5.53 | API RP 45 | NA |
| Chloride, $Cl^{-1}$ (Calc.) | 64.4 | | 1.82 | API RP 45 | NA |
| Organic Alkalinity | 0.0 | X | 0.00 | Chevron Calc. | NA |

| QC (Quality Control) | Results | | Criteria | Limits |
|---|---|---|---|---|
| Meas EC - Calc EC = | 0.9 | *Note | (0.9 - 1.1) EC | >2500 |
| TDS - EC Ratio = | 0.69 | **Note | (0.55 - 0.70) | >2500 |
| Measured EC - Ion Sum = | 0.9 | Cation | (0.9 - 1.1) EC | |
| | 0.9 | Anion | (0.9 - 1.1) EC | |
| Calc. Na - Actual Na = | 1.00 | Na/Na | (0.98 - 1.02) | |
| NaCl/(NaCl Calc.) = | 1.00 | Na:Cl | (0.98 - 1.02) | |

**QC - Anion - Cation Balance Criteria**

| Anion Sum meq/L | meq/L SUM | Acceptable % Difference |
|---|---|---|
| 0 - 3.0 | NA | ± 0.2 meq |
| 3.0 - 10.0 | NA | ± 2 % |
| 10.0 - 800 | 17 | ± 2 - 5 % |
| Anion - Cation Balance = | -3.7 | % |

**Notes:**

MDL - Method Detection Limit .

PQL - Practical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of precision and accuracy of the analytical methodology (5X MDL).

N.D. - Not Detected (below PQL)

TDS* - Cation and anion sum..

NA - Not applicable to report.

Σ = Sum

** Dissociated ions may elevate this value ($Ca^{+2}$, $SO4^{-2}$ etc.)

X = Not Analyzed for

***Calcium Carbonate***

***Stability Index***

(+) =CaCO3 will tend to precipitate.

(-) = CaCO3 will tend to dissolve.

(±) = CaCO3 is at equilibrium.

**Comments:**


**References:**

1. APHA-AWWA; "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM; "Water," 2007 American Society for Testing and Material Vol. 11.01-02
3. EPA;"Methods for Chemical Analysis of Water and Waste," 1983 EPA-600/4-73-020
4. API; "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Insitiute, API RP 45.
5. Patton, C.C.; "Applied Water Technology," 1986 Campbell Petroleum Series.


**The Quality of the Analysis is Only as Good as the Quality of the Sample**

QC ______________ Date ______________

______________________________ Date: ______________

Laboratory Director Midway Laboratory, Inc

# *Laboratory Report*

ELAP Cert. 1396A

Rev 7-10-09

## *Geo-Chemical Water Analysis*

| | | | |
|---|---|---|---|
| *Customer:* | Chevron Corporation | Log # : | 16812-4 |
| *Address:* | 9525 Camino Media | Date In: | 8/6/09 |
| | Bakersfield, CA 93311 | Date Completed: | 8/10/09 |
| *Attention:* | Ray Franze | Date Reported: | 8/10/09 |
| *Sample Description:* | Producers 1002 | | |

| Anions | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Bicarbonate, $HCO_3^{-1}$ | 385.6 | . | 6.31 | SM2320 B | 0.20 |
| Bromide, Br | 0.0 | X | 0.00 | EPA 300.0 | 0.05 |
| Carbonate, $CO_3^{-1}$ | 0.00 | X | 0.00 | SM2320 B | 0.20 |
| Chloride, $Cl^{-1}$ | 70.9 | . | 2.00 | EPA 300.0 | 0.05 |
| Fluoride, $F^{-1}$ | 0.00 | X | 0.00 | EPA 300.0 | 0.20 |
| Hydroxide, $OH^{-1}$ | 0.0 | X | 0.00 | SM2320 B | 0.20 |
| Iodide, $I^{-1}$ (Iodine) | 0.0 | X | 0.00 | EPA 300.1 | 0.05 |
| Sulfate, $SO_4^{-2}$ | 0.00 | . | 0.00 | EPA 300.0 | 0.05 |
| Sulfide, $S^{-1}$ | 0.0 | X | 0.00 | SM4500-$S^{-2}$ | 1.00 |
| Sulfite, $SO_3^{-2}$ | 0.0 | X | 0.00 | SM4500-$SO3^{-2}$ | 1.00 |

| Calculations | Results | Units | Method # | PQL |
|---|---|---|---|---|
| Alkalinity, as CaCO3 (Total) | 316.1 | mg/l | SM 3320 B | NA |
| as CaCO3 (less Org. Alk.) | 316.1 | mg/l | SM 3320 B | NA |
| Hardness, as CaCO3 (Calc.) | 136.2 | mg/l | SM 2340 B | NA |
| Refractive Index | NA | NA | NA | NA |
| Salinity, as NaCl | 128.1 | mg/l | (Calc.) | 1.00 |
| *Calcium Carbonate* | | | | |
| Stability Index (Langlier) | 0.32 | (Notes) | SM 2230 B | NA |
| Stability Index (Stiff Davis) | 0.24 | NA | Ref. 4 | NA |

| Cations | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Ammonium, $NH4^{+1}$ | 0.00 | X | 0.00 | ASTM D 6919 | 0.10 |
| Barium, $Ba^{+2}$ | 0.00 | . | 0.00 | EPA 200.7 | 0.05 |
| Boron, $B^{+3}$ | 0.15 | . | 0.04 | EPA 200.7 | 0.10 |
| Calcium, $Ca^{+2}$ | 41.3 | . | 2.06 | EPA 200.7 | 0.05 |
| Iron, $Fe^{+3}$ | 0.32 | . | 0.02 | EPA 200.7 | 0.10 |
| Magnesiumn, $Mg^{+2}$ | 7.99 | . | 0.66 | EPA 200.7 | 0.05 |
| Manganese, $Mn^{+2}$ | 0.00 | X | 0.00 | EPA 200.7 | 0.05 |
| Potassium, $K^{+1}$ | 2.98 | . | 0.08 | EPA 200.7 | 0.50 |
| Sodium, $Na^{+1}$ | 5.80 | . | 0.25 | EPA 200.7 | 5.00 |
| Strontium, $Sr^{+2}$ | 0.00 | X | 0.00 | EPA 200.7 | 0.10 |
| Zinc, $Zn^{+2}$ | 0.00 | X | 0.00 | EPA 200.7 | 0.02 |

| Physical Data | Results | | Method # | PQL |
|---|---|---|---|---|
| Conductivity (Measured) | 734.0 | μmho's | SM 2510 B | 1000 |
| Resistivity | 13.624 | ohm's | (Calc.) | NA |
| Specific Gravity (60/60) | 1.0008 | units | API RP 45 | ±0.0001 |
| Ionic strength | 0.01 | IS (μ) | (Calc.) | NA |
| pH | 7.91 | units | SM 4500 H B | ± 0.01 |
| Temperature | 60.0 | °F | SM 2550 B | ± 0.2 |
| Total Diss. Solids (TDS)* | 515.1 | mg/L | (An-Cat Sum.) | NA |
| Total Diss. Solids @ 180 °c | NA | mg/L | Chevron | NA |

| Other | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Acetate | 0.0 | X | 0.0 | ASTM D 4327 | 1.00 |
| Formate | 0.0 | X | 0.0 | ASTM D 4327 | 1.00 |
| Propionate | 0.0 | X | 0.0 | ASTM D 4327 | 1.00 |
| Organic Alkalinity | 0 | X | 0.0 | Chevron Pub. | NA |
| Lithium, Li | 0.0 | X | 0.0 | EPA 200.7 | 0.02 |
| Silica, as SiO2 | 36.1 | . | 5.21 | EPA 200.7 | 0.50 |
| Sodium, $Na^{+1}$ (Calc.) | 5.8 | | 0.25 | API RP 45 | NA |

| QC (Quality Control) | Results | | Criteria | Limits |
|---|---|---|---|---|
| Meas EC - Calc EC = | 1.2 | *Note | (0.9 - 1.1 ) EC | >2500 |
| TDS - EC Ratio = | 0.70 | **Note | (0.55 - 0.70) | >2500 |
| Measured EC - Ion Sum = | 1.1 | Cation | (0.9 - 1.1) EC | |
| | 1.1 | Anion | (0.9 - 1.1) EC | |
| Calc. Na - Actual Na = | 1.00 | Na/Na | (0.98 - 1.02) | |
| NaCl/(NaCl Calc.) = | 1.00 | Na:Cl | (0.98 - 1.02) | |

**QC - Anion - Cation Balance Criteria**

| Anion Sum meq/L | meq/L SUM | Acceptable % Difference |
|---|---|---|
| 0 - 3.0 | NA | ± 0.2 meq |
| 3.0 - 10.0 | NA | ± 2 % |
| 10.0 - 800 | 17 | ± 2 - 5 % |
| Anion - Cation Balance = | 0.0 | % |

**Notes:**

MDL - Method Detection Limit.

PQL - Practical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of precision and accuracy of the analytical methodology (5X MDL).

N.D. - Not Detected (below PQL)

TDS* - Cation and anion sum.

NA - Not applicable to report.

Σ = Sum

** Dissociated ions may elevate this value ($Ca^{+2}$, $SO4^{-2}$ etc.)

X = Not Analyzed for

*Calcium Carbonate*

*Stability Index*

(+) =CaCO3 will tend to precipitate.

(-) = CaCO3 will tend to dissolve.

(±) = CaCO3 is at equilibrium.


**References:**

1. APHA-AWWA; "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM; "Water," 2007 American Society for Testing and Material Vol. 11.01-02
3. EPA;"Methods for Chemical Analysis of Water and Waste," 1983 EPA-600/4-79-020
4. API; "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Institute. API RP 45.
5. Patton, C.C., "Applied Water Technology," 1986 Campbell Petroleum Series.


The Quality of the Analysis is Only as Good as the Quality of the Sample

Comments:

QC ______________ Date ______________

Date: ______________

Kurt R. Buckle, B.S. Vice-President, Laboratory Director Midway Laboratory, Inc

## *Laboratory Report*

*ELAP Cert. 1398A*

### *Geochemical Water Analysis*

| | | | |
|---|---|---|---|
| ***Customer:*** | Chevron Corporation | ***Log # :*** | 17023-2 |
| ***Address:*** | 9525 Camino Media | ***Date in:*** | 9/17/09 |
| | Bakersfield, CA 93311 | ***Date out:*** | 9/24/09 |
| ***Attention:*** | Ray Franze, Carla S | | |
| ***Sample Description:*** | Producers 1002 | | Rev 10-3-08 |

| Anions | mg/L | meq/L | Method #. | PQL(mg/L) | Calculations | Results | Units | Method # | PQL(mg/L) |
|---|---|---|---|---|---|---|---|---|---|
| Bicarbonate, $HCO_3$ | 260.7 | 4.27 | SM2320 B | 0.20 | Alkalinity, as $CaCO_3$ (Total) | 213.7 | mg/l | SM 3320 B | 0.10 |
| Carbonate, $CO_3$ | 0.00 | 0.00 | SM2320 B | 0.20 | Hardness, as $CaCO_3$ (Total) | 105.6 | mg/l | SM 2340 B | 0.10 |
| Chloride, Cl | 129.0 | 3.64 | EPA 300.0 | 0.01 | Salinity, as NaCl | 233.0 | mg/l | (Calc.) | 1.00 |
| Hydroxide, OH | 0.00 | 0.00 | SM2320 B | 0.20 | ***Calcium Carbonate*** | | | | |
| Nitrate, NO3 | 0.00 | 0.00 | EPA 300.0 | 0.01 | Stability Index (Stiff Davis) | -0.36 | (Notes) | SM 2230 B | N.A. |
| Sulfate, $SO_4$ | 0.00 | 0.00 | EPA 300.0 | 0.02 | Langelier Saturation Index | -0.27 | (Notes) | SM 203 | N.A. |

| Cations | mg/L | meq/L | Method #. | PQL(mg/L) | Physical Data | Results | | Method # | PQL |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia, NH2 | 0.00 | 0.00 | EPA 200.7 | 0.01 | | | | | |
| Arsenic, As | 16.10 | NA | ASTM D 6919 | 0.500 | | | | | |
| Barium, Ba | 0.08 | 0.00 | EPA 200.7 | 0.05 | Conductivity (Measured) | 793.0 | µmho's | SM 2510 B | 0.100 |
| Boron, B | 0.18 | 0.05 | EPA 200.7 | 0.10 | Resistivity | 12.6103 | ohm's | (Calc.) | 0.0005 |
| Calcium, Ca | 30.2 | 1.51 | EPA 200.7 | 0.05 | Specific Gravity (60/60) | 0.9981 | units | API RP 45 | 0.0005 |
| Iron, Fe | 0.11 | 0.01 | EPA 200.7 | 0.10 | Ionic strength | 0.009 | IS (µ) | (Calc.) | 0.001 |
| Magnesiumn, Mg | 7.31 | 0.60 | EPA 200.7 | 0.05 | pH | 7.62 | units | SM 4500 H B | ± 0.01 |
| Potassium, K | 5.39 | 0.14 | EPA 200.7 | 0.50 | Temperature | 68.0 | °F | SM 2550 B | ± 0.1 |
| Sodium, Na | 110.0 | 4.78 | EPA 200.7 | 5.00 | Total Diss. Solids (TDS)* | 559.1 | mg/L | (Calc.) | 0.1 |
| Strontium, Sr | 0.00 | 0.00 | EPA 200.7 | 0.01 | Total Susp. Solids (TSS) | NA | mg/L | SM 2540 D | 5.0 |

| Other | | | | QC | Results | | Range | Limits |
|---|---|---|---|---|---|---|---|---|
| | | | | Meas EC - Calc EC | 0.9 | | (0.9-1.1 ) EC | |
| Silica, as $SiO_2$ | 82.4 | N.A. | SM 3500-Si B | TDS - EC Ratio | 0.70 | | (0.55-0.70) | >2500 TDS |
| Sodium, Na (Calc.) | 110.9 | 4.82 | API RP-45 2.10 | Measured EC - Ion Sum | 0.9 | Cation | (0.9-1.1) EC | |
| | | | | | 1.0 | Anion | (0.9-1.1) EC | |

***Notes***

PQL - Practical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of precision and accuracy of the analytical methodology.

N.D. - Not Detected (below PQL)

TDS* - Cation and anion summation.

N.A. - Not applicable to report.

***Calcium Carbonate Stability Index***

(+) =CaCO3 will tend to precipitate

(-) = CaCO3 will tend to dissolve

(±) = CaCO3 is at equilibrium

QC____________Date____________


***References:***

1. APHA-AWWA, "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM, "Water," 1983 American Society for Testing and Material Vol11 01-02
3. EPA,"Methods for Chemical Analysis of Water and Wastes," 1983 EPA-600/4-79-020
4. API, "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Institute, API RP 45.
5. Patton, C.C., "Applied Water Technology," 1986 C. C. Patton & Associates, Campbell Petroleum Series.


Kurt R. Buckle
Laboratory Director
Midway Laboratory, Inc.

________________Date__________

# *Laboratory Report*

*ELAP Cert. 1396A*

## *Geochemical Water Analysis*

***Customer:*** Chevron Corporation
***Address:*** 9525 Camino Media
Bakersfield, CA 93311
***Attention:*** Ray Franze, Carla S
***Sample Description:*** Producers 1002

Practical quantification limit

***Log #:*** 17104-3
***Date In:*** 10/1/09
***Date out:*** 10/13/09

Rev 10-3-08

| Anions | mg/L | meq/L | Method # | PQL(mg/L) | Calculations | Results | Units | Method # | PQL(mg/L) |
|---|---|---|---|---|---|---|---|---|---|
| Bicarbonate, $HCO_3$ | 223.9 | 3.67 | SM2320 B | 0.20 | Alkalinity, as $CaCO_3$ (Total) | 183.5 | mg/l | SM 2320 B | 0.10 |
| Carbonate, $CO_3$ | 0.00 | 0.00 | SM2320 B | 0.20 | Hardness, as $CaCO_3$ (Total) | 72.3 | mg/l | SM 2340 B | 0.10 |
| Chloride, Cl | 88.4 | 2.49 | EPA 300.0 | 0.01 | Salinity, as NaCl | 159.7 | mg/l | (Calc.) | 1.00 |
| Hydroxide, OH | 0.00 | 0.00 | SM2320 B | 0.20 | ***Calcium Carbonate*** | | | | |
| Nitrate, NO3 | 0.00 | 0.00 | EPA 300.0 | 0.01 | Stability Index (Stiff Davis) | -0.16 | (Notes) | SM 2230 B | N.A. |
| Sulfate, $SO_4$ | 0.60 | 0.01 | EPA 300.0 | 0.02 | Langelier Saturation Index | -0.07 | (Notes) | SM 203 | N.A. |

| Cations | mg/L | meq/L | Method # | PQL(mg/L) | Physical Data | Results | Units | Method # | PQL |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia, NH2 | 0.00 | 0.00 | EPA 200.7 | 0.01 | | | | | |
| Arsenic, As | 0.00 | NA | ASTM D 6919 | 0.10 | | | | | |
| Barium, Ba | 0.00 | 0.00 | EPA 200.7 | 0.05 | Conductivity (Measured) | 689.0 | µmho's | SM 2510 B | 0.100 |
| Boron, B | 0.13 | 0.04 | EPA 200.7 | 0.10 | Resistivity | 14.5138 | ohm's | (Calc.) | 0.0005 |
| Calcium, Ca | 19.9 | 0.99 | EPA 200.7 | 0.05 | Specific Gravity (60/60) | 1.0011 | units | API RP 45 | 0.0005 |
| Iron, Fe | 0.07 | 0.00 | EPA 200.7 | 0.10 | Ionic strength | 0.007 | IS (µ) | (Calc.) | 0.001 |
| Magnesiumn, Mg | 5.48 | 0.45 | EPA 200.7 | 0.05 | pH | 8.07 | units | SM 4500 H B | ± 0.01 |
| Potassium, K | 3.63 | 0.09 | EPA 200.7 | 0.50 | Temperature | 68.0 | °F | SM 2550 B | ± 0.1 |
| Sodium, Na | 98.7 | 4.29 | EPA 200.7 | 5.00 | Total Diss. Solids (TDS)* | 440.8 | mg/L | (Calc.) | 0.1 |
| Strontium, Sr | 0.00 | 0.00 | EPA 200.7 | 0.01 | Total Susp. Solids (TSS) | NA | mg/L | SM 2540 D | 5.0 |

| *Other* | | | | QC | Results | | Range | Limits |
|---|---|---|---|---|---|---|---|---|
| | | | | Meas EC - Calc EC | 1.0 | | (0.9-1.1) EC | |
| Silica, as $SiO_2$ | 83.2 | N.A. | SM 3500-SI B | TDS - EC Ratio | 0.64 | | (0.55-0.70) | >2500 TDS |
| Sodium, Na (Calc.) | 99.0 | 4.31 | API RP-45 2.10 | Measured EC - Ion Sum | 0.9 | Cation | (0.9-1.1) EC | |
| | | | | | 0.9 | Anion | (0.9-1.1) EC | |

***Notes***

PQL - Praactical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of precision and accuracy of the analytical methodology.
N.D. - Not Detected (below PQL)
TDS* - Cation and anion summation.
N.A. - Not applicable to report.

***Calcium Carbonate***
***Stability Index***
(+) =CaCO3 will tend to precipitate.
(-) = CaCO3 will tend to dissolve.
(±) = CaCO3 is at equilibrium.

QC__________ Date__________

***References:***


1. APHA-AWWA, "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM, "Water," 1983 American Society for Testing and Material Vol11 01-02
3. EPA,"Methods for Chemical Analyses of Water and Wastes," 1983 EPA-600/4-79-020
4. API, "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Institute, API RP 45.
5. Patton, C.C., "Applied Water Technology," 1986 C. C. Patton & Associates, Campbell Petroleum Series


Kurt R. Buckle
Laboratory Director
Midway Laboratory, Inc.

__________ Date__________

## *Laboratory Report*
ELAP Cert. 1398A

### *Geo-Chemical Water Analysis*

Rev 12-16-09

| | | | |
|---|---|---|---|
| *Customer:* | Chevron Corporation | Log # : | 17433-7 |
| *Address:* | 9525 Camino Media | Date In: | 12/3/09 |
| | Bakersfield, CA 93311 | Date Completed: | 12/7/09 |
| *Attention:* | Ray Franze, Carla Semprun | Date Reported: | 12/14/09 |
| *Sample Description:* | Producers 1002 | | |

| Anions | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Bicarbonate, $HCO_3^{-1}$ | 230.0 | . | 3.77 | SM2320 B | 0.20 |
| Carbonate, $CO_3^{-1}$ | 0.0 | . | 0.00 | SM2320 B | 0.20 |
| Chloride, $Cl^{-1}$ | 52.0 | . | 1.47 | SM4500-Cl | 0.05 |
| Hydroxide, $OH^{-1}$ | 0.0 | . | 0.00 | SM2320 B | 0.20 |
| Sulfate, $SO_4^{-2}$ | 0.6 | . | 0.01 | SM4500-SO4$^{-2}$ | 1.0 |
| Sulfide, $S^{-1}$ | 0.0 | X | 0.00 | SM4500-S$^{-2}$ | 1.0 |
| Sulfite, $SO_3^{-2}$ | 0.0 | X | 0.00 | SM4500-SO3$^{-2}$ | 1.0 |

| Calculations | Results | Units | Method # | PQL |
|---|---|---|---|---|
| Alkalinity, as CaCO3 (Total) | 188.5 | mg/l | SM 2320 B | NA |
| as CaCO3 (less Org. Alk.) | 188.5 | mg/l | SM 2320 B | NA |
| Hardness, as CaCO3 (Calc.) | 69.8 | mg/l | SM 2340 B | NA |
| Salinity, calc. Na+Cl | 306.4 | mg/l | (Calc.) | NA |
| Salinity, from Chlorosity | 93.9 | mg/l | (Calc.) | NA |
| ***Calcium Carbonate*** | | | | |
| Stability Index (Langlier) | -0.48 | (Notes) | SM 2330 B | NA |
| Stability Index (Stiff Davis) | -0.56 | NA | Ref. 4 | NA |

| Cations | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Ammonium, $NH_4^{+1}$ | 0.00 | X | 0.00 | ASTM D 6919 | 0.10 |
| Barium, $Ba^{+2}$ | 0.00 | . | 0.00 | EPA 200.7 | 0.05 |
| Boron, $B^{+3}$ | 0.09 | . | 0.02 | EPA 200.7 | 0.10 |
| Calcium, $Ca^{+2}$ | 19.5 | . | 0.97 | EPA 200.7 | 0.05 |
| Iron, $Fe^{+3}$ | 1.23 | . | 0.07 | EPA 200.7 | 0.10 |
| Magnesium, $Mg^{+2}$ | 5.12 | . | 0.42 | EPA 200.7 | 0.05 |
| Potassium, $K^{+1}$ | 2.29 | . | 0.06 | EPA 200.7 | 0.50 |
| Sodium, $Na^{+1}$ | 84.9 | . | 3.69 | EPA 200.7 | 5.00 |
| Strontium, $Sr^{+2}$ | 0.00 | X | 0.00 | EPA 200.7 | 0.10 |

| Physical Data | Results | | Method # | PQL |
|---|---|---|---|---|
| Conductivity (Measured) | 568.0 | µmho's | SM 2510 B | 1000 |
| Resistivity | 17.606 | ohm's | (Calc.) | NA |
| Specific Gravity (60/60) | 1.0013 | units | API RP 45 | ±0.0001 |
| Ionic strength | 0.01 | IS (µ) | (Calc.) | NA |
| pH | 7.66 | units | SM 4500 H B | ± 0.01 |
| Temperature | 60.0 | °F | SM 2550 B | ± 0.2 |
| Total Diss. Solids (TDS)* | 395.7 | mg/L | (An-Cat Sum.) | NA |
| Total Diss. Solids @ 180 °c | NA | mg/L | Chevron | NA |

| Other | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Arsenic, As | 0.034 | . | 0.00 | EPA 200.7 | 0.002 |
| Silica, as SiO2 | 26.1 | . | 3.75 | EPA 200.7 | 0.10 |
| Sodium, $Na^{+1}$ (Calc.) | 84.9 | | 3.69 | API RP 45 | NA |
| Chloride, $Cl^{-1}$ (Calc.) | 51.7 | | 1.46 | API RP 45 | NA |
| Organic Alkalinity | 0.0 | X | 0.00 | Chevron Calc. | NA |

| QC (Quality Control) | Results | | Criteria | Limits |
|---|---|---|---|---|
| Meas EC - Calc EC = | 0.9 | *Note | (0.9 - 1.1) EC | >2500 |
| TDS - EC Ratio = | 0.70 | **Note | (0.55 - 0.70) | >2500 |
| Measured EC - Ion Sum = | 0.9 | Cation | (0.9 - 1.1) EC | |
| | 0.9 | Anion | (0.9 - 1.1) EC | |
| Calc. Na - Actual Na = | 1.00 | Na/Na | (0.98 - 1.02) | |
| NaCl/(NaCl Calc.) = | 1.00 | Na:Cl | (0.98 - 1.02) | |

**QC - Anion - Cation Balance Criteria**

| Anion Sum meq/L | meq/L SUM | Acceptable % Difference |
|---|---|---|
| 0 - 3.0 | NA | ± 0.2 meq |
| 3.0 - 10.0 | NA | ± 2 % |
| 10.0 - 800 | 10 | ± 2 - 5 % |
| Anion - Cation Balance = | -0.1 | % |

**Notes:**

MDL - Method Detection Limit.

PQL - Practical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of precision and accuracy of the analytical methodology (5X MDL).

N.D. - Not Detected (below PQL)

TDS* - Cation and anion sum.

NA - Not applicable to report.

∑ = Sum

** Dissociated ions may elevate this value ($Ca^{+2}$, $SO4^{-2}$ etc.)

X = Not Analyzed for

***Calcium Carbonate***

***Stability Index***

(+) =CaCO3 will tend to precipitate.

(-) = CaCO3 will tend to dissolve.

(±) = CaCO3 is at equilibrium.

Comments:


**References:**

1. APHA-AWWA; "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM; "Water," 2007 American Society for Testing and Material Vol. 11.01-02
3. EPA;"Methods for Chemical Analysis of Water and Waste," 1983 EPA-600/4-73-020
4. API; "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Institute, API RP 45.
5. Patton, C.C.; "Applied Water Technology," 1986 Campbell Petroleum Series.


The Quality of the Analysis is Only as Good as the Quality of the Sample

QC ____________ Date ____________

Date: ____________

Laboratory Director    Midway Laboratory, Inc

## *Laboratory Report*

ELAP Cert. 1398A

### *Geo-Chemical Water Analysis*

Rev 12-16-09

**Customer:** Chevron Corporation
**Address:** 9525 Camino Media
Bakersfield, CA 93311
**Attention:** Ray Franze, Carla Semprun
**Sample Description:** Producers 1002

Log # : 17630-6
Date In: 1/14/10
Date Completed: 1/20/10
Date Reported: 1/21/10

| Anions | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Bicarbonate, $HCO_3^{-1}$ | 276.4 | . | 4.53 | SM2320 B | 0.20 |
| Carbonate, $CO_3^{-1}$ | 0.0 | . | 0.00 | SM2320 B | 0.20 |
| Chloride, $Cl^{-1}$ | 82.1 | . | 2.32 | SM4500-Cl' | 0.05 |
| Hydroxide, $OH^{-1}$ | 0.0 | . | 0.00 | SM2320 B | 0.20 |
| Sulfate, $SO_4^{-2}$ | 0.9 | . | 0.02 | SM4500-SO4$^{-2}$ | 1.0 |
| Sulfide, $S^{-1}$ | 0.0 | X | 0.00 | SM4500-S$^{-2}$ | 1.0 |
| Sulfite, $SO_3^{-2}$ | 0.0 | X | 0.00 | SM4500-SO3$^{-2}$ | 1.0 |

| Calculations | Results | Units | Method # | PQL |
|---|---|---|---|---|
| Alkalinity, as CaCO3 (Total) | 226.6 | mg/l | SM 2320 B | NA |
| as CaCO3 (less Org. Alk.) | 226.6 | mg/l | SM 2320 B | NA |
| Hardness, as CaCO3 (Calc.) | 78.7 | mg/l | SM 2340 B | NA |
| Salinity, calc. Na+Cl | 384.3 | mg/l | (Calc.) | NA |
| Salinity, from Chlorosity | 148.3 | mg/l | (Calc.) | NA |
| *Calcium Carbonate* | | | | |
| Stability Index (Langlier) | -0.35 | (Notes) | SM 2330 B | NA |
| Stability Index (Stiff Davis) | -0.44 | NA | Ref. 4 | NA |

| Cations | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Ammonium, $NH4^{+1}$ | 0.00 | X | 0.00 | ASTM D 6919 | 0.10 |
| Barium, $Ba^{+2}$ | 0.00 | . | 0.00 | EPA 200.7 | 0.05 |
| Boron, $B^{+3}$ | 0.14 | . | 0.04 | EPA 200.7 | 0.10 |
| Calcium, $Ca^{+2}$ | 22.5 | . | 1.12 | EPA 200.7 | 0.05 |
| Iron, $Fe^{+3}$ | 0.46 | . | 0.02 | EPA 200.7 | 0.10 |
| Magnesium, $Mg^{+2}$ | 5.46 | . | 0.45 | EPA 200.7 | 0.05 |
| Potassium, $K^{+1}$ | 2.31 | . | 0.06 | EPA 200.7 | 0.50 |
| Sodium, $Na^{+1}$ | 102 | . | 4.44 | EPA 200.7 | 5.00 |
| Strontium, $Sr^{+2}$ | 0.00 | X | 0.00 | EPA 200.7 | 0.10 |

| Physical Data | Results | Units | Method # | PQL |
|---|---|---|---|---|
| Conductivity (Measured) | 718.0 | µmho's | SM 2510 B | 1000 |
| Resistivity | 13.928 | ohm's | (Calc.) | NA |
| Specific Gravity (60/60) | 1.0008 | units | API RP 45 | ±0.0001 |
| Ionic strength | 0.01 | IS (µ) | (Calc.) | NA |
| pH | 7.64 | units | SM 4500 H B | ± 0.01 |
| Temperature | 60.0 | °F | SM 2550 B | ± 0.2 |
| Total Diss. Solids (TDS)* | 492.3 | mg/L | (An-Cat Sum.) | NA |
| Total Diss. Solids @ 180 °c | NA | mg/L | Chevron | NA |

| Other | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Arsenic, As | 0.000 | . | 0.00 | EPA 200.7 | 0.002 |
| Silica, as SiO2 | 61.2 | . | 8.81 | EPA 200.7 | 0.10 |
| Sodium, $Na^{+1}$ (Calc.) | 102.0 | | 4.44 | API RP 45 | NA |
| Chloride, $Cl^{-1}$ (Calc.) | 56.2 | | 1.59 | API RP 45 | NA |
| Organic Alkalinity | 0.0 | X | 0.00 | Chevron Calc. | NA |

| QC (Quality Control) | Results | | Criteria | Limits |
|---|---|---|---|---|
| Meas EC - Calc EC = | 0.9 | *Note | (0.9 - 1.1) EC | >2500 |
| TDS - EC Ratio = | 0.69 | **Note | (0.55 - 0.70) | >2500 |
| Measured EC - Ion Sum = | 0.9 | Cation | (0.9 - 1.1) EC | |
| | 1.0 | Anion | (0.9 - 1.1) EC | |
| Calc. Na - Actual Na = | 1.00 | Na/Na | (0.98 - 1.02) | |
| NaCl/(NaCl Calc.) = | 1.00 | Na:Cl | (0.98 - 1.02) | |

**QC - Anion - Cation Balance Criteria**

| Anion Sum meq/l | meq/L SUM | Acceptable % Difference |
|---|---|---|
| 0 - 3.0 | NA | ± 0.2 meq |
| 3.0 - 10.0 | NA | ± 2 % |
| 10.0 - 800 | 13 | ± 2 - 5 % |
| Anion - Cation Balance = | -5.6 | % |

**Notes:**

MDL - Method Detection Limit.
PQL - Practical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of precision and accuracy of the analytical methodology (5X MDL).
N.D. - Not Detected (below PQL)
TDS* - Cation and anion sum..
NA - Not applicable to report.
Σ = Sum
** Dissociated ions may elevate this value ($Ca^{+2}$, $SO4^{-2}$ etc.)
X = Not Analyzed for
*Calcium Carbonate*
*Stability Index*
(+) =CaCO3 will tend to precipitate.
(-) = CaCO3 will tend to dissolve.
(±) = CaCO3 is at equilibrium.

**Comments:**


**References:**

1. APHA-AWWA; "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM; "Water," 2007 American Society for Testing and Material Vol. 11.01-02
3. EPA;"Methods for Chemical Analysis of Water and Waste," 1983 EPA-600/4-73-020
4. API; "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Institute, API RP 45.
5. Patton, C.C.; "Applied Water Technology," 1986 Campbell Petroleum Series.


**The Quality of the Analysis Is Only as Good as the Quality of the Sample**

QC ______________ Date ______________

Date: ______________

Laboratory Director Midway Laboratory, Inc

## *Laboratory Report*

*ELAP Cert. 1396A*

### *Geochemical Water Analysis*

| | | | |
|---|---|---|---|
| ***Customer:*** | Chevron Corporation | ***Log # :*** | 16399-1 |
| ***Address:*** | 9525 Camino Media | ***Date In:*** | 5/7/09 |
| | Bakersfield, CA 93311 | ***Date out:*** | 5/12/09 |
| ***Attention:*** | Ray Franze, Carla S | | |
| ***Sample Description:*** | Sec. 25 1001 | | **Rev 10-3-08** |

| **Anions** | **mg/L** | **meq/L** | **Method #.** | **PQL(mg/L)** | **Calculations** | **Results** | **Units** | **Method #** | **PQL(mg/L)** |
|---|---|---|---|---|---|---|---|---|---|
| Bicarbonate, $HCO_3$ | 156.6 | 2.57 | SM2320 B | 0.20 | Alkalinity, as $CaCO_3$ (Total) | 130.4 | mg/l | SM 3320 B | 0.10 |
| Carbonate, $CO_3$ | 1.24 | 0.04 | SM2320 B | 0.20 | Hardness, as $CaCO_3$ (Total) | 12.7 | mg/l | SM 2340 B | 0.10 |
| Chloride, Cl | 107.0 | 3.02 | EPA 300.0 | 0.01 | Salinity, as NaCl | 193.3 | mg/l | (Calc.) | 1.00 |
| Hydroxide, OH | 0.00 | 0.00 | SM2320 B | 0.20 | ***Calcium Carbonate*** | | | | |
| Nitrate, NO3 | 0.00 | 0.00 | EPA 300.0 | 0.01 | Stability Index (Stiff Davis) | -0.54 | (Notes) | SM 2230 B | N.A. |
| Sulfate, $SO_4$ | 1.80 | 0.04 | EPA 300.0 | 0.02 | Langelier Saturation Index | -0.45 | (Notes) | SM 203 | N.A. |

| **Cations** | **mg/L** | **meq/L** | **Method #.** | **PQL(mg/L)** | **Physical Data** | **Results** | | **Method #** | **PQL** |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia, NH2 | 0.00 | 0.00 | EPA 200.7 | 0.01 | | | | | |
| Arsenic, As | 0.000 | NA | ASTM D 6919 | 0.005 | | | | | |
| Barium, Ba | 0.00 | 0.00 | EPA 200.7 | 0.01 | Conductivity (Measured) | 624.0 | µmho's | SM 2510 B | 0.100 |
| Boron, B | 0.86 | 0.24 | EPA 200.7 | 0.01 | Resistivity | 16.0256 | ohm's | (Calc.) | 0.0005 |
| Calcium, Ca | 4.62 | 0.23 | EPA 200.7 | 0.01 | Specific Gravity (60/60) | 1.0014 | units | API RP 45 | 0.0005 |
| Iron, Fe | 0.00 | 0.00 | EPA 200.7 | 0.01 | Ionic strength | 0.006 | IS (µ) | (Calc.) | 0.001 |
| Magnesiumn, Mg | 0.28 | 0.02 | EPA 200.7 | 0.01 | pH | 8.47 | units | SM 4500 H B | ± 0.01 |
| Potassium, K | 0.61 | 0.02 | EPA 200.7 | 0.01 | Temperature | 68.0 | °F | SM 2550 B | ± 0.1 |
| Sodium, Na | 117.0 | 5.09 | EPA 200.7 | 0.01 | Total Diss. Solids (TDS)* | 390.0 | mg/L | (Calc.) | 0.1 |
| Strontium, Sr | 0.00 | 0.00 | EPA 200.7 | 0.01 | Total Susp. Solids (TSS) | NA | mg/L | SM 2540 D | 5.0 |

| **Other** | | | | **QC** | **Results** | | **Range** | **Limits** |
|---|---|---|---|---|---|---|---|---|
| | | | | Meas EC - Calc EC | 1.0 | | (0.9-1.1 ) EC | |
| Silica, as $SiO_2$ | 23.3 | N.A. | SM 3500-SI B | TDS - EC Ratio | 0.63 | | (0.55-0.70) | >2500 TDS |
| Sodium, Na (Calc.) | 117.1 | 5.09 | API RP-45 2.10 | Measured EC - Ion Sum | 0.9 | Cation | (0.9-1.1) EC | |
| | | | | | 0.9 | Anion | (0.9-1.1) EC | |

**Notes**

PQL - Praactical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of prcision and accuracy of the analytical methodology

N.D. - Not Detected (below PQL)

TDS* - Cation and anion summation

N.A. - Not applicable to report.

***Calcium Carbonate Stability Index***

(+) =CaCO3 will tend to precipitate

(-) = CaCO3 will tend to dissolve

(±) = CaCO3 is at equilibrium

QC____________ Date____________


***References:***

1. APHA-AWWA; "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM; "Water," 1983 American Society for Testing and Material Vol11.01-02
3. EPA;"Methods for Chemical Analysis of Water and Wastes," 1983 EPA-600/4-79-020
4. API; "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Institute, API RP 45.
5. Patton, C.C., "Applied Water Technology," 1986 C. C. Patton & Associates, Campbell Petroleum Series.


Kurt R. Buckle
Laboratory Director
Midway Laboratory, Inc.

________________ Date__________

# *Laboratory Report*

*ELAP Cert. 1396A*

## *Geochemical Water Analysis*

| | | | |
|---|---|---|---|
| ***Customer:*** | Chevron Corporation | ***Log # :*** | 16584-4 |
| ***Address:*** | 9525 Camino Media | ***Date in:*** | 6/18/09 |
| | Bakersfield, CA 93311 | ***Date out:*** | 6/22/09 |
| ***Attention:*** | Ray Franze, Carla S | | |
| ***Sample Description:*** | Sec. 25 1001 | | Rev 10-3-08 |

| Anions | mg/L | meq/L | Method #. | PQL(mg/L) | Calculations | Results | Units | Method # | PQL(mg/L) |
|---|---|---|---|---|---|---|---|---|---|
| Bicarbonate, $HCO_3$ | 149.3 | 2.45 | SM2320 B | 0.20 | Alkalinity, as $CaCO_3$ (Total) | 130.4 | mg/l | SM 3320 B | 0.10 |
| Carbonate, $CO_3$ | 4.97 | 0.17 | SM2320 B | 0.20 | Hardness, as $CaCO_3$ (Total) | 12.8 | mg/l | SM 2340 B | 0.10 |
| Chloride, Cl | 77.9 | 2.20 | EPA 300.0 | 0.01 | Salinity, as NaCl | 140.7 | mg/l | (Calc.) | 1.00 |
| Hydroxide, OH | 0.00 | 0.00 | SM2320 B | 0.20 | ***Calcium Carbonate*** | | | | |
| Nitrate, NO3 | 0.00 | 0.00 | EPA 300.0 | 0.01 | Stability Index (Stiff Davis) | -0.60 | (Notes) | SM 2230 B | N.A. |
| Sulfate, $SO_4$ | 0.00 | 0.00 | EPA 300.0 | 0.02 | Langelier Saturation Index | -0.51 | (Notes) | SM 203 | N.A. |

| Cations | mg/L | meq/L | Method #. | PQL(mg/L) | Physical Data | Results | | Method # | PQL |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia, NH2 | 0.00 | 0.00 | EPA 200.7 | 0.01 | | | | | |
| Arsenic, As | 0.000 | NA | ASTM D 6919 | 0.005 | | | | | |
| Barium, Ba | 0.00 | 0.00 | EPA 200.7 | 0.01 | Conductivity (Measured) | 550.0 | µmho's | SM 2510 B | 0.100 |
| Boron, B | 0.19 | 0.05 | EPA 200.7 | 0.01 | Resistivity | 18.1818 | ohm's | (Calc.) | 0.0005 |
| Calcium, Ca | 4.64 | 0.23 | EPA 200.7 | 0.01 | Specific Gravity (60/60) | 0.9963 | units | API RP 45 | 0.0005 |
| Iron, Fe | 0.00 | 0.00 | EPA 200.7 | 0.01 | Ionic strength | 0.005 | IS (µ) | (Calc.) | 0.001 |
| Magnesiumn, Mg | 0.30 | 0.02 | EPA 200.7 | 0.01 | pH | 8.41 | units | SM 4500 H B | ± 0.01 |
| Potassium, K | 0.65 | 0.02 | EPA 200.7 | 0.01 | Temperature | 68.0 | °F | SM 2550 B | ± 0.1 |
| Sodium, Na | 118.0 | 5.13 | EPA 200.7 | 0.01 | Total Diss. Solids (TDS)* | 355.9 | mg/L | (Calc.) | 0.1 |
| Strontium, Sr | 0.00 | 0.00 | EPA 200.7 | 0.01 | Total Susp. Solids (TSS) | NA | mg/L | SM 2540 D | 5.0 |

| Other | | | | QC | Results | | Range | Limits |
|---|---|---|---|---|---|---|---|---|
| | | | | Meas EC - Calc EC | 1.0 | | (0.9-1.1 ) EC | |
| Silica, as $SiO_2$ | 22.9 | N.A. | SM 3500-SI B | TDS - EC Ratio | 0.65 | | (0.55-0.70) | >2500 TDS |
| Sodium, Na (Calc.) | 117.4 | 5.11 | API RP-45 2.10 | Measured EC - Ion Sum | 1.0 | Cation | (0.9-1.1) EC | |
| | | | | | 0.9 | Anion | (0.9-1.1) EC | |

***Notes***

PQL - Praactical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of prcision and accuracy of the analytical methodology.

N.D. - Not Detected (below PQL)

TDS* - Cation and anion summation.

N.A. - Not applicable to report.

***Calcium Carbonate Stability Index***

(+) =CaCO3 will tend to precipitate.

(-) = CaCO3 will tend to dissolve.

(±) = CaCO3 is at equilibrium.

QC____________Date____________

***References:***


1. APHA-AWWA; "Standard Methods for the Examination of Water and Waste Water," 16-20 th. Ed. 1992-98
2. ASTM; "Water," 1983 American Society for Testing and Material Vol11.01-02
3. EPA;"Methods for Chemical Analysis of Water and Wastes," 1983 EPA-600/4-79-020
4. API; "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Institute, API RP 45.
5. Patton, C.C.; "Applied Water Technology," 1986 C. C. Patton & Associates, Campbell Petroleum Series.



Kurt R. Buckle
Laboratory Director
Midway Laboratory, Inc.


____________________Date____________

## *Laboratory Report*

**ELAP Cert. 1396A** — **Rev 7-10-09**

### *Geo-Chemical Water Analysis*

| | | | |
|---|---|---|---|
| ***Customer:*** | Chevron Corporation | **Log # :** | 16681-1 |
| ***Address:*** | 9525 Camino Media | **Date In:** | 7/9/09 |
| | Bakersfield, CA 93311 | **Date Completed:** | 7/14/09 |
| ***Attention:*** | Ray Franze | **Date Reported:** | 7/15/09 |
| ***Sample Description:*** | Sec 25 1001 | | |

| Anions | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Bicarbonate, $HCO_3^{-1}$ | 166.4 | . | 2.73 | SM2320 B | 0.20 |
| Bromide, Br | 0.0 | X | 0.00 | EPA 300.0 | 0.05 |
| Carbonate, $CO_3^{-1}$ | 0.0 | X | 0.00 | SM2320 B | 0.20 |
| Chloride, $Cl^{-1}$ | 206.0 | . | 5.81 | EPA 300.0 | 0.05 |
| Fluoride, $F^{-1}$ | 0.00 | X | 0.00 | EPA 300.0 | 0.20 |
| Hydroxide, $OH^{-1}$ | 0.0 | X | 0.00 | SM2320 B | 0.20 |
| Iodide, $I^{-1}$ (Iodine) | 0.0 | X | 0.00 | EPA 300.1 | 0.05 |
| Sulfate, $SO_4^{-2}$ | 1.50 | . | 0.03 | EPA 300.0 | 0.05 |
| Sulfide, $S^{-1}$ | 0.0 | X | 0.00 | SM4500-$S^{-2}$ | 1.00 |
| Sulfite, $SO_3^{-2}$ | 0.0 | X | 0.00 | SM4500-$SO3^{-2}$ | 1.00 |

| Calculations | Results | Units | Method # | PQL |
|---|---|---|---|---|
| Alkalinity, as CaCO3 (Total) | 136.4 | mg/l | SM 3320 B | NA |
| as CaCO3 (less Org. Alk.) | 136.4 | mg/l | SM 3320 B | NA |
| Hardness, as CaCO3 (Calc.) | 12.8 | mg/l | SM 2340 B | NA |
| Refractive Index | NA | NA | NA | NA |
| Salinity, as NaCl | 372.1 | mg/l | (Calc.) | 1.00 |
| ***Calcium Carbonate*** | | | | |
| Stability Index (Langlier) | -0.82 | (Notes) | SM 2230 B | NA |
| Stability Index (Stiff Davis) | -0.91 | NA | Ref. 4 | NA |

| Cations | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Ammonium, $NH4^{+1}$ | 0.00 | X | 0.00 | ASTM D 6919 | 0.10 |
| Barium, $Ba^{+2}$ | 0.00 | . | 0.00 | EPA 200.7 | 0.10 |
| Boron, $B^{+3}$ | 0.12 | . | 0.03 | EPA 200.7 | 0.02 |
| Calcium, $Ca^{+2}$ | 4.64 | . | 0.23 | EPA 200.7 | 0.05 |
| Iron, $Fe^{+3}$ | 0.00 | . | 0.00 | EPA 200.7 | 0.05 |
| Magnesium, $Mg^{+2}$ | 0.30 | . | 0.02 | EPA 200.7 | 0.10 |
| Manganese, $Mn^{+2}$ | 0.00 | X | 0.00 | EPA 200.7 | 0.05 |
| Potassium, $K^{+1}$ | 0.81 | . | 0.02 | EPA 200.7 | 0.10 |
| Sodium, $Na^{+1}$ | 119.0 | . | 5.18 | EPA 200.7 | 0.10 |
| Strontium, $Sr^{+2}$ | 0.00 | X | 0.00 | EPA 200.7 | 0.10 |
| Zinc, $Zn^{+2}$ | 0.00 | X | 0.00 | EPA 200.7 | 0.02 |

| Physical Data | Results | | Method # | PQL |
|---|---|---|---|---|
| Conductivity (Measured) | 898.0 | µmho's | SM 2510 B | 1000 |
| Resistivity | 11.136 | ohm's | (Calc.) | NA |
| Specific Gravity (60/60) | 0.9997 | units | API RP 45 | ±0.0001 |
| Ionic strength | 0.01 | IS (µ) | (Calc.) | NA |
| pH | 8.08 | units | SM 4500 H B | ± 0.01 |
| Temperature | 60.0 | °F | SM 2550 B | ± 0.2 |
| Total Diss. Solids (TDS)* | 498.8 | mg/L | (An-Cat Sum.) | NA |
| Total Diss. Solids @ 180 °c | NA | mg/L | Chevron | NA |

| Other | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Acetate | 0.0 | X | 0.0 | ASTM D 4327 | 1.00 |
| Formate | 0.0 | X | 0.0 | ASTM D 4327 | 1.00 |
| Propionate | 0.0 | X | 0.0 | ASTM D 4327 | 1.00 |
| Organic Alkalinity | 0 | X | 0.0 | Chevron Pub. | NA |
| Lithium, Li | 0.0 | X | 0.0 | EPA 200.7 | 0.02 |
| Silica, as SiO2 | 21.4 | . | 3.08 | EPA 200.7 | 0.01 |
| Sodium, $Na^{+1}$ (Calc.) | 119.0 | | 5.18 | API RP 45 | NA |

| QC (Quality Control) | Results | | Criteria | Limits |
|---|---|---|---|---|
| Meas EC - Calc EC = | 0.9 | *Note | (0.9 - 1.1 ) EC | >2500 |
| TDS - EC Ratio = | 0.56 | **Note | (0.55 - 0.70) | >2500 |
| Measured EC - Ion Sum = | 1.0 | Cation | (0.9 - 1.1) EC | |
| | 1.0 | Anion | (0.9 - 1.1) EC | |
| Calc. Na - Actual Na = | 1.00 | Na/Na | (0.98 - 1.02) | |
| NaCl/(NaCl Calc.) = | 1.00 | Na:Cl | (0.98 - 1.02) | |

**QC - Anion - Cation Balance Criteria**

| Anion Sum meq/L | meq/L SUM | Acceptable % Difference |
|---|---|---|
| 0 - 3.0 | NA | ± 0.2 meq |
| 3.0 - 10.0 | NA | ± 2 % |
| 10.0 - 800 | 17 | ± 2 - 5 % |
| Anion - Cation Balance = | 0.0 | % |

**Notes:**

MDL - Method Detection Limit .

PQL - Practical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of precision and accuracy of the analytical methodology (5X MDL).

N.D. - Not Detected (below PQL)

TDS* - Cation and anion sum.

NA - Not applicable to report.

Σ = Sum

** Dissociated ions may elevate this value ($Ca^{+2}$, $SO4^{-2}$ etc.)

X = Not Analyzed for

***Calcium Carbonate***

***Stability Index***

(+) =CaCO3 will tend to precipitate.

(-) = CaCO3 will tend to dissolve.

(±) = CaCO3 is at equilibrium.

**Comments:**


**References:**

1. APHA-AWWA; "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM; "Water," 2007 American Society for Testing and Material Vol. 11.01-02
3. EPA;"Methods for Chemical Analysis of Water and Waste," 1983 EPA-600/4-73-020
4. API; "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Insitiute, API RP 45.
5. Patton, C.C.; "Applied Water Technology," 1986 Campbell Petroleum Series.


**The Quality of the Analysis is Only as Good as the Quality of the Sample**

QC ____________ Date ____________

Date: ____________

**Kurt R. Buckle, B.S. Vice-President, Laboratory Director Midway Laboratory, Inc**

## *Laboratory Report*

*ELAP Cert. 1396A*

### *Geochemical Water Analysis*

| | | | |
|---|---|---|---|
| *Customer:* | Chevron Corporation | *Log # :* | 16989-1 |
| *Address:* | 9525 Camino Media | *Date in:* | 9/10/09 |
| | Bakersfield, CA 93311 | *Date out:* | 9/15/09 |
| *Attention:* | Ray Franze, Carla S | | |
| *Sample Description:* | Sec. 25 1001 | | Rev 10-3-08 |

| Anions | mg/L | meq/L | Method #. | PQL(mg/L) | Calculations | Results | Units | Method # | PQL(mg/L) |
|---|---|---|---|---|---|---|---|---|---|
| Bicarbonate, $HCO_3$ | 144.4 | 2.37 | SM2320 B | 0.20 | Alkalinity, as $CaCO_3$ (Total) | 130.4 | mg/l | SM 3320 B | 0.10 |
| Carbonate, $CO_3$ | 7.46 | 0.25 | SM2320 B | 0.20 | Hardness, as $CaCO_3$ (Total) | 14.9 | mg/l | SM 2340 B | 0.10 |
| Chloride, Cl | 107.0 | 3.02 | EPA 300.0 | 0.01 | Salinity, as NaCl | 193.3 | mg/l | (Calc.) | 1.00 |
| Hydroxide, OH | 0.00 | 0.00 | SM2320 B | 0.20 | *Calcium Carbonate* | | | | |
| Nitrate, $NO_3$ | 0.00 | 0.00 | EPA 300.0 | 0.01 | Stability Index (Stiff Davis) | -0.31 | (Notes) | SM 2230 B | N.A. |
| Sulfate, $SO_4$ | 1.60 | 0.03 | EPA 300.0 | 0.02 | Langelier Saturation Index | -0.22 | (Notes) | SM 203 | N.A. |

| Cations | mg/L | meq/L | Method #. | PQL(mg/L) | Physical Data | Results | | Method # | PQL |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia, $NH_2$ | 0.00 | 0.00 | EPA 200.7 | 0.01 | | | | | |
| Arsenic, As | 0.00 | NA | ASTM D 6919 | 0.50 | | | | | |
| Barium, Ba | 0.00 | 0.00 | EPA 200.7 | 0.05 | Conductivity (Measured) | 557.0 | μmho's | SM 2510 B | 0.100 |
| Boron, B | 0.18 | 0.05 | EPA 200.7 | 0.10 | Resistivity | 17.9533 | ohm's | (Calc.) | 0.0005 |
| Calcium, Ca | 5.47 | 0.27 | EPA 200.7 | 0.05 | Specific Gravity (60/60) | 0.9983 | units | API RP 45 | 0.0005 |
| Iron, Fe | 0.00 | 0.00 | EPA 200.7 | 0.10 | Ionic strength | 0.006 | IS (μ) | (Calc.) | 0.001 |
| Magnesiumn, Mg | 0.29 | 0.02 | EPA 200.7 | 0.05 | pH | 8.63 | units | SM 4500 H B | ± 0.01 |
| Potassium, K | 0.72 | 0.02 | EPA 200.7 | 0.50 | Temperature | 68.0 | °F | SM 2550 B | ± 0.1 |
| Sodium, Na | 120 | 5.22 | EPA 200.7 | 5.00 | Total Diss. Solids (TDS)* | 387.1 | mg/L | (Calc.) | 0.1 |
| Strontium, Sr | 0.00 | 0.00 | EPA 200.7 | 0.01 | Total Susp. Solids (TSS) | NA | mg/L | SM 2540 D | 5.0 |

| Other | mg/L | meq/L | Method | QC | Results | | Range | Limits |
|---|---|---|---|---|---|---|---|---|
| | | | | Meas EC - Calc EC | 0.9 | | (0.9-1.1 ) EC | |
| Silica, as $SiO_2$ | 21.8 | N.A. | SM 3500-SI B | TDS - EC Ratio | 0.70 | | (0.55-0.70) | >2500 TDS |
| Sodium, Na (Calc.) | 120.1 | 5.23 | API RP-45 2.10 | Measured EC - Ion Sum | 1.0 | Cation | (0.9-1.1) EC | |
| | | | | | 1.0 | Anion | (0.9-1.1) EC | |

***Notes***

PQL - Praactical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of precision and accuracy of the analytical methodology.

N.D. - Not Detected (below PQL)

TDS* - Cation and anion summation

N.A. - Not applicable to report

QC____________Date____________

***Calcium Carbonate Stability Index***

(+) =CaCO3 will tend to precipitate

(-) = CaCO3 will tend to dissolve

(±) = CaCO3 is at equilibrium

***References:***

1. APHA-AWWA; "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM, "Water." 1983 American Society for Testing and Material Vol11 01-02
3. EPA,"Methods for Chemical Analysis of Water and Wastes," 1983 EPA-600/4-79-020
4. API, "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Institute, API RP 45.
5. Patton, C.C.; "Applied Water Technology," 1986 C. C. Patton & Associates, Campbell Petroleum Series.


Kurt R. Buckle
Laboratory Director
Midway Laboratory, Inc.

________________Date____________

# *Laboratory Report*

**ELAP Cert. 1396A**

## *Geo-Chemical Water Analysis*

Rev 12-16-09

| | | | |
|---|---|---|---|
| ***Customer:*** | Chevron Corporation | **Log # :** | 17433-1 |
| ***Address:*** | 9525 Camino Media | **Date In:** | 12/3/09 |
| | Bakersfield, CA 93311 | **Date Completed:** | 12/7/09 |
| ***Attention:*** | Ray Franze, Carla Semprun | **Date Reported:** | 12/14/09 |
| ***Sample Description:*** | **Sec. 25 1001** | | |

| Anions | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Bicarbonate, $HCO_3^{-1}$ | 204.3 | . | 3.35 | SM2320 B | 0.20 |
| Carbonate, $CO_3^{-1}$ | 2.5 | . | 0.08 | SM2320 B | 0.20 |
| Chloride, $Cl^{-1}$ | 49.0 | . | 1.38 | SM4500-Cl$^{-1}$ | 0.05 |
| Hydroxide, $OH^{-1}$ | 0.0 | . | 0.00 | SM2320 B | 0.20 |
| Sulfate, $SO_4^{-2}$ | 0.8 | . | 0.02 | SM4500-SO4$^{-2}$ | 1.0 |
| Sulfide, $S^{-1}$ | 0.0 | X | 0.00 | SM4500-S$^{-2}$ | 1.0 |
| Sulfite, $SO_3^{-2}$ | 0.0 | X | 0.00 | SM4500-SO3$^{-2}$ | 1.0 |

| Calculations | Results | Units | Method # | PQL |
|---|---|---|---|---|
| Alkalinity, as CaCO3 (Total) | 167.5 | mg/l | SM 2320 B | NA |
| as CaCO3 (less Org. Alk.) | 167.5 | mg/l | SM 2320 B | NA |
| Hardness, as CaCO3 (Calc.) | 12.7 | mg/l | SM 2340 B | NA |
| Salinity, calc. Na+Cl | 282.3 | mg/l | (Calc.) | NA |
| Salinity, from Chlorosity | 88.5 | mg/l | (Calc.) | NA |
| ***Calcium Carbonate*** | | | | |
| Stability Index (Langlier) | -0.43 | (Notes) | SM 2330 B | NA |
| Stability Index (Stiff Davis) | -0.52 | NA | Ref. 4 | NA |

| Cations | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Ammonium, $NH4^{+1}$ | 0.00 | X | 0.00 | ASTM D 6919 | 0.10 |
| Barium, $Ba^{+2}$ | 0.00 | X | 0.00 | EPA 200.7 | 0.05 |
| Boron, $B^{+3}$ | 0.12 | . | 0.03 | EPA 200.7 | 0.10 |
| Calcium, $Ca^{+2}$ | 4.65 | . | 0.23 | EPA 200.7 | 0.05 |
| Iron, $Fe^{+3}$ | 0.00 | X | 0.00 | EPA 200.7 | 0.10 |
| Magnesium, $Mg^{+2}$ | 0.27 | . | 0.02 | EPA 200.7 | 0.05 |
| Potassium, $K^{+1}$ | 0.59 | . | 0.02 | EPA 200.7 | 0.50 |
| Sodium, $Na^{+1}$ | 104.2 | . | 4.53 | EPA 200.7 | 5.00 |
| Strontium, $Sr^{+2}$ | 0.00 | X | 0.00 | EPA 200.7 | 0.10 |

| Physical Data | Results | Units | Method # | PQL |
|---|---|---|---|---|
| Conductivity (Measured) | 525.0 | μmho's | SM 2510 B | 1000 |
| Resistivity | 19.048 | ohm's | (Calc.) | NA |
| Specific Gravity (60/60) | 1.0006 | units | API RP 45 | ±0.0001 |
| Ionic strength | 0.01 | IS (μ) | (Calc.) | NA |
| pH | 8.38 | units | SM 4500 H B | ± 0.01 |
| Temperature | 68.0 | °F | SM 2550 B | ± 0.2 |
| Total Diss. Solids (TDS)* | 366.4 | mg/L | (An-Cat Sum.) | NA |
| Total Diss. Solids @ 180 °c | NA | mg/L | Chevron | NA |

| Other | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Arsenic, As | 0.000 | . | 0.00 | EPA 200.7 | 0.002 |
| Silica, as SiO2 | 21.8 | . | 3.13 | EPA 200.7 | 0.10 |
| Sodium, $Na^{+1}$ (Calc.) | 104.2 | | 4.53 | API RP 45 | NA |
| Chloride, $Cl^{-1}$ (Calc.) | 49.3 | | 1.39 | API RP 45 | NA |
| Organic Alkalinity | 0.0 | X | 0.00 | Chevron Calc. | NA |

| QC (Quality Control) | Results | | Criteria | Limits |
|---|---|---|---|---|
| Meas EC - Calc EC = | 1.1 | *Note | (0.9 - 1.1 ) EC | >2500 |
| TDS - EC Ratio = | 0.70 | **Note | (0.55 - 0.70) | >2500 |
| Measured EC - Ion Sum = | 0.9 | Cation | (0.9 - 1.1) EC | |
| | 0.9 | Anion | (0.9 - 1.1) EC | |
| Calc. Na - Actual Na = | 1.00 | Na/Na | (0.98 - 1.02) | |
| NaCl/(NaCl Calc.) = | 1.00 | Na:Cl | (0.98 - 1.02) | |

**QC - Anion - Cation Balance Criteria**

| Anion Sum meq/L | meq/L SUM | Acceptable % Difference |
|---|---|---|
| 0 - 3.0 | NA | ± 0.2 meq |
| 3.0 - 10.0 | NA | ± 2 % |
| 10.0 - 800 | 10 | ± 2 - 5 % |
| Anion - Cation Balance = | 0.1 | % |

**Notes:**

MDL - Method Detection Limit

PQL - Practical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of precision and accuracy of the analytical methodology (5X MDL).

N.D. - Not Detected (below PQL)

TDS* - Cation and anion sum.

NA - Not applicable to report.

Σ = Sum

** Dissociated ions may elevate this value ($Ca^{+2}$, $SO4^{-2}$ etc.)

X = Not Analyzed for

***Calcium Carbonate***

***Stability Index***

(+) =CaCO3 will tend to precipitate.

(-) = CaCO3 will tend to dissolve.

(±) = CaCO3 is at equilibrium.

**Comments:**


**References:**

1. APHA-AWWA; "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM; "Water," 2007 American Society for Testing and Material Vol. 11.01-02
3. EPA;"Methods for Chemical Analysis of Water and Waste," 1983 EPA-600/4-73-020
4. API; "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Institute, API RP 45.
5. Patton, C.C.; "Applied Water Technology," 1986 Campbell Petroleum Series.


**The Quality of the Analysis is Only as Good as the Quality of the Sample**

QC ____________ Date ____________

Date: ____________

**Laboratory Director** **Midway Laboratory, Inc**

## *Laboratory Report*

ELAP Cert. 1398A

### *Geo-Chemical Water Analysis*

Rev 12-16-09

| | | | |
|---|---|---|---|
| ***Customer:*** | Chevron Corporation | Log # : | 17630-8 |
| ***Address:*** | 9525 Camino Media | Date In: | 1/14/10 |
| | Bakersfield, CA 93311 | Date Completed: | 1/20/10 |
| ***Attention:*** | Ray Franze, Carla Semprun | Date Reported: | 1/21/10 |
| ***Sample Description:*** | Sec. 26 1001 | | |

| Anions | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Bicarbonate, $HCO_3^{-1}$ | 142.0 | . | 2.32 | SM2320 B | 0.20 |
| Carbonate, $CO_3^{-1}$ | 3.7 | . | 0.12 | SM2320 B | 0.20 |
| Chloride, $Cl^{-1}$ | 119 | . | 3.36 | SM4500-Cl⁻¹ | 0.05 |
| Hydroxide, $OH^{-1}$ | 0.0 | . | 0.00 | SM2320 B | 0.20 |
| Sulfate, $SO_4^{-2}$ | 0.8 | . | 0.02 | SM4500-SO4⁻² | 1.0 |
| Sulfide, $S^{-1}$ | 0.0 | X | 0.00 | SM4500-S⁻² | 1.0 |
| Sulfite, $SO_3^{-2}$ | 0.0 | X | 0.00 | SM4500-SO3⁻² | 1.0 |

| Calculations | Results | Units | Method # | PQL |
|---|---|---|---|---|
| Alkalinity, as CaCO3 (Total) | 116.4 | mg/l | SM 2320 B | NA |
| as CaCO3 (less Org. Alk.) | 116.4 | mg/l | SM 2320 B | NA |
| Hardness, as CaCO3 (Calc.) | 14.5 | mg/l | SM 2340 B | NA |
| Salinity, calc. Na+Cl | 322.3 | mg/l | (Calc.) | NA |
| Salinity, from Chlorosity | 215.0 | mg/l | (Calc.) | NA |
| ***Calcium Carbonate*** | | | | |
| Stability Index (Langlier) | -0.52 | (Notes) | SM 2330 B | NA |
| Stability Index (Stiff Davis) | -0.61 | NA | Ref. 4 | NA |

| Cations | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Ammonium, $NH_4^{+1}$ | 0.00 | X | 0.00 | ASTM D 6919 | 0.10 |
| Barium, $Ba^{+2}$ | 0.00 | . | 0.00 | EPA 200.7 | 0.05 |
| Boron, $B^{+3}$ | 0.12 | . | 0.03 | EPA 200.7 | 0.10 |
| Calcium, $Ca^{+2}$ | 5.30 | . | 0.26 | EPA 200.7 | 0.05 |
| Iron, $Fe^{+3}$ | 0.00 | . | 0.00 | EPA 200.7 | 0.10 |
| Magnesium, $Mg^{+2}$ | 0.30 | . | 0.02 | EPA 200.7 | 0.05 |
| Potassium, $K^{+1}$ | 0.67 | . | 0.02 | EPA 200.7 | 0.50 |
| Sodium, $Na^{+1}$ | 108 | . | 4.70 | EPA 200.7 | 5.00 |
| Strontium, $Sr^{+2}$ | 0.00 | X | 0.00 | EPA 200.7 | 0.10 |

| Physical Data | Results | Units | Method # | PQL |
|---|---|---|---|---|
| Conductivity (Measured) | 543.0 | µmho's | SM 2510 B | 1000 |
| Resistivity | 18.416 | ohm's | (Calc.) | NA |
| Specific Gravity (60/60) | 1.0005 | units | API RP 45 | ±0.0001 |
| Ionic strength | 0.01 | IS (µ) | (Calc.) | NA |
| pH | 8.39 | units | SM 4500 H B | ± 0.01 |
| Temperature | 68.0 | °F | SM 2550 B | ± 0.2 |
| Total Diss. Solids (TDS)* | 379.9 | mg/L | (An-Cat Sum.) | NA |
| Total Diss. Solids @ 180 °c | NA | mg/L | Chevron | NA |

| Other | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Arsenic, As | 0.391 | . | 0.02 | EPA 200.7 | 0.002 |
| Silica, as SiO2 | 21.4 | . | 3.08 | EPA 200.7 | 0.10 |
| Sodium, $Na^{+1}$ (Calc.) | 108.0 | | 4.70 | API RP 45 | NA |
| Chloride, $Cl^{-1}$ (Calc.) | 91.2 | | 2.57 | API RP 45 | NA |
| Organic Alkalinity | 0.0 | X | 0.00 | Chevron Calc. | NA |

| QC (Quality Control) | Results | | Criteria | Limits |
|---|---|---|---|---|
| Meas EC - Calc EC = | 1.0 | *Note | (0.9 - 1.1) EC | >2500 |
| TDS - EC Ratio = | 0.70 | **Note | (0.55 - 0.70) | >2500 |
| Measured EC - Ion Sum = | 0.9 | Cation | (0.9 - 1.1) EC | |
| | 1.1 | Anion | (0.9 - 1.1) EC | |
| Calc. Na - Actual Na = | 1.00 | Na/Na | (0.98 - 1.02) | |
| NaCl/(NaCl Calc.) = | 1.00 | Na:Cl | (0.98 - 1.02) | |

QC - Anion - Cation Balance Criteria

| Anion Sum meq/l | meq/L SUM | Acceptable % Difference |
|---|---|---|
| 0 - 3.0 | NA | ± 0.2 meq |
| 3.0 - 10.0 | NA | ± 2 % |
| 10.0 - 800 | 11 | ± 2 - 5 % |
| Anion - Cation Balance = | -7.2 | % |

**Notes:**

MDL - Method Detection Limit .

PQL - Practical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of precision and accuracy of the analytical methodology (5X MDL).

N.D. - Not Detected (below PQL)

TDS* - Cation and anion sum.

NA - Not applicable to report.

Σ = Sum

** Dissociated ions may elevate this value ($Ca^{+2}$, $SO4^{-2}$ etc.)

X = Not Analyzed for

***Calcium Carbonate***

***Stability Index***

(+) =CaCO3 will tend to precipitate.

(-) = CaCO3 will tend to dissolve.

(±) = CaCO3 is at equilibrium.

**Comments:**


**References:**

1. APHA-AWWA; "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM; "Water," 2007 American Society for Testing and Material Vol. 11.01-02
3. EPA;"Methods for Chemical Analysis of Water and Waste," 1983 EPA-600/4-73-020
4. API; "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Insitute, API RP 45.
5. Patton, C.C., "Applied Water Technology," 1986 Campbell Petroleum Series.


The Quality of the Analysis is Only as Good as the Quality of the Sample

QC ____________ Date ____________

Date: ____________

Laboratory Director    Midway Laboratory, Inc

# Laboratory Report

ELAP Cert. 1396A

## Geochemical Water Analysis

| | | | |
|---|---|---|---|
| **Customer:** | Chevron Corporation | **Log # :** | 16958-3 |
| **Address:** | 9525 Camino Media | **Date in:** | 9/3/09 |
| | Bakersfield, CA 93311 | **Date out:** | 9/14/09 |
| **Attention:** | Ray Franze, Carla S | | |
| **Sample Description:** | SJ 1002 | | Rev 10-3-08 |

| Anions | mg/L | meq/L | Method #. | PQL(mg/L) | Calculations | Results | Units | Method # | PQL(mg/L) |
|---|---|---|---|---|---|---|---|---|---|
| Bicarbonate, $HCO_3$ | 88.1 | 1.44 | SM2320 B | 0.20 | Alkalinity, as $CaCO_3$ (Total) | 72.2 | mg/l | SM 3320 B | 0.10 |
| Carbonate, $CO_3$ | 0.00 | 0.00 | SM2320 B | 0.20 | Hardness, as $CaCO_3$ (Total) | 13.9 | mg/l | SM 2340 B | 0.10 |
| Chloride, Cl | 40.0 | 1.13 | EPA 300.0 | 0.01 | Salinity, as NaCl | 72.3 | mg/l | (Calc.) | 1.00 |
| Hydroxide, OH | 0.00 | 0.00 | SM2320 B | 0.20 | *Calcium Carbonate* | | | | |
| Nitrate, NO3 | 0.00 | 0.00 | EPA 300.0 | 0.01 | Stability Index (Stiff Davis) | -1.56 | (Notes) | SM 2230 B | N.A. |
| Sulfate, $SO_4$ | 3.60 | 0.07 | EPA 300.0 | 0.02 | Langelier Saturation Index | -1.48 | (Notes) | SM 203 | N.A. |

| Cations | mg/L | meq/L | Method #. | PQL(mg/L) | Physical Data | Results | | Method # | PQL |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia, NH2 | 0.00 | 0.00 | EPA 200.7 | 0.01 | | | | | |
| Arsenic, As | 0.00 | NA | ASTM D 6919 | 0.500 | | | | | |
| Barium, Ba | 0.00 | 0.00 | EPA 200.7 | 0.05 | Conductivity (Measured) | 260.0 | µmho's | SM 2510 B | 0.100 |
| Boron, B | 0.17 | 0.05 | EPA 200.7 | 0.10 | Resistivity | 38.4615 | ohm's | (Calc.) | 0.0005 |
| Calcium, Ca | 4.84 | 0.24 | EPA 200.7 | 0.05 | Specific Gravity (60/60) | 0.9976 | units | API RP 45 | 0.0005 |
| Iron, Fe | 0.08 | 0.00 | EPA 200.7 | 0.10 | Ionic strength | 0.003 | IS (µ) | (Calc.) | 0.001 |
| Magnesiumn, Mg | 0.43 | 0.04 | EPA 200.7 | 0.05 | pH | 7.68 | units | SM 4500 H B | ± 0.01 |
| Potassium, K | 0.62 | 0.02 | EPA 200.7 | 0.50 | Temperature | 68.0 | °F | SM 2550 B | ± 0.1 |
| Sodium, Na | 43.4 | 1.89 | EPA 200.7 | 5.00 | Total Diss. Solids (TDS)* | 181.2 | mg/L | (Calc.) | 0.1 |
| Strontium, Sr | 0.00 | 0.00 | EPA 200.7 | 0.01 | Total Susp. Solids (TSS) | NA | mg/L | SM 2540 D | 5.0 |

| Other | | | | QC | Results | | Range | Limits |
|---|---|---|---|---|---|---|---|---|
| | | | | Meas EC - Calc EC | 1.0 | | (0.9-1.1 ) EC | |
| Silica, as $SiO_2$ | 27.0 | N.A. | SM 3500-SI B | TDS - EC Ratio | 0.70 | | (0.55-0.70) | >2500 TDS |
| Sodium, Na (Calc.) | 43.8 | 1.91 | API RP-45 2.10 | Measured EC - Ion Sum | 0.9 | Cation | (0.9-1.1) EC | |
| | | | | | 1.0 | Anion | (0.9-1.1) EC | |

***Notes***

PQL - Praactical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of prcision and accuracy of the analytical methodology.

N.D. - Not Detected (below PQL)

TDS* - Cation and anion summation.

N.A. - Not applicable to report.

QC____________Date____________

*Calcium Carbonate Stability Index*

(+) =CaCO3 will tend to precipitate

(-) = CaCO3 will tend to dissolve.

(±) = CaCO3 is at equilibrium

***References:***


1. APHA-AWWA, "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM, "Water," 1983 American Society for Testing and Material Vol11 01-02
3. EPA,"Methods for Chemical Analysis of Water and Wastes," 1983 EPA-600/4-79-020
4. API, "Analysis of Oil-Field Waters," 1981 2nd Ed. American Petroleum Institute, API RP 45.
5. Patton, C.C.; "Applied Water Technology," 1986 C. C. Patton & Associates, Campbell Petroleum Series


Kurt R. Buckle
Laboratory Director
Midway Laboratory, Inc.

____________________Date____________

# Laboratory Report

ELAP Cert. 1398A

## Geochemical Water Analysis

**Customer:** Chevron Corporation
**Address:** 9525 Camino Media
Bakersfield, CA 93311
**Attention:** Ray Franze, Carla S
**Sample Description:** SJ 1002

**Log #:** 17104-7
**Date In:** 10/1/09
**Date out:** 10/13/09

Rev 10-3-08

| Anions | mg/L | meq/L | Method #. | PQL(mg/L) | Calculations | Results | Units | Method # | PQL(mg/L) |
|---|---|---|---|---|---|---|---|---|---|
| Bicarbonate, $HCO_3$ | 74.6 | 1.22 | SM2320 B | 0.20 | Alkalinity, as $CaCO_3$ (Total) | 61.1 | mg/l | SM 2320 B | 0.10 |
| Carbonate, $CO_3$ | 0.00 | 0.00 | SM2320 B | 0.20 | Hardness, as $CaCO_3$ (Total) | 19.2 | mg/l | SM 2340 B | 0.10 |
| Chloride, Cl | 41.4 | 1.17 | EPA 300.0 | 0.01 | Salinity, as NaCl | 74.8 | mg/l | (Calc.) | 1.00 |
| Hydroxide, OH | 0.00 | 0.00 | SM2320 B | 0.20 | *Calcium Carbonate* | | | | |
| Nitrate, NO3 | 0.00 | 0.00 | EPA 300.0 | 0.01 | Stability Index (Stiff Davis) | -1.25 | (Notes) | SM 2230 B | N.A. |
| Sulfate, $SO_4$ | 9.00 | 0.19 | EPA 300.0 | 0.02 | Langelier Saturation Index | -1.17 | (Notes) | SM 203 | N.A. |

| Cations | mg/L | meq/L | Method #. | PQL(mg/L) | Physical Data | Results | | Method # | PQL |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia, NH2 | 0.00 | 0.00 | EPA 200.7 | 0.01 | | | | | |
| Arsenic, As | 0.00 | NA | ASTM D 6919 | 0.10 | | | | | |
| Barium, Ba | 0.00 | 0.00 | EPA 200.7 | 0.05 | Conductivity (Measured) | 275.0 | µmho's | SM 2510 B | 0.100 |
| Boron, B | 0.10 | 0.03 | EPA 200.7 | 0.10 | Resistivity | 36.3636 | ohm's | (Calc.) | 0.0005 |
| Calcium, Ca | 6.57 | 0.33 | EPA 200.7 | 0.05 | Specific Gravity (60/60) | 1.0000 | units | API RP 45 | 0.0005 |
| Iron, Fe | 0.13 | 0.01 | EPA 200.7 | 0.10 | Ionic strength | 0.003 | IS (µ) | (Calc.) | 0.001 |
| Magnesiumn, Mg | 0.67 | 0.05 | EPA 200.7 | 0.05 | pH | 7.93 | units | SM 4500 H B | ± 0.01 |
| Potassium, K | 0.83 | 0.02 | EPA 200.7 | 0.50 | Temperature | 68.0 | °F | SM 2550 B | ± 0.1 |
| Sodium, Na | 45.2 | 1.97 | EPA 200.7 | 5.00 | Total Diss. Solids (TDS)* | 178.5 | mg/L | (Calc.) | 0.1 |
| Strontium, Sr | 0.00 | 0.00 | EPA 200.7 | 0.01 | Total Susp. Solids (TSS) | NA | mg/L | SM 2540 D | 5.0 |

| Other | mg/L | meq/L | Method #. | PQL(mg/L) | QC | Results | | Range | Limits |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Meas EC - Calc EC | 1.0 | | (0.9-1.1) EC | |
| Silica, as $SiO_2$ | 30.2 | N.A. | SM 3500-SI B | | TDS - EC Ratio | 0.65 | | (0.55-0.70) | >2500 TDS |
| Sodium, Na (Calc.) | 45.4 | 1.97 | API RP-45 | 2.10 | Measured EC - Ion Sum | 0.9 | Cation | (0.9-1.1) EC | |
| | | | | | | 0.9 | Anion | (0.9-1.1) EC | |

**Notes**

PQL - Praactical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of precision and accuracy of the analytical methodology.
N.D. - Not Detected (below PQL)
TDS* - Cation and anion summation.
N.A. - Not applicable to report.

*Calcium Carbonate*
*Stability Index*
(+) =CaCO3 will tend to precipitate
(-) = CaCO3 will tend to dissolve
(±) = CaCO3 is at equilibrium

QC____________Date____________


***References:***

1. APHA-AWWA, "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM, "Water," 1983 American Society for Testing and Material Vol11 01-02
3. EPA,"Methods for Chemical Analysis of Water and Wastes," 1983 EPA-600/4-79-020
4. API, "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Institute, API RP 45.
5. Patton, C.C., "Applied Water Technology," 1986 C. C. Patton & Associates, Campbell Petroleum Series.


Kurt R. Buckle
Laboratory Director
Midway Laboratory, Inc.

____________________Date__________

## *Laboratory Report*

*ELAP Cert. 1398A*

### *Geochemical Water Analysis*

| | | | | |
|---|---|---|---|---|
| *Customer:* | Chevron Corporation | | *Log # :* | 17288-6 |
| *Address:* | 9525 Camino Media | | *Date In:* | 11/5/09 |
| | Bakersfield, CA 93311 | | *Date out:* | 11/18/09 |
| *Attention:* | Ray Franze, Carla S | | | |
| *Sample Description:* | SJ 1002 | | | Rev 10-3-08 |

| Anions | mg/L | meq/L | Method #. | PQL(mg/L) | Calculations | Results | Units | Method # | PQL(mg/L) |
|---|---|---|---|---|---|---|---|---|---|
| Bicarbonate, $HCO_3$ | 77 | 1.26 | SM2320 B | 0.20 | Alkalinity, as $CaCO_3$ (Total) | 63.2 | mg/l | SM 2320 B | 0.10 |
| Carbonate, $CO_3$ | 0.00 | 0.00 | SM2320 B | 0.20 | Hardness, as $CaCO_3$ (Total) | 18.3 | mg/l | SM 2340 B | 0.10 |
| Chloride, Cl | 42 | 1.19 | EPA 300.0 | 0.01 | Salinity, as NaCl | 76.1 | mg/l | (Calc.) | 1.00 |
| Hydroxide, OH | 0.00 | 0.00 | SM2320 B | 0.20 | ***Calcium Carbonate*** | | | | |
| Nitrate, NO3 | 0.00 | 0.00 | EPA 300.0 | 0.01 | Stability Index (Stiff Davis) | -1.31 | (Notes) | SM 2230 B | N.A. |
| Sulfate, $SO_4$ | 4.30 | 0.09 | EPA 300.0 | 0.02 | Langelier Saturation Index | -1.23 | (Notes) | SM 203 | N.A. |

| Cations | mg/L | meq/L | Method #. | PQL(mg/L) | Physical Data | Results | | Method # | PQL |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia, NH2 | 0.00 | 0.00 | EPA 200.7 | 0.01 | | | | | |
| Arsenic, As | 0.000 | 0.00 | ASTM D 6919 | 0.002 | | | | | |
| Barium, Ba | 0.00 | 0.00 | EPA 200.7 | 0.05 | Conductivity (Measured) | 240.0 | µmho's | SM 2510 B | 0.100 |
| Boron, B | 0.11 | 0.03 | EPA 200.7 | 0.10 | Resistivity | 41.6667 | ohm's | (Calc.) | 0.0005 |
| Calcium, Ca | 6.40 | 0.32 | EPA 200.7 | 0.05 | Specific Gravity (60/60) | 1.0001 | units | API RP 45 | 0.0005 |
| Iron, Fe | 0.14 | 0.01 | EPA 200.7 | 0.10 | Ionic strength | 0.003 | IS (µ) | (Calc.) | 0.001 |
| Magnesiumn, Mg | 0.56 | 0.05 | EPA 200.7 | 0.05 | pH | 7.87 | units | SM 4500 H B | ± 0.01 |
| Potassium, K | 0.62 | 0.02 | EPA 200.7 | 0.50 | Temperature | 68.0 | °F | SM 2550 B | ± 0.1 |
| Sodium, Na | 37.4 | 1.63 | EPA 200.7 | 5.00 | Total Diss. Solids (TDS)* | 168.7 | mg/L | (Calc.) | 0.1 |
| Strontium, Sr | 0.00 | 0.00 | EPA 200.7 | 0.01 | Total Susp. Solids (TSS) | NA | mg/L | SM 2540 D | 5.0 |

| Other | | | | | QC | Results | | Range | Limits |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Meas EC - Calc EC | 0.9 | | (0.9-1.1 ) EC | |
| Silica, as $SiO_2$ | 29.9 | N.A. | SM 3500-Si B | | TDS - EC Ratio | 0.70 | | (0.55-0.70) | >2500 TDS |
| Sodium, Na (Calc.) | 38 | 1.65 | API RP-45 | 2.10 | Measured EC - Ion Sum | 0.9 | Cation | (0.9-1.1) EC | |
| | | | | | | 1.1 | Anion | (0.9-1.1) EC | |

***Notes***

PQL - Practical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of precision and accuracy of the analytical methodology.

N.D. - Not Detected (below PQL)

TDS* - Cation and anion summation.

N.A. - Not applicable to report.

QC____________Date____________

***Calcium Carbonate***

***Stability Index***

(+) =CaCO3 will tend to precipitate

(-) = CaCO3 will tend to dissolve

(±) = CaCO3 is at equilibrium

***References:***


1. APHA-AWWA; "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM; "Water," 1983 American Society for Testing and Material Vol11 01-02
3. EPA;"Methods for Chemical Analysis of Water and Wastes," 1983 EPA-600/4-79-020
4. API; "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Institute, API RP 45.
5. Patton, C.C.; "Applied Water Technology," 1986 C. C. Patton & Associates, Campbell Petroleum Series.


Laboratory Director

Midway Laboratory, Inc.

________________Date__________

## *Laboratory Report*

*ELAP Cert. 1396A*

### *Geochemical Water Analysis*

| | | | |
|---|---|---|---|
| *Customer:* | Chevron Corporation | *Log # :* | 16584-10 |
| *Address:* | 9525 Camino Media | *Date In:* | 6/18/09 |
| | Bakersfield, CA 93311 | *Date out:* | 6/22/09 |
| *Attention:* | Ray Franze, Carla S | | |
| *Sample Description:* | SJ 1003 | | Rev 10-3-08 |

| Anions | mg/L | meq/L | Method #. | PQL(mg/L) | Calculations | Results | Units | Method # | PQL(mg/L) |
|---|---|---|---|---|---|---|---|---|---|
| Bicarbonate, $HCO_3$ | 155.4 | 2.55 | SM2320 B | 0.20 | Alkalinity, as $CaCO_3$ (Total) | 127.4 | mg/l | SM 3320 B | 0.10 |
| Carbonate, $CO_3$ | 0.00 | 0.00 | SM2320 B | 0.20 | Hardness, as $CaCO_3$ (Total) | 92.0 | mg/l | SM 2340 B | 0.10 |
| Chloride, Cl | 106.0 | 2.99 | EPA 300.0 | 0.01 | Salinity, as NaCl | 191.5 | mg/l | (Calc.) | 1.00 |
| Hydroxide, OH | 0.00 | 0.00 | SM2320 B | 0.20 | ***Calcium Carbonate*** | | | | |
| Nitrate, NO3 | 0.00 | 0.00 | EPA 300.0 | 0.01 | Stability Index (Stiff Davis) | -0.20 | (Notes) | SM 2230 B | N.A. |
| Sulfate, $SO_4$ | 0.00 | 0.00 | EPA 300.0 | 0.02 | Langelier Saturation Index | -0.12 | (Notes) | SM 203 | N.A. |

| Cations | mg/L | meq/L | Method #. | PQL(mg/L) | Physical Data | Results | | Method # | PQL |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia, NH2 | 0.00 | 0.00 | EPA 200.7 | 0.01 | | | | | |
| Arsenic, As | 0.000 | NA | ASTM D 6919 | 0.005 | | | | | |
| Barium, Ba | 0.06 | 0.00 | EPA 200.7 | 0.01 | Conductivity (Measured) | 552.0 | µmho's | SM 2510 B | 0.100 |
| Boron, B | 0.22 | 0.06 | EPA 200.7 | 0.01 | Resistivity | 18.1159 | ohm's | (Calc.) | 0.0005 |
| Calcium, Ca | 31.00 | 1.55 | EPA 200.7 | 0.01 | Specific Gravity (60/60) | 0.9958 | units | API RP 45 | 0.0005 |
| Iron, Fe | 0.35 | 0.02 | EPA 200.7 | 0.01 | Ionic strength | 0.006 | IS (µ) | (Calc.) | 0.001 |
| Magnesiumn, Mg | 3.52 | 0.29 | EPA 200.7 | 0.01 | pH | 7.99 | units | SM 4500 H B | ± 0.01 |
| Potassium, K | 2.00 | 0.05 | EPA 200.7 | 0.01 | Temperature | 68.0 | °F | SM 2550 B | ± 0.1 |
| Sodium, Na | 71.9 | 3.13 | EPA 200.7 | 0.01 | Total Diss. Solids (TDS)* | 370.4 | mg/L | (Calc.) | 0.1 |
| Strontium, Sr | 0.00 | 0.00 | EPA 200.7 | 0.01 | Total Susp. Solids (TSS) | NA | mg/L | SM 2540 D | 5.0 |

| Other | | | | QC | Results | | Range | Limits |
|---|---|---|---|---|---|---|---|---|
| | | | | Meas EC - Calc EC | 0.9 | | (0.9-1.1 ) EC | |
| Silica, as $SiO_2$ | 44.9 | N.A. | SM 3500-Si B | TDS - EC Ratio | 0.67 | | (0.55-0.70) | >2500 TDS |
| Sodium, Na (Calc.) | 72.4 | 3.15 | API RP-45 2.10 | Measured EC - Ion Sum | 0.9 | Cation | (0.9-1.1) EC | |
| | | | | | 1.0 | Anion | (0.9-1.1) EC | |

***Notes***

PQL - Praactical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of prcision and accuracy of the analytical methodology.

N.D. - Not Detected (below PQL)

TDS* - Cation and anion summation.

N.A. - Not applicable to report.

***Calcium Carbonate Stability Index***

(+) =CaCO3 will tend to precipitate.

(-) = CaCO3 will tend to dissolve.

(±) = CaCO3 is at equilibrium.

QC____________Date____________


***References:***

1. APHA-AWWA; "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM; "Water," 1983 American Society for Testing and Material Vol11.01-02
3. EPA,"Methods for Chemical Analysis of Water and Wastes," 1983 EPA-600/4-79-020
4. API; "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Institute, API RP 45.
5. Patton, C.C.; "Applied Water Technology," 1986 C. C. Patton & Associates, Campbell Petroleum Series.


Kurt R. Buckle
Laboratory Director
Midway Laboratory, Inc.

________________Date__________

## *Laboratory Report*

ELAP Cert. 1396A — Rev 7-10-09

### *Geo-Chemical Water Analysis*

| | | | |
|---|---|---|---|
| ***Customer:*** | Chevron Corporation | **Log # :** | 16681-7 |
| ***Address:*** | 9525 Camino Media | **Date In:** | 7/9/09 |
| | Bakersfield, CA 93311 | **Date Completed:** | 7/14/09 |
| ***Attention:*** | Ray Franze | **Date Reported:** | 7/15/09 |
| ***Sample Description:*** | SJ 1003 | | |

| Anions | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Bicarbonate, $HCO_3^{-1}$ | 146.9 | . | 2.41 | SM2320 B | 0.20 |
| Bromide, Br | 0.0 | X | 0.00 | EPA 300.0 | 0.05 |
| Carbonate, $CO_3^{-1}$ | 0.0 | X | 0.00 | SM2320 B | 0.20 |
| Chloride, $Cl^{-1}$ | 295.0 | . | 8.32 | EPA 300.0 | 0.05 |
| Fluoride, $F^{-1}$ | 0.00 | X | 0.00 | EPA 300.0 | 0.20 |
| Hydroxide, $OH^{-1}$ | 0.0 | X | 0.00 | SM2320 B | 0.20 |
| Iodide, $I^{-1}$ (Iodine) | 0.0 | X | 0.00 | EPA 300.1 | 0.05 |
| Sulfate, $SO_4^{-2}$ | 0.00 | . | 0.00 | EPA 300.0 | 0.05 |
| Sulfide, $S^{-1}$ | 0.0 | X | 0.00 | SM4500-$S^{-2}$ | 1.00 |
| Sulfite, $SO_3^{-2}$ | 0.0 | X | 0.00 | SM4500-$SO3^{-2}$ | 1.00 |

| Calculations | Results | Units | Method # | PQL |
|---|---|---|---|---|
| Alkalinity, as CaCO3 (Total) | 120.4 | mg/l | SM 3320 B | NA |
| as CaCO3 (less Org. Alk.) | 120.4 | mg/l | SM 3320 B | NA |
| Hardness, as CaCO3 (Calc.) | 84.7 | mg/l | SM 2340 B | NA |
| Refractive Index | NA | NA | NA | NA |
| Salinity, as NaCl | 532.9 | mg/l | (Calc.) | 1.00 |
| ***Calcium Carbonate*** | | | | |
| Stability Index (Langlier) | -0.27 | (Notes) | SM 2230 B | NA |
| Stability Index (Stiff Davis) | -0.35 | NA | Ref. 4 | NA |

| Cations | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Ammonium, $NH4^{+1}$ | 0.00 | X | 0.00 | ASTM D 6919 | 0.10 |
| Barium, $Ba^{+2}$ | 0.05 | . | 0.00 | EPA 200.7 | 0.10 |
| Boron, $B^{+3}$ | 0.10 | . | 0.03 | EPA 200.7 | 0.02 |
| Calcium, $Ca^{+2}$ | 28.40 | . | 1.42 | EPA 200.7 | 0.05 |
| Iron, $Fe^{+3}$ | 0.23 | . | 0.01 | EPA 200.7 | 0.05 |
| Magnesiumn, $Mg^{+2}$ | 3.33 | . | 0.27 | EPA 200.7 | 0.10 |
| Manganese, $Mn^{+2}$ | 0.00 | X | 0.00 | EPA 200.7 | 0.05 |
| Potassium, $K^{+1}$ | 2.62 | . | 0.07 | EPA 200.7 | 0.10 |
| Sodium, $Na^{+1}$ | 74.6 | . | 3.24 | EPA 200.7 | 0.10 |
| Strontium, $Sr^{+2}$ | 0.00 | X | 0.00 | EPA 200.7 | 0.10 |
| Zinc, $Zn^{+2}$ | 0.00 | X | 0.00 | EPA 200.7 | 0.02 |

| Physical Data | Results | | Method # | PQL |
|---|---|---|---|---|
| Conductivity (Measured) | 990.0 | μmho's | SM 2510 B | 1000 |
| Resistivity | 10.101 | ohm's | (Calc.) | NA |
| Specific Gravity (60/60) | 1.0003 | units | API RP 45 | ±0.0001 |
| Ionic strength | 0.01 | IS (μ) | (Calc.) | NA |
| pH | 7.90 | units | SM 4500 H B | ± 0.01 |
| Temperature | 60.0 | °F | SM 2550 B | ± 0.2 |
| Total Diss. Solids (TDS)* | 551.2 | mg/L | (An-Cat Sum.) | NA |
| Total Diss. Solids @ 180 °c | NA | mg/L | Chevron | NA |

| Other | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Acetate | 0.0 | X | 0.0 | ASTM D 4327 | 1.00 |
| Formate | 0.0 | X | 0.0 | ASTM D 4327 | 1.00 |
| Propionate | 0.0 | X | 0.0 | ASTM D 4327 | 1.00 |
| Organic Alkalinity | 0 | X | 0.0 | Chevron Pub. | NA |
| Lithium, Li | 0.0 | X | 0.0 | EPA 200.7 | 0.02 |
| Silica, as SiO2 | 39.4 | . | 5.67 | EPA 200.7 | 0.01 |
| Sodium, $Na^{+1}$ (Calc.) | 74.6 | | 3.25 | API RP 45 | NA |

| QC (Quality Control) | Results | | Criteria | Limits |
|---|---|---|---|---|
| Meas EC - Calc EC = | 0.9 | *Note | (0.9 - 1.1) EC | >2500 |
| TDS - EC Ratio = | 0.56 | **Note | (0.55 - 0.70) | >2500 |
| Measured EC - Ion Sum = | 1.1 | Cation | (0.9 - 1.1) EC | |
| | 1.1 | Anion | (0.9 - 1.1) EC | |
| Calc. Na - Actual Na = | 1.00 | Na/Na | (0.98 - 1.02) | |
| NaCl/(NaCl Calc.) = | 1.00 | Na:Cl | (0.98 - 1.02) | |

**QC - Anion - Cation Balance Criteria**

| Anion Sum meq/L | meq/L SUM | Acceptable % Difference |
|---|---|---|
| 0 - 3.0 | NA | ± 0.2 meq |
| 3.0 - 10.0 | NA | ± 2 % |
| 10.0 - 800 | 21 | ± 2 - 5 % |
| Anion - Cation Balance = | 0.0 | % |

**Notes:**

MDL - Method Detection Limit .

PQL - Practical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of precision and accuracy of the analytical methodology (5X MDL).

N.D. - Not Detected (below PQL)

TDS* - Cation and anion sum..

NA - Not applicable to report.

∑ = Sum

** Dissociated ions may elevate this value ($Ca^{+2}$, $SO4^{-2}$ etc.)

X = Not Analyzed for

***Calcium Carbonate***

***Stability Index***

(+) =CaCO3 will tend to precipitate.

(-) = CaCO3 will tend to dissolve.

(±) = CaCO3 is at equilibrium.

**Comments:**


**References:**

1. APHA-AWWA; "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM; "Water," 2007 American Society for Testing and Material Vol. 11.01-02
3. EPA;"Methods for Chemical Analysis of Water and Waste," 1983 EPA-600/4-73-020
4. API; "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Institute, API RP 45.
5. Patton, C.C.; "Applied Water Technology," 1986 Campbell Petroleum Series.


**The Quality of the Analysis is Only as Good as the Quality of the Sample**

QC ____________ Date ____________

Date: ____________

Kurt R. Buckle, B.S. Vice-President, Laboratory Director Midway Laboratory, Inc

## *Laboratory Report*

*ELAP Cert. 1398A*

### *Geochemical Water Analysis*

| | | | |
|---|---|---|---|
| ***Customer:*** | Chevron Corporation | ***Log # :*** | 16958-2 |
| ***Address:*** | 9525 Camino Media | ***Date In:*** | 9/3/09 |
| | Bakersfield, CA 93311 | ***Date out:*** | 9/14/09 |
| ***Attention:*** | Ray Franze, Carla S | | |
| ***Sample Description:*** | SJ 1003 | | Rev 10-3-08 |

| Anions | mg/L | meq/L | Method #. | PQL(mg/L) | Calculations | Results | Units | Method # | PQL(mg/L) |
|---|---|---|---|---|---|---|---|---|---|
| Bicarbonate, $HCO_3$ | 162.7 | 2.67 | SM2320 B | 0.20 | Alkalinity, as $CaCO_3$ (Total) | 133.4 | mg/l | SM 3320 B | 0.10 |
| Carbonate, $CO_3$ | 0.00 | 0.00 | SM2320 B | 0.20 | Hardness, as $CaCO_3$ (Total) | 98.7 | mg/l | SM 2340 B | 0.10 |
| Chloride, Cl | 109.0 | 3.07 | EPA 300.0 | 0.01 | Salinity, as NaCl | 196.9 | mg/l | (Calc.) | 1.00 |
| Hydroxide, OH | 0.00 | 0.00 | SM2320 B | 0.20 | ***Calcium Carbonate*** | | | | |
| Nitrate, NO3 | 0.00 | 0.00 | EPA 300.0 | 0.01 | Stability Index (Stiff Davis) | -0.33 | (Notes) | SM 2230 B | N.A. |
| Sulfate, $SO_4$ | 0.80 | 0.02 | EPA 300.0 | 0.02 | Langelier Saturation Index | -0.24 | (Notes) | SM 203 | N.A. |

| Cations | mg/L | meq/L | Method #. | PQL(mg/L) | Physical Data | Results | | Method # | PQL |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia, NH2 | 0.00 | 0.00 | EPA 200.7 | 0.01 | | | | | |
| Arsenic, As | 0.00 | NA | ASTM D 6919 | 0.500 | | | | | |
| Barium, Ba | 0.06 | 0.00 | EPA 200.7 | 0.05 | Conductivity (Measured) | 548.0 | µmho's | SM 2510 B | 0.100 |
| Boron, B | 0.20 | 0.05 | EPA 200.7 | 0.10 | Resistivity | 18.2482 | ohm's | (Calc.) | 0.0005 |
| Calcium, Ca | 33.4 | 1.67 | EPA 200.7 | 0.05 | Specific Gravity (60/60) | 0.9976 | units | API RP 45 | 0.0005 |
| Iron, Fe | 0.34 | 0.02 | EPA 200.7 | 0.10 | Ionic strength | 0.006 | IS (µ) | (Calc.) | 0.001 |
| Magnesiumn, Mg | 3.69 | 0.30 | EPA 200.7 | 0.05 | pH | 7.81 | units | SM 4500 H B | ± 0.01 |
| Potassium, K | 2.18 | 0.06 | EPA 200.7 | 0.50 | Temperature | 68.0 | °F | SM 2550 B | ± 0.1 |
| Sodium, Na | 73.5 | 3.20 | EPA 200.7 | 5.00 | Total Diss. Solids (TDS)* | 385.9 | mg/L | (Calc.) | 0.1 |
| Strontium, Sr | 0.00 | 0.00 | EPA 200.7 | 0.01 | Total Susp. Solids (TSS) | NA | mg/L | SM 2540 D | 5.0 |

| Other | | | | QC | Results | | Range | Limits |
|---|---|---|---|---|---|---|---|---|
| | | | | Meas EC - Calc EC | 0.9 | | (0.9-1.1 ) EC | |
| Silica, as $SiO_2$ | 43.6 | N.A. | SM 3500-Si B | TDS - EC Ratio | 0.70 | | (0.55-0.70) | >2500 TDS |
| Sodium, Na (Calc.) | 74.0 | 3.22 | API RP-45 2.10 | Measured EC - Ion Sum | 1.0 | Cation | (0.9-1.1) EC | |
| | | | | | 1.1 | Anion | (0.9-1.1) EC | |

**Notes**

PQL - Practical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of precision and accuracy of the analytical methodology.

N.D. - Not Detected (below PQL)

TDS* - Cation and anion summation.

N.A. - Not applicable to report.

QC____________Date____________

***Calcium Carbonate***

***Stability Index***

(+) =CaCO3 will tend to precipitate.

(-) = CaCO3 will tend to dissolve.

(±) = CaCO3 is at equilibrium.


***References:***

1. APHA-AWWA, "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM, "Water," 1983 American Society for Testing and Material Vol11 01-02
3. EPA,"Methods for Chemical Analysis of Water and Wastes," 1983 EPA-600/4-79-020
4. API, "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Institute, API RP 45.
5. Patton, C.C., "Applied Water Technology," 1986 C. C. Patton & Associates, Campbell Petroleum Series.


Kurt R. Buckle
Laboratory Director
Midway Laboratory, Inc.

________________Date__________

# Laboratory Report

*ELAP Cert. 1396A*

## Geochemical Water Analysis

| | | | |
|---|---|---|---|
| **Customer:** | Chevron Corporation | **Log # :** | 17104-6 |
| **Address:** | 9525 Camino Media | **Date in:** | 10/1/09 |
| | Bakersfield, CA 93311 | **Date out:** | 10/13/09 |
| **Attention:** | Ray Franze, Carla S | | |
| **Sample Description:** | SJ 1003 | | Rev 10-3-08 |

| Anions | mg/L | meq/L | Method #. | PQL(mg/L) | Calculations | Results | Units | Method # | PQL(mg/L) |
|---|---|---|---|---|---|---|---|---|---|
| Bicarbonate, $HCO_3$ | 159.0 | 2.61 | SM2320 B | 0.20 | Alkalinity, as $CaCO_3$ (Total) | 130.3 | mg/l | SM 2320 B | 0.10 |
| Carbonate, $CO_3$ | 0.00 | 0.00 | SM2320 B | 0.20 | Hardness, as $CaCO_3$ (Total) | 90.2 | mg/l | SM 2340 B | 0.10 |
| Chloride, Cl | 106.0 | 2.99 | EPA 300.0 | 0.01 | Salinity, as NaCl | 191.5 | mg/l | (Calc.) | 1.00 |
| Hydroxide, OH | 0.00 | 0.00 | SM2320 B | 0.20 | *Calcium Carbonate* | | | | |
| Nitrate, NO3 | 0.00 | 0.00 | EPA 300.0 | 0.01 | Stability Index (Stiff Davis) | -0.12 | (Notes) | SM 2230 B | N.A. |
| Sulfate, $SO_4$ | 0.70 | 0.01 | EPA 300.0 | 0.02 | Langelier Saturation Index | -0.03 | (Notes) | SM 203 | N.A. |

| Cations | mg/L | meq/L | Method #. | PQL(mg/L) | Physical Data | Results | | Method # | PQL |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia, NH2 | 0.00 | 0.00 | EPA 200.7 | 0.01 | | | | | |
| Arsenic, As | 0.00 | NA | ASTM D 6919 | 0.10 | | | | | |
| Barium, Ba | 0.06 | 0.00 | EPA 200.7 | 0.05 | Conductivity (Measured) | 544.0 | µmho's | SM 2510 B | 0.100 |
| Boron, B | 0.14 | 0.04 | EPA 200.7 | 0.10 | Resistivity | 18.3824 | ohm's | (Calc.) | 0.0005 |
| Calcium, Ca | 29.9 | 1.49 | EPA 200.7 | 0.05 | Specific Gravity (60/60) | 1.0005 | units | API RP 45 | 0.0005 |
| Iron, Fe | 0.40 | 0.02 | EPA 200.7 | 0.10 | Ionic strength | 0.006 | IS (µ) | (Calc.) | 0.001 |
| Magnesiumn, Mg | 3.74 | 0.31 | EPA 200.7 | 0.05 | pH | 8.08 | units | SM 4500 H B | ± 0.01 |
| Potassium, K | 2.27 | 0.06 | EPA 200.7 | 0.50 | Temperature | 68.0 | °F | SM 2550 B | ± 0.1 |
| Sodium, Na | 75.4 | 3.28 | EPA 200.7 | 5.00 | Total Diss. Solids (TDS)* | 377.6 | mg/L | (Calc.) | 0.1 |
| Strontium, Sr | 0.00 | 0.00 | EPA 200.7 | 0.01 | Total Susp. Solids (TSS) | NA | mg/L | SM 2540 D | 5.0 |

| Other | | | | | QC | Results | | Range | Limits |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Meas EC - Calc EC | 0.9 | | (0.9-1.1 ) EC | |
| Silica, as $SiO_2$ | 44.9 | N.A. | SM 3500-Si B | | TDS - EC Ratio | 0.69 | | (0.55-0.70) | >2500 TDS |
| Sodium, Na (Calc.) | 75.8 | 3.30 | API RP-45 | 2.10 | Measured EC - Ion Sum | 1.0 | Cation | (0.9-1.1) EC | |
| | | | | | | 1.0 | Anion | (0.9-1.1) EC | |

**Notes**

PQL - Praactical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of prcision and accuracy of the analytical methodology.

N.D. - Not Detected (below PQL)

TDS* - Cation and anion summation.

N.A. - Not applicable to report.

*Calcium Carbonate*
*Stability Index*

(+) =CaCO3 will tend to precipitate.

(-) = CaCO3 will tend to dissolve.

(±) = CaCO3 is at equilibrium.

QC____________Date____________


*References:*

1. APHA-AWWA; "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM, "Water," 1983 American Society for Testing and Material Vol11 01-02
3. EPA,"Methods for Chemical Analysis of Water and Wastes," 1983 EPA-600/4-79-020
4. API, "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Insitute, API RP 45
5. Patton, C.C., "Applied Water Technology," 1986 C. C. Patton & Associates, Campbell Petroleum Series


Kurt R. Buckle
Laboratory Director
Midway Laboratory, Inc.

____________________Date__________

## Laboratory Report

ELAP Cert. 1396A

### Geochemical Water Analysis

| | | | |
|---|---|---|---|
| **Customer:** | Chevron Corporation | **Log # :** | 17288-5 |
| **Address:** | 9525 Camino Media | **Date In:** | 11/5/09 |
| | Bakersfield, CA 93311 | **Date out:** | 11/18/09 |
| **Attention:** | Ray Franze, Carla S | | |
| **Sample Description:** | SJ 1003 | | Rev 10-3-08 |

| Anions | mg/L | meq/L | Method #. | PQL(mg/L) | Calculations | Results | Units | Method # | PQL(mg/L) |
|---|---|---|---|---|---|---|---|---|---|
| Bicarbonate, $HCO_3$ | 166 | 2.73 | SM2320 B | 0.20 | Alkalinity, as $CaCO_3$ (Total) | 136.4 | mg/l | SM 2320 B | 0.10 |
| Carbonate, $CO_3$ | 0.00 | 0.00 | SM2320 B | 0.20 | Hardness, as $CaCO_3$ (Total) | 98.6 | mg/l | SM 2340 B | 0.10 |
| Chloride, Cl | 111 | 3.13 | EPA 300.0 | 0.01 | Salinity, as NaCl | 200.5 | mg/l | (Calc.) | 1.00 |
| Hydroxide, OH | 0.00 | 0.00 | SM2320 B | 0.20 | ***Calcium Carbonate*** | | | | |
| Nitrate, NO3 | 0.00 | 0.00 | EPA 300.0 | 0.01 | Stability Index (Stiff Davis) | -0.29 | (Notes) | SM 2230 B | N.A. |
| Sulfate, $SO_4$ | 0.30 | 0.01 | EPA 300.0 | 0.02 | Langelier Saturation Index | -0.21 | (Notes) | SM 203 | N.A. |

| Cations | mg/L | meq/L | Method #. | PQL(mg/L) | Physical Data | Results | | Method # | PQL |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia, NH2 | 0.00 | 0.00 | EPA 200.7 | 0.01 | | | | | |
| Arsenic, As | 0.007 | 0.00 | ASTM D 6919 | 0.002 | | | | | |
| Barium, Ba | 0.06 | 0.00 | EPA 200.7 | 0.05 | Conductivity (Measured) | 557.0 | µmho's | SM 2510 B | 0.100 |
| Boron, B | 0.15 | 0.04 | EPA 200.7 | 0.10 | Resistivity | 17.9533 | ohm's | (Calc.) | 0.0005 |
| Calcium, Ca | 33.1 | 1.65 | EPA 200.7 | 0.05 | Specific Gravity (60/60) | 0.9999 | units | API RP 45 | 0.0005 |
| Iron, Fe | 0.27 | 0.01 | EPA 200.7 | 0.10 | Ionic strength | 0.006 | IS (µ) | (Calc.) | 0.001 |
| Magnesiumn, Mg | 3.84 | 0.32 | EPA 200.7 | 0.05 | pH | 7.84 | units | SM 4500 H B | ± 0.01 |
| Potassium, K | 2.19 | 0.06 | EPA 200.7 | 0.50 | Temperature | 68.0 | °F | SM 2550 B | ± 0.1 |
| Sodium, Na | 69.2 | 3.01 | EPA 200.7 | 5.00 | Total Diss. Solids (TDS)* | 386.5 | mg/L | (Calc.) | 0.1 |
| Strontium, Sr | 0.00 | 0.00 | EPA 200.7 | 0.01 | Total Susp. Solids (TSS) | NA | mg/L | SM 2540 D | 5.0 |

| Other | mg/L | meq/L | Method #. | PQL | QC | Results | | Range | Limits |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Meas EC - Calc EC | 0.9 | | (0.9-1.1 ) EC | |
| Silica, as $SiO_2$ | 48.6 | N.A. | SM 3500-SI B | | TDS - EC Ratio | 0.69 | | (0.55-0.70) | >2500 TDS |
| Sodium, Na (Calc.) | 70 | 3.04 | API RP-45 | 2.10 | Measured EC - Ion Sum | 0.9 | Cation | (0.9-1.1) EC | |
| | | | | | | 1.1 | Anion | (0.9-1.1) EC | |

**Notes**

PQL - Praactical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of prcision and accuracy of the analytical methodology.

N.D. - Not Detected (below PQL)

TDS* - Cation and anion summation

N.A. - Not applicable to report.

QC____________Date____________

***Calcium Carbonate Stability Index***

(+) =CaCO3 will tend to precipitate.

(-) = CaCO3 will tend to dissolve.

(±) = CaCO3 is at equilibrium.


**References:**

1. APHA-AWWA; "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM; "Water," 1983 American Society for Testing and Material Vol11 01-02
3. EPA;"Methods for Chemical Analysis of Water and Wastes," 1983 EPA-600/4-79-020
4. API; "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Institute, API RP 45.
5. Patton, C.C. "Applied Water Technology," 1986 C. C. Patton & Associates, Campbell Petroleum Series.


Laboratory Director
Midway Laboratory, Inc.

________________Date__________

## *Laboratory Report*

ELAP Cert. 1386A

### *Geo-Chemical Water Analysis*

Rev 12-16-09

| | | | |
|---|---|---|---|
| ***Customer:*** | Chevron Corporation | Log # : | 17630-10 |
| ***Address:*** | 9525 Camino Media | Date In: | 1/14/10 |
| | Bakersfield, CA 93311 | Date Completed: | 1/20/10 |
| ***Attention:*** | Ray Franze, Carla Semprun | Date Reported: | 1/21/10 |
| ***Sample Description:*** | SJ 1003 | | |

| Anions | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Bicarbonate, $HCO_3^{-1}$ | 155.4 | . | 2.54 | SM2320 B | 0.20 |
| Carbonate, $CO_3^{-1}$ | 0.0 | . | 0.00 | SM2320 B | 0.20 |
| Chloride, $Cl^{-1}$ | 120 | . | 3.38 | SM4500-$Cl^{-1}$ | 0.05 |
| Hydroxide, $OH^{-1}$ | 0.0 | . | 0.00 | SM2320 B | 0.20 |
| Sulfate, $SO_4^{-2}$ | 0.7 | . | 0.01 | SM4500-$SO4^{-2}$ | 1.0 |
| Sulfide, $S^{-1}$ | 0.0 | X | 0.00 | SM4500-$S^{-2}$ | 1.0 |
| Sulfite, $SO_3^{-2}$ | 0.0 | X | 0.00 | SM4500-$SO3^{-2}$ | 1.0 |

| Calculations | Results | Units | Method # | PQL |
|---|---|---|---|---|
| Alkalinity, as CaCO3 (Total) | 127.4 | mg/l | SM 2320 B | NA |
| as CaCO3 (less Org. Alk.) | 127.4 | mg/l | SM 2320 B | NA |
| Hardness, as CaCO3 (Calc.) | 103.3 | mg/l | SM 2340 B | NA |
| Salinity, calc. Na+Cl | 326.7 | mg/l | (Calc.) | NA |
| Salinity, from Chlorosity | 216.8 | mg/l | (Calc.) | NA |
| ***Calcium Carbonate*** | | | | |
| Stability Index (Langlier) | -0.20 | (Notes) | SM 2330 B | NA |
| Stability Index (Stiff Davis) | -0.29 | NA | Ref. 4 | NA |

| Cations | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Ammonium, $NH4^{+1}$ | 0.00 | X | 0.00 | ASTM D 6919 | 0.10 |
| Barium, $Ba^{+2}$ | 0.08 | . | 0.00 | EPA 200.7 | 0.05 |
| Boron, $B^{+3}$ | 0.16 | . | 0.04 | EPA 200.7 | 0.10 |
| Calcium, $Ca^{+2}$ | 33.7 | . | 1.68 | EPA 200.7 | 0.05 |
| Iron, $Fe^{+3}$ | 0.31 | . | 0.02 | EPA 200.7 | 0.10 |
| Magnesium, $Mg^{+2}$ | 4.62 | . | 0.38 | EPA 200.7 | 0.05 |
| Potassium, $K^{+1}$ | 2.28 | . | 0.06 | EPA 200.7 | 0.50 |
| Sodium, $Na^{+1}$ | 65.8 | . | 2.86 | EPA 200.7 | 5.00 |
| Strontium, $Sr^{+2}$ | 0.00 | X | 0.00 | EPA 200.7 | 0.10 |

| Physical Data | Results | | Method # | PQL |
|---|---|---|---|---|
| Conductivity (Measured) | 551.0 | µmho's | SM 2510 B | 1000 |
| Resistivity | 18.149 | ohm's | (Calc.) | NA |
| Specific Gravity (60/60) | 1.0006 | units | API RP 45 | ±0.0001 |
| Ionic strength | 0.01 | IS (µ) | (Calc.) | NA |
| pH | 7.87 | units | SM 4500 H B | ± 0.01 |
| Temperature | 68.0 | °F | SM 2550 B | ± 0.2 |
| Total Diss. Solids (TDS)* | 383.1 | mg/L | (An-Cat Sum.) | NA |
| Total Diss. Solids @ 180 °c | NA | mg/L | Chevron | NA |

| Other | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Arsenic, $As^{+3}$ | 0.000 | . | 0.00 | EPA 200.7 | 0.002 |
| Silica, as SiO2 | 43.0 | . | 6.19 | EPA 200.7 | 0.10 |
| Sodium, $Na^{+1}$ (Calc.) | 65.8 | | 2.86 | API RP 45 | NA |
| Chloride, $Cl^{-1}$ (Calc.) | 88.1 | | 2.48 | API RP 45 | NA |
| Organic Alkalinity | 0.0 | X | 0.00 | Chevron Calc. | NA |

| QC (Quality Control) | Results | | Criteria | Limits |
|---|---|---|---|---|
| Meas EC - Calc EC = | 0.9 | *Note | (0.9 - 1.1 ) EC | >2500 |
| TDS - EC Ratio = | 0.70 | **Note | (0.55 - 0.70) | >2500 |
| Measured EC - Ion Sum = | 0.9 | Cation | (0.9 - 1.1) EC | |
| | 1.1 | Anion | (0.9 - 1.1) EC | |
| Calc. Na - Actual Na = | 1.00 | Na/Na | (0.98 - 1.02) | |
| NaCl/(NaCl Calc.) = | 1.00 | Na:Cl | (0.98 - 1.02) | |

**QC - Anion - Cation Balance Criteria**

| Anion Sum meq/L | meq/L SUM | Acceptable % Difference |
|---|---|---|
| 0 - 3.0 | NA | ± 0.2 meq |
| 3.0 - 10.0 | NA | ± 2 % |
| 10.0 - 800 | 11 | ± 2 - 5 % |
| Anion - Cation Balance = | -8.2 | % |

**Notes:**

MDL - Method Detection Limit .

PQL - Practical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of precision and accuracy of the analytical methodology (5X MDL).

N.D. - Not Detected (below PQL)

TDS* - Cation and anion sum..

NA - Not applicable to report.

Σ = Sum

** Dissociated Ions may elevate this value ($Ca^{+2}$, $SO4^{-2}$ etc.)

X = Not Analyzed for

***Calcium Carbonate***

***Stability Index***

(+) =CaCO3 will tend to precipitate.

(-) = CaCO3 will tend to dissolve.

(±) = CaCO3 is at equilibrium.

Comments:

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**References:**

1. APHA-AWWA; "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM; "Water," 2007 American Society for Testing and Material Vol. 11.01-02
3. EPA;"Methods for Chemical Analysis of Water and Waste," 1983 EPA-600/4-73-020
4. API; "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Institute, API RP 45.
5. Patton, C.C.; "Applied Water Technology," 1986 Campbell Petroleum Series.


**The Quality of the Analysis is Only as Good as the Quality of the Sample**

QC ______________ Date ______________

______________________________ Date: ______________

Laboratory Director Midway Laboratory, Inc

# Laboratory Report

ELAP Cert. 1398A

## Geochemical Water Analysis

| | | | |
|---|---|---|---|
| **Customer:** | Chevron Corporation | **Log # :** | 16399-2 |
| **Address:** | 9525 Camino Media | **Date in:** | 5/7/09 |
| | Bakersfield, CA 93311 | **Date out:** | 5/12/09 |
| **Attention:** | Ray Franze, Carla S | | |
| **Sample Description:** | Tejon 1000 | | Rev 10-3-08 |

| Anions | mg/L | meq/L | Method #. | PQL(mg/L) | Calculations | Results | Units | Method # | PQL(mg/L) |
|---|---|---|---|---|---|---|---|---|---|
| Bicarbonate, $HCO_3$ | 304.6 | 4.99 | SM2320 B | 0.20 | Alkalinity, as $CaCO_3$ (Total) | 249.7 | mg/l | SM 3320 B | 0.10 |
| Carbonate, $CO_3$ | 0.00 | 0.00 | SM2320 B | 0.20 | Hardness, as $CaCO_3$ (Total) | 83.6 | mg/l | SM 2340 B | 0.10 |
| Chloride, Cl | 81.4 | 2.30 | EPA 300.0 | 0.01 | Salinity, as NaCl | 147.1 | mg/l | (Calc.) | 1.00 |
| Hydroxide, OH | 0.00 | 0.00 | SM2320 B | 0.20 | *Calcium Carbonate* | | | | |
| Nitrate, $NO_3$ | 0.00 | 0.00 | EPA 300.0 | 0.01 | Stability Index (Stiff Davis) | 0.15 | (Notes) | SM 2230 B | N.A. |
| Sulfate, $SO_4$ | 0.00 | 0.00 | EPA 300.0 | 0.02 | Langelier Saturation Index | 0.24 | (Notes) | SM 203 | N.A. |

| Cations | mg/L | meq/L | Method #. | PQL(mg/L) | Physical Data | Results | | Method # | PQL |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia, $NH_2$ | 0.00 | 0.00 | EPA 200.7 | 0.01 | | | | | |
| Arsenic, As | 0.266 | NA | ASTM D 6919 | 0.005 | | | | | |
| Barium, Ba | 0.00 | 0.00 | EPA 200.7 | 0.01 | Conductivity (Measured) | 780.0 | µmho's | SM 2510 B | 0.100 |
| Boron, B | 0.96 | 0.27 | EPA 200.7 | 0.01 | Resistivity | 12.8205 | ohm's | (Calc.) | 0.0005 |
| Calcium, Ca | 25.30 | 1.26 | EPA 200.7 | 0.01 | Specific Gravity (60/60) | 1.0009 | units | API RP 45 | 0.0005 |
| Iron, Fe | 0.17 | 0.01 | EPA 200.7 | 0.01 | Ionic strength | 0.008 | IS (µ) | (Calc.) | 0.001 |
| Magnesiumn, Mg | 4.93 | 0.41 | EPA 200.7 | 0.01 | pH | 8.14 | units | SM 4500 H B | ± 0.01 |
| Potassium, K | 2.31 | 0.06 | EPA 200.7 | 0.01 | Temperature | 68.0 | °F | SM 2550 B | ± 0.1 |
| Sodium, Na | 117.0 | 5.09 | EPA 200.7 | 0.01 | Total Diss. Solids (TDS)* | 537.0 | mg/L | (Calc.) | 0.1 |
| Strontium, Sr | 0.00 | 0.00 | EPA 200.7 | 0.01 | Total Susp. Solids (TSS) | NA | mg/L | SM 2540 D | 5.0 |

| Other | | | | | QC | Results | | Range | Limits |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Meas EC - Calc EC | 1.0 | | (0.9-1.1 ) EC | |
| Silica, as $SiO_2$ | 38.9 | N.A. | SM 3500-SI B | | TDS - EC Ratio | 0.69 | | (0.55-0.70) | >2500 TDS |
| Sodium, Na (Calc.) | 117.2 | 5.10 | API RP-45 | 2.10 | Measured EC - Ion Sum | 0.9 | Cation | (0.9-1.1) EC | |
| | | | | | | 0.9 | Anion | (0.9-1.1) EC | |

**Notes**

PQL - Practical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of prcision and accuracy of the analytical methodology

N.D. - Not Detected (below PQL)

TDS* - Cation and anion summation.

N.A. - Not applicable to report.

*Calcium Carbonate Stability Index*

(+) =CaCO3 will tend to precipitate.

(-) = CaCO3 will tend to dissolve.

(±) = CaCO3 is at equilibrium

QC____________Date____________


*References:*

1. APHA-AWWA; "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM; "Water," 1983 American Society for Testing and Material Vol11.01-02
3. EPA "Methods for Chemical Analysis of Water and Wastes," 1983 EPA-600/4-79-020
4. API; "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Institute, API RP 45
5. Patton, C.C. "Applied Water Technology," 1986 C. C. Patton & Associates, Campbell Petroleum Series.


Kurt R. Buckle
Laboratory Director
Midway Laboratory, Inc.

________________Date__________

# Laboratory Report

ELAP Cert. 1396A

## Geochemical Water Analysis

| | | | |
|---|---|---|---|
| **Customer:** | Chevron Corporation | **Log # :** | 16584-5 |
| **Address:** | 9525 Camino Media | **Date In:** | 6/18/09 |
| | Bakersfield, CA 93311 | **Date out:** | 6/22/09 |
| **Attention:** | Ray Franze, Carla S | | |
| **Sample Description:** | Tejon 1000 | | Rev 10-3-08 |

| Anions | mg/L | meq/L | Method #. | PQL(mg/L) | Calculations | Results | Units | Method # | PQL(mg/L) |
|---|---|---|---|---|---|---|---|---|---|
| Bicarbonate, $HCO_3$ | 305.9 | 5.01 | SM2320 B | 0.20 | Alkalinity, as $CaCO_3$ (Total) | 250.8 | mg/l | SM 3320 B | 0.10 |
| Carbonate, $CO_3$ | 0.00 | 0.00 | SM2320 B | 0.20 | Hardness, as $CaCO_3$ (Total) | 91.0 | mg/l | SM 2340 B | 0.10 |
| Chloride, Cl | 112.0 | 3.16 | EPA 300.0 | 0.01 | Salinity, as NaCl | 202.3 | mg/l | (Calc.) | 1.00 |
| Hydroxide, OH | 0.00 | 0.00 | SM2320 B | 0.20 | ***Calcium Carbonate*** | | | | |
| Nitrate, NO3 | 0.00 | 0.00 | EPA 300.0 | 0.01 | Stability Index (Stiff Davis) | 0.22 | (Notes) | SM 2230 B | N.A. |
| Sulfate, $SO_4$ | 0.00 | 0.00 | EPA 300.0 | 0.02 | Langelier Saturation Index | 0.30 | (Notes) | SM 203 | N.A. |

| Cations | mg/L | meq/L | Method #. | PQL(mg/L) | Physical Data | Results | | Method # | PQL |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia, NH2 | 0.00 | 0.00 | EPA 200.7 | 0.01 | | | | | |
| Arsenic, As | 0.000 | NA | ASTM D 6919 | 0.005 | | | | | |
| Barium, Ba | 0.00 | 0.00 | EPA 200.7 | 0.01 | Conductivity (Measured) | 810.0 | µmho's | SM 2510 B | 0.100 |
| Boron, B | 0.23 | 0.06 | EPA 200.7 | 0.01 | Resistivity | 12.3457 | ohm's | (Calc.) | 0.0005 |
| Calcium, Ca | 27.80 | 1.39 | EPA 200.7 | 0.01 | Specific Gravity (60/60) | 0.9967 | units | API RP 45 | 0.0005 |
| Iron, Fe | 0.13 | 0.01 | EPA 200.7 | 0.01 | Ionic strength | 0.008 | IS (µ) | (Calc.) | 0.001 |
| Magnesiumn, Mg | 5.23 | 0.43 | EPA 200.7 | 0.01 | pH | 8.16 | units | SM 4500 H B | ± 0.01 |
| Potassium, K | 2.46 | 0.06 | EPA 200.7 | 0.01 | Temperature | 68.0 | °F | SM 2550 B | ± 0.1 |
| Sodium, Na | 115.0 | 5.00 | EPA 200.7 | 0.01 | Total Diss. Solids (TDS)* | 568.8 | mg/L | (Calc.) | 0.1 |
| Strontium, Sr | 0.00 | 0.00 | EPA 200.7 | 0.01 | Total Susp. Solids (TSS) | NA | mg/L | SM 2540 D | 5.0 |

| Other | | | | QC | Results | | Range | Limits |
|---|---|---|---|---|---|---|---|---|
| | | | | Meas EC - Calc EC | 1.0 | | (0.9-1.1 ) EC | |
| Silica, as $SiO_2$ | 38.1 | N.A. | SM 3500-Si B | TDS - EC Ratio | 0.70 | | (0.55-0.70) | >2500 TDS |
| Sodium, Na (Calc.) | 116.3 | 5.06 | API RP-45 2.10 | Measured EC - Ion Sum | 0.9 | Cation | (0.9-1.1) EC | |
| | | | | | 1.0 | Anion | (0.9-1.1) EC | |

**Notes**

PQL - Praactical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of prcision and accuracy of the analytical methodology.

N.D. - Not Detected (below PQL)

TDS* - Cation and anion summation.

N.A. - Not applicable to report.

*Calcium Carbonate Stability Index*

(+) =CaCO3 will tend to precipitate.

(-) = CaCO3 will tend to dissolve.

(±) = CaCO3 is at equilibrium.

QC__________ Date__________


**References:**

1. APHA-AWWA; "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM; "Water," 1983 American Society for Testing and Material Vol11 01-02
3. EPA;"Methods for Chemical Analysis of Water and Wastes," 1983 EPA-600/4-79-020
4. API; "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Institute, API RP 45.
5. Patton, C.C.; "Applied Water Technology," 1986 C. C. Patton & Associates, Campbell Petroleum Series.


Kurt R. Buckle
Laboratory Director
Midway Laboratory, Inc.

__________________ Date__________

## Laboratory Report

ELAP Cert. 1396A — Rev 7-10-09

### Geo-Chemical Water Analysis

| | | | |
|---|---|---|---|
| *Customer:* | Chevron Corporation | Log # : | 16812-2 |
| *Address:* | 9525 Camino Media | Date In: | 8/6/09 |
| | Bakersfield, CA 93311 | Date Completed: | 8/10/09 |
| *Attention:* | Ray Franze | Date Reported: | 8/10/09 |
| *Sample Description:* | Tejon 1000 | | |

| Anions | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Bicarbonate, $HCO_3^{-1}$ | 307.0 | . | 5.03 | SM2320 B | 0.20 |
| Bromide, Br | 0.0 | X | 0.00 | EPA 300.0 | 0.05 |
| Carbonate, $CO_3^{-1}$ | 0.00 | X | 0.00 | SM2320 B | 0.20 |
| Chloride, $Cl^{-1}$ | 75.1 | . | 2.12 | EPA 300.0 | 0.05 |
| Fluoride, $F^{-1}$ | 0.00 | X | 0.00 | EPA 300.0 | 0.20 |
| Hydroxide, $OH^{-1}$ | 0.0 | X | 0.00 | SM2320 B | 0.20 |
| Iodide, $I^{-1}$ (Iodine) | 0.0 | X | 0.00 | EPA 300.1 | 0.05 |
| Sulfate, $SO_4^{-2}$ | 0.00 | . | 0.00 | EPA 300.0 | 0.05 |
| Sulfide, $S^{-1}$ | 0.0 | X | 0.00 | SM4500-$S^{-2}$ | 1.00 |
| Sulfite, $SO_3^{-2}$ | 0.0 | X | 0.00 | SM4500-$SO3^{-2}$ | 1.00 |

| Calculations | Results | Units | Method # | PQL |
|---|---|---|---|---|
| Alkalinity, as CaCO3 (Total) | 251.7 | mg/l | SM 3320 B | NA |
| as CaCO3 (less Org. Alk.) | 251.7 | mg/l | SM 3320 B | NA |
| Hardness, as CaCO3 (Calc.) | 97.9 | mg/l | SM 2340 B | NA |
| Refractive Index | NA | NA | NA | NA |
| Salinity, as NaCl | 135.7 | mg/l | (Calc.) | 1.00 |
| ***Calcium Carbonate*** | | | | |
| Stability Index (Langlier) | 0.06 | (Notes) | SM 2230 B | NA |
| Stability Index (Stiff Davis) | -0.02 | NA | Ref. 4 | NA |

| Cations | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Ammonium, $NH4^{+1}$ | 0.00 | X | 0.00 | ASTM D 6919 | 0.10 |
| Barium, $Ba^{+2}$ | 0.00 | . | 0.00 | EPA 200.7 | 0.05 |
| Boron, $B^{+3}$ | 0.15 | . | 0.04 | EPA 200.7 | 0.10 |
| Calcium, $Ca^{+2}$ | 29.9 | . | 1.49 | EPA 200.7 | 0.05 |
| Iron, $Fe^{+3}$ | 0.17 | . | 0.01 | EPA 200.7 | 0.10 |
| Magnesiumn, $Mg^{+2}$ | 5.62 | . | 0.46 | EPA 200.7 | 0.05 |
| Manganese, $Mn^{+2}$ | 0.00 | X | 0.00 | EPA 200.7 | 0.05 |
| Potassium, $K^{+1}$ | 2.85 | . | 0.07 | EPA 200.7 | 0.50 |
| Sodium, $Na^{+1}$ | 13.8 | . | 0.60 | EPA 200.7 | 5.00 |
| Strontium, $Sr^{+2}$ | 0.00 | X | 0.00 | EPA 200.7 | 0.10 |
| Zinc, $Zn^{+2}$ | 0.00 | X | 0.00 | EPA 200.7 | 0.02 |

| Physical Data | Results | | Method # | PQL |
|---|---|---|---|---|
| Conductivity (Measured) | 630.0 | µmho's | SM 2510 B | 1000 |
| Resistivity | 15.873 | ohm's | (Calc.) | NA |
| Specific Gravity (60/60) | 1.0017 | units | API RP 45 | ±0.0001 |
| Ionic strength | 0.01 | IS (µ) | (Calc.) | NA |
| pH | 7.89 | units | SM 4500 H B | ± 0.01 |
| Temperature | 60.0 | °F | SM 2550 B | ± 0.2 |
| Total Diss. Solids (TDS)* | 434.6 | mg/L | (An-Cat Sum.) | NA |
| Total Diss. Solids @ 180 °c | NA | mg/L | Chevron | NA |

| Other | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Acetate | 0.0 | X | 0.0 | ASTM D 4327 | 1.00 |
| Formate | 0.0 | X | 0.0 | ASTM D 4327 | 1.00 |
| Propionate | 0.0 | X | 0.0 | ASTM D 4327 | 1.00 |
| Organic Alkalinity | 0 | X | 0.0 | Chevron Pub. | NA |
| Lithium, Li | 0.0 | X | 0.0 | EPA 200.7 | 0.02 |
| Silica, as SiO2 | 31.0 | . | 4.47 | EPA 200.7 | 0.50 |
| Sodium, $Na^{+1}$ (Calc.) | 13.8 | | 0.60 | API RP 45 | NA |

| QC (Quality Control) | Results | | Criteria | Limits |
|---|---|---|---|---|
| Meas EC - Calc EC = | 1.1 | *Note | (0.9 - 1.1 ) EC | >2500 |
| TDS - EC Ratio = | 0.69 | **Note | (0.55 - 0.70) | >2500 |
| Measured EC - Ion Sum = | 1.1 | Cation | (0.9 - 1.1) EC | |
| | 1.1 | Anion | (0.9 - 1.1) EC | |
| Calc. Na - Actual Na = | 1.00 | Na/Na | (0.98 - 1.02) | |
| NaCl/(NaCl Calc.) = | 1.00 | Na:Cl | (0.98 - 1.02) | |

**QC - Anion - Cation Balance Criteria**

| Anion Sum meq/l | meq/L SUM | Acceptable % Difference |
|---|---|---|
| 0 - 3.0 | NA | ± 0.2 meq |
| 3.0 - 10.0 | NA | ± 2 % |
| 10.0 - 800 | 14 | ± 2 - 5 % |
| Anion - Cation Balance = | 0.0 | % |

**Notes:**

MDL - Method Detection Limit .

PQL - Practical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of precision and accuracy of the analytical methodology (5X MDL).

N.D. - Not Detected (below PQL)

TDS* - Cation and anion sum..

NA - Not applicable to report.

Σ = Sum

** Dissociated ions may elevate this value ($Ca^{+2}$, $SO4^{-2}$ etc.)

X = Not Analyzed for

***Calcium Carbonate Stability Index***

(+) =CaCO3 will tend to precipitate.

(-) = CaCO3 will tend to dissolve.

(±) = CaCO3 is at equilibrium.


**References:**

1. APHA-AWWA; "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM; "Water," 2007 American Society for Testing and Material Vol. 11.01-02
3. EPA,"Methods for Chemical Analysis of Water and Waste," 1983 EPA-600/4-79-020
4. API; "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Institute, API RP 45.
5. Patton, C.C.; "Applied Water Technology," 1986 Campbell Petroleum Series.


**The Quality of the Analysis is Only as Good as the Quality of the Sample**

Comments:

QC ______________ Date ______________

Date: ______________

Kurt R. Buckle, B.S. Vice-President, Laboratory Director    Midway Laboratory, Inc

# *Laboratory Report*

*ELAP Cert. 1398A*

## *Geochemical Water Analysis*

| | | | |
|---|---|---|---|
| *Customer:* | Chevron Corporation | *Log # :* | 16989-3 |
| *Address:* | 9525 Camino Media | *Date in:* | 9/10/09 |
| | Bakersfield, CA 93311 | *Date out:* | 9/15/09 |
| *Attention:* | Ray Franze, Carla S | | |
| *Sample Description:* | Tejon Fee 1000 | | Rev 10-3-08 |

| Anions | mg/L | meq/L | Method #. | PQL(mg/L) | Calculations | Results | Units | Method # | PQL(mg/L) |
|---|---|---|---|---|---|---|---|---|---|
| Bicarbonate, $HCO_3$ | 319.4 | 5.23 | SM2320 B | 0.20 | Alkalinity, as $CaCO_3$ (Total) | 261.8 | mg/l | SM 3320 B | 0.10 |
| Carbonate, $CO_3$ | 0.00 | 0.00 | SM2320 B | 0.20 | Hardness, as $CaCO_3$ (Total) | 92.9 | mg/l | SM 2340 B | 0.10 |
| Chloride, Cl | 75.8 | 2.14 | EPA 300.0 | 0.01 | Salinity, as NaCl | 136.9 | mg/l | (Calc.) | 1.00 |
| Hydroxide, OH | 0.00 | 0.00 | SM2320 B | 0.20 | ***Calcium Carbonate*** | | | | |
| Nitrate, NO3 | 0.00 | 0.00 | EPA 300.0 | 0.01 | Stability Index (Stiff Davis) | 0.13 | (Notes) | SM 2230 B | N.A. |
| Sulfate, $SO_4$ | 0.00 | 0.00 | EPA 300.0 | 0.02 | Langelier Saturation Index | 0.22 | (Notes) | SM 203 | N.A. |

| Cations | mg/L | meq/L | Method #. | PQL(mg/L) | Physical Data | Results | | Method # | PQL |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia, NH2 | 0.00 | 0.00 | EPA 200.7 | 0.01 | | | | | |
| Arsenic, As | 0.00 | NA | ASTM D 6919 | 0.50 | | | | | |
| Barium, Ba | 0.00 | 0.00 | EPA 200.7 | 0.05 | Conductivity (Measured) | 792.0 | µmho's | SM 2510 B | 0.100 |
| Boron, B | 0.23 | 0.06 | EPA 200.7 | 0.10 | Resistivity | 12.6263 | ohm's | (Calc.) | 0.0005 |
| Calcium, Ca | 28.20 | 1.41 | EPA 200.7 | 0.05 | Specific Gravity (60/60) | 0.9978 | units | API RP 45 | 0.0005 |
| Iron, Fe | 0.20 | 0.01 | EPA 200.7 | 0.10 | Ionic strength | 0.008 | IS (µ) | (Calc.) | 0.001 |
| Magnesiumn, Mg | 5.45 | 0.45 | EPA 200.7 | 0.05 | pH | 8.05 | units | SM 4500 H B | ± 0.01 |
| Potassium, K | 2.51 | 0.06 | EPA 200.7 | 0.50 | Temperature | 68.0 | °F | SM 2550 B | ± 0.1 |
| Sodium, Na | 126 | 5.48 | EPA 200.7 | 5.00 | Total Diss. Solids (TDS)* | 557.8 | mg/L | (Calc.) | 0.1 |
| Strontium, Sr | 0.00 | 0.00 | EPA 200.7 | 0.01 | Total Susp. Solids (TSS) | NA | mg/L | SM 2540 D | 5.0 |

| *Other* | | | | QC | Results | | Range | Limits |
|---|---|---|---|---|---|---|---|---|
| | | | | Meas EC - Calc EC | 1.0 | | (0.9-1.1 ) EC | |
| Silica, as $SiO_2$ | 36.4 | N.A. | SM 3500-Si B | TDS - EC Ratio | 0.70 | | (0.55-0.70) | >2500 TDS |
| Sodium, Na (Calc.) | 125.9 | 5.48 | API RP-45 2.10 | Measured EC - Ion Sum | 0.9 | Cation | (0.9-1.1) EC | |
| | | | | | 0.9 | Anion | (0.9-1.1) EC | |

***Notes***

PQL - Praactical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of prcision and accuracy of the analytical methodology

N.D. - Not Detected (below PQL)

TDS* - Cation and anion summation.

N.A. - Not applicable to report.

***Calcium Carbonate***

***Stability Index***

(+) =CaCO3 will tend to precipitate.

(-) = CaCO3 will tend to dissolve.

(±) = CaCO3 is at equilibrium

QC____________ Date____________


***References:***

1. APHA-AWWA; "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM; "Water," 1983 American Society for Testing and Material Vol11 01-02
3. EPA,"Methods for Chemical Analysis of Water and Wastes," 1983 EPA-600/4-79-020
4. API, "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Institute, API RP 45
5. Patton, C.C.; "Applied Water Technology," 1986 C. C. Patton & Associates, Campbell Petroleum Series


Kurt R. Buckle
Laboratory Director
Midway Laboratory, Inc.

________________ Date__________

## *Laboratory Report*

*ELAP Cert. 1396A*

### *Geochemical Water Analysis*

| | | | |
|---|---|---|---|
| *Customer:* | Chevron Corporation | *Log # :* | 16399-4 |
| *Address:* | 9525 Camino Media | *Date In:* | 5/7/09 |
| | Bakersfield, CA 93311 | *Date out:* | 5/12/09 |
| *Attention:* | Ray Franze, Carla S | | |
| *Sample Description:* | Winspear 1000 | | Rev 10-3-08 |

| Anions | mg/L | meq/L | Method #. | PQL(mg/L) | Calculations | Results | Units | Method # | PQL(mg/L) |
|---|---|---|---|---|---|---|---|---|---|
| Bicarbonate, $HCO_3$ | 368.2 | 6.03 | SM2320 B | 0.20 | Alkalinity, as $CaCO_3$ (Total) | 301.8 | mg/l | SM 3320 B | 0.10 |
| Carbonate, $CO_3$ | 0.00 | 0.00 | SM2320 B | 0.20 | Hardness, as $CaCO_3$ (Total) | 139.1 | mg/l | SM 2340 B | 0.10 |
| Chloride, Cl | 53.3 | 1.50 | EPA 300.0 | 0.01 | Salinity, as NaCl | 96.3 | mg/l | (Calc.) | 1.00 |
| Hydroxide, OH | 0.00 | 0.00 | SM2320 B | 0.20 | *Calcium Carbonate* | | | | |
| Nitrate, NO3 | 0.00 | 0.00 | EPA 300.0 | 0.01 | Stability Index (Stiff Davis) | 0.23 | (Notes) | SM 2230 B | N.A. |
| Sulfate, $SO_4$ | 0.00 | 0.00 | EPA 300.0 | 0.02 | Langelier Saturation Index | 0.31 | (Notes) | SM 203 | N.A. |

| Cations | mg/L | meq/L | Method #. | PQL(mg/L) | Physical Data | Results | | Method # | PQL |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia, NH2 | 0.00 | 0.00 | EPA 200.7 | 0.01 | | | | | |
| Arsenic, As | 0.000 | NA | ASTM D 6919 | 0.005 | | | | | |
| Barium, Ba | 0.00 | 0.00 | EPA 200.7 | 0.01 | Conductivity (Measured) | 820.0 | µmho's | SM 2510 B | 0.100 |
| Boron, B | 1.13 | 0.31 | EPA 200.7 | 0.01 | Resistivity | 12.1951 | ohm's | (Calc.) | 0.0005 |
| Calcium, Ca | 38.50 | 1.92 | EPA 200.7 | 0.01 | Specific Gravity (60/60) | 1.0011 | units | API RP 45 | 0.0005 |
| Iron, Fe | 1.24 | 0.07 | EPA 200.7 | 0.01 | Ionic strength | 0.009 | IS (µ) | (Calc.) | 0.001 |
| Magnesiumn, Mg | 10.40 | 0.86 | EPA 200.7 | 0.01 | pH | 7.95 | units | SM 4500 H B | ± 0.01 |
| Potassium, K | 3.08 | 0.08 | EPA 200.7 | 0.01 | Temperature | 68.0 | °F | SM 2550 B | ± 0.1 |
| Sodium, Na | 91.8 | 3.99 | EPA 200.7 | 0.01 | Total Diss. Solids (TDS)* | 567.7 | mg/L | (Calc.) | 0.1 |
| Strontium, Sr | 0.00 | 0.00 | EPA 200.7 | 0.01 | Total Susp. Solids (TSS) | NA | mg/L | SM 2540 D | 5.0 |

| Other | | | | QC | Results | | Range | Limits |
|---|---|---|---|---|---|---|---|---|
| | | | | Meas EC - Calc EC | 1.1 | | (0.9-1.1 ) EC | |
| Silica, as $SiO_2$ | 87.7 | N.A. | SM 3500-SI B | TDS - EC Ratio | 0.69 | | (0.55-0.70) | >2500 TDS |
| Sodium, Na (Calc.) | 92.1 | 4.01 | API RP-45 2.10 | Measured EC - Ion Sum | 0.9 | Cation | (0.9-1.1) EC | |
| | | | | | 0.9 | Anion | (0.9-1.1) EC | |

**Notes**

PQL - Praactical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of prcision and accuracy of the analytical methodology.

N.D. - Not Detected (below PQL)

TDS* - Cation and anion summation.

N.A. - Not applicable to report.

*Calcium Carbonate Stability Index*

(+) =CaCO3 will tend to precipitate.

(-) = CaCO3 will tend to dissolve.

(±) = CaCO3 is at equilibrium.

QC____________Date____________


**References:**

1. APHA-AWWA, "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM, "Water," 1983 American Society for Testing and Material Vol11.01-02
3. EPA,"Methods for Chemical Analysis of Water and Wastes," 1983 EPA-600/4-79-020
4. API, "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Institute, API RP 45.
5. Patton, C.C., "Applied Water Technology," 1986 C. C. Patton & Associates, Campbell Petroleum Series.


Kurt R. Buckle
Laboratory Director
Midway Laboratory, Inc.

____________________Date____________

## *Laboratory Report*

*ELAP Cert. 1396A*

### *Geochemical Water Analysis*

| | | | |
|---|---|---|---|
| *Customer:* | Chevron Corporation | *Log # :* | 16958-1 |
| *Address:* | 9525 Camino Media | *Date in:* | 9/3/09 |
| | Bakersfield, CA 93311 | *Date out:* | 9/14/09 |
| *Attention:* | Ray Franze, Carla S | | |
| *Sample Description:* | Winspear 1000 | | Rev 10-3-08 |

| Anions | mg/L | meq/L | Method #. | PQL(mg/L) | Calculations | Results | Units | Method # | PQL(mg/L) |
|---|---|---|---|---|---|---|---|---|---|
| Bicarbonate, $HCO_3$ | 292.5 | 4.79 | SM2320 B | 0.20 | Alkalinity, as $CaCO_3$ (Total) | 239.7 | mg/l | SM 3320 B | 0.10 |
| Carbonate, $CO_3$ | 0.00 | 0.00 | SM2320 B | 0.20 | Hardness, as $CaCO_3$ (Total) | 89.4 | mg/l | SM 2340 B | 0.10 |
| Chloride, Cl | 66.7 | 1.88 | EPA 300.0 | 0.01 | Salinity, as NaCl | 120.5 | mg/l | (Calc.) | 1.00 |
| Hydroxide, OH | 0.00 | 0.00 | SM2320 B | 0.20 | ***Calcium Carbonate*** | | | | |
| Nitrate, NO3 | 0.00 | 0.00 | EPA 300.0 | 0.01 | Stability Index (Stiff Davis) | -0.34 | (Notes) | SM 2230 B | N.A. |
| Sulfate, $SO_4$ | 0.20 | 0.00 | EPA 300.0 | 0.02 | Langelier Saturation Index | -0.25 | (Notes) | SM 203 | N.A. |

| Cations | mg/L | meq/L | Method #. | PQL(mg/L) | Physical Data | Results | | Method # | PQL |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia, NH2 | 0.00 | 0.00 | EPA 200.7 | 0.01 | | | | | |
| Arsenic, As | 0.00 | NA | ASTM D 6919 | 0.500 | | | | | |
| Barium, Ba | 0.08 | 0.00 | EPA 200.7 | 0.05 | Conductivity (Measured) | 758.0 | µmho's | SM 2510 B | 0.100 |
| Boron, B | 0.20 | 0.06 | EPA 200.7 | 0.10 | Resistivity | 13.1926 | ohm's | (Calc.) | 0.0005 |
| Calcium, Ca | 24.6 | 1.23 | EPA 200.7 | 0.05 | Specific Gravity (60/60) | 0.9976 | units | API RP 45 | 0.0005 |
| Iron, Fe | 0.34 | 0.02 | EPA 200.7 | 0.10 | Ionic strength | 0.007 | IS (µ) | (Calc.) | 0.001 |
| Magnesiumn, Mg | 6.78 | 0.56 | EPA 200.7 | 0.05 | pH | 7.68 | units | SM 4500 H B | ± 0.01 |
| Potassium, K | 2.68 | 0.07 | EPA 200.7 | 0.50 | Temperature | 68.0 | °F | SM 2550 B | ± 0.1 |
| Sodium, Na | 105 | 4.57 | EPA 200.7 | 5.00 | Total Diss. Solids (TDS)* | 499.0 | mg/L | (Calc.) | 0.1 |
| Strontium, Sr | 0.00 | 0.00 | EPA 200.7 | 0.01 | Total Susp. Solids (TSS) | NA | mg/L | SM 2540 D | 5.0 |

| Other | | | | QC | Results | | Range | Limits |
|---|---|---|---|---|---|---|---|---|
| | | | | Meas EC - Calc EC | 1.1 | | (0.9-1.1 ) EC | |
| Silica, as $SiO_2$ | 65.2 | N.A. | SM 3500-Si B | TDS - EC Ratio | 0.66 | | (0.55-0.70) | >2500 TDS |
| Sodium, Na (Calc.) | 105.2 | 4.58 | API RP-45 2.10 | Measured EC - Ion Sum | 0.9 | Cation | (0.9-1.1) EC | |
| | | | | | 0.9 | Anion | (0.9-1.1) EC | |

**Notes**

PQL - Praactical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of prcsion and accuracy of the analytical methodology.

N.D. - Not Detected (below PQL)

TDS* - Cation and anion summation.

N.A. - Not applicable to report.

QC____________Date____________

*Calcium Carbonate*

*Stability Index*

(+) =CaCO3 will tend to precipitate.

(-) = CaCO3 will tend to dissolve.

(±) = CaCO3 is at equilibrium.


**References:**

1. APHA-AWWA, "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM, "Water," 1983 American Society for Testing and Material Vol11 01-02
3. EPA,"Methods for Chemical Analysis of Water and Wastes," 1983 EPA-600/4-79-020
4. API, "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Institute, API RP 45.
5. Patton, C.C., "Applied Water Technology," 1986 C. C. Patton & Associates, Campbell Petroleum Series.


Kurt R. Buckle

Laboratory Director

Midway Laboratory, Inc.

________________Date__________

# *Laboratory Report*

*ELAP Cert. 1396A*

## *Geochemical Water Analysis*

| | | | |
|---|---|---|---|
| ***Customer:*** | Chevron Corporation | ***Log #:*** | 17104-4 |
| ***Address:*** | 9525 Camino Media | ***Date In:*** | 10/1/09 |
| | Bakersfield, CA 93311 | ***Date out:*** | 10/13/09 |
| ***Attention:*** | Ray Franze, Carla S | | |
| ***Sample Description:*** | Winspear 1000 | | **Rev 10-3-08** |

| **Anions** | **mg/L** | **meq/L** | **Method #.** | **PQL(mg/L)** | **Calculations** | **Results** | **Units** | **Method #** | **PQL(mg/L)** |
|---|---|---|---|---|---|---|---|---|---|
| Bicarbonate, $HCO_3$ | 348.7 | 5.71 | SM2320 B | 0.20 | Alkalinity, as $CaCO_3$ (Total) | 285.8 | mg/l | SM 2320 B | 0.10 |
| Carbonate, $CO_3$ | 0.00 | 0.00 | SM2320 B | 0.20 | Hardness, as $CaCO_3$ (Total) | 133.2 | mg/l | SM 2340 B | 0.10 |
| Chloride, Cl | 54.1 | 1.53 | EPA 300.0 | 0.01 | Salinity, as NaCl | 97.7 | mg/l | (Calc.) | 1.00 |
| Hydroxide, OH | 0.00 | 0.00 | SM2320 B | 0.20 | ***Calcium Carbonate*** | | | | |
| Nitrate, NO3 | 0.00 | 0.00 | EPA 300.0 | 0.01 | Stability Index (Stiff Davis) | 0.40 | (Notes) | SM 2230 B | N.A. |
| Sulfate, $SO_4$ | 0.90 | 0.02 | EPA 300.0 | 0.02 | Langelier Saturation Index | 0.49 | (Notes) | SM 203 | N.A. |

| **Cations** | **mg/L** | **meq/L** | **Method #.** | **PQL(mg/L)** | **Physical Data** | **Results** | | **Method #** | **PQL** |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia, NH2 | 0.00 | 0.00 | EPA 200.7 | 0.01 | | | | | |
| Arsenic, As | 0.00 | NA | ASTM D 6919 | 0.10 | | | | | |
| Barium, Ba | 0.14 | 0.00 | EPA 200.7 | 0.05 | Conductivity (Measured) | 770.0 | μmho's | SM 2510 B | 0.100 |
| Boron, B | 0.13 | 0.03 | EPA 200.7 | 0.10 | Resistivity | 12.9870 | ohm's | (Calc.) | 0.0005 |
| Calcium, Ca | 36.5 | 1.82 | EPA 200.7 | 0.05 | Specific Gravity (60/60) | 1.0002 | units | API RP 45 | 0.0005 |
| Iron, Fe | 0.22 | 0.01 | EPA 200.7 | 0.10 | Ionic strength | 0.008 | IS (μ) | (Calc.) | 0.001 |
| Magnesiumn, Mg | 10.2 | 0.84 | EPA 200.7 | 0.05 | pH | 8.17 | units | SM 4500 H B | ± 0.01 |
| Potassium, K | 3.16 | 0.08 | EPA 200.7 | 0.50 | Temperature | 68.0 | °F | SM 2550 B | ± 0.1 |
| Sodium, Na | 87.3 | 3.80 | EPA 200.7 | 5.00 | Total Diss. Solids (TDS)* | 541.3 | mg/L | (Calc.) | 0.1 |
| Strontium, Sr | 0.00 | 0.00 | EPA 200.7 | 0.01 | Total Susp. Solids (TSS) | NA | mg/L | SM 2540 D | 5.0 |

| ***Other*** | | | | **QC** | **Results** | | **Range** | **Limits** |
|---|---|---|---|---|---|---|---|---|
| | | | | Meas EC - Calc EC | 1.1 | | (0.9-1.1) EC | |
| Silica, as $SiO_2$ | 81.7 | N.A. | SM 3500-Si B | TDS - EC Ratio | 0.70 | | (0.55-0.70) | >2500 TDS |
| Sodium, Na (Calc.) | 88.0 | 3.83 | API RP-45 2.10 | Measured EC - Ion Sum | 0.9 | Cation | (0.9-1.1) EC | |
| | | | | | 0.9 | Anion | (0.9-1.1) EC | |

***Notes***

PQL - Practical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of precision and accuracy of the analytical methodology.

N.D. - Not Detected (below PQL)

TDS* - Cation and anion summation.

N.A. - Not applicable to report.

QC____________Date____________

***Calcium Carbonate Stability Index***

(+) =CaCO3 will tend to precipitate.

(-) = CaCO3 will tend to dissolve.

(±) = CaCO3 is at equilibrium.


***References:***

1. APHA-AWWA, "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM, "Water," 1983 American Society for Testing and Material Vol11 01-02
3. EPA,"Methods for Chemical Analysis of Water and Wastes," 1983 EPA-600/4-79-020
4. API, "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Institute, API RP 45.
5. Patton, C.C., "Applied Water Technology," 1986 C. C. Patton & Associates, Campbell Petroleum Series.


Kurt R. Buckle
Laboratory Director
Midway Laboratory, Inc.

________________Date__________

# *Laboratory Report*

*ELAP Cert. 1398A*

## *Geochemical Water Analysis*

| | | | |
|---|---|---|---|
| *Customer:* | Chevron Corporation | *Log # :* | 17288-3 |
| *Address:* | 9525 Camino Media | *Date In:* | 11/5/09 |
| | Bakersfield, CA 93311 | *Date out:* | 11/18/09 |
| *Attention:* | Ray Franze, Carla S | | |
| *Sample Description:* | Winspear 1000 | | Rev 10-3-08 |

| Anions | mg/L | meq/L | Method #, | PQL(mg/L) | Calculations | Results | Units | Method # | PQL(mg/L) |
|---|---|---|---|---|---|---|---|---|---|
| Bicarbonate, $HCO_3$ | 343 | 5.61 | SM2320 B | 0.20 | Alkalinity, as $CaCO_3$ (Total) | 280.8 | mg/l | SM 2320 B | 0.10 |
| Carbonate, $CO_3$ | 0.00 | 0.00 | SM2320 B | 0.20 | Hardness, as $CaCO_3$ (Total) | 135.2 | mg/l | SM 2340 B | 0.10 |
| Chloride, Cl | 57 | 1.61 | EPA 300.0 | 0.01 | Salinity, as NaCl | 102.8 | mg/l | (Calc.) | 1.00 |
| Hydroxide, OH | 0.00 | 0.00 | SM2320 B | 0.20 | ***Calcium Carbonate*** | | | | |
| Nitrate, $NO_3$ | 0.00 | 0.00 | EPA 300.0 | 0.01 | Stability Index (Stiff Davis) | -0.04 | (Notes) | SM 2230 B | N.A. |
| Sulfate, $SO_4$ | 0.00 | 0.00 | EPA 300.0 | 0.02 | Langelier Saturation Index | 0.05 | (Notes) | SM 203 | N.A. |

| Cations | mg/L | meq/L | Method #, | PQL(mg/L) | Physical Data | Results | | Method # | PQL |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia, NH2 | 0.00 | 0.00 | EPA 200.7 | 0.01 | | | | | |
| Arsenic, As | 0.000 | 0.00 | ASTM D 6919 | 0.002 | | | | | |
| Barium, Ba | 0.13 | 0.00 | EPA 200.7 | 0.05 | Conductivity (Measured) | 770.0 | µmho's | SM 2510 B | 0.100 |
| Boron, B | 0.14 | 0.04 | EPA 200.7 | 0.10 | Resistivity | 12.9870 | ohm's | (Calc.) | 0.0005 |
| Calcium, Ca | 37.1 | 1.85 | EPA 200.7 | 0.05 | Specific Gravity (60/60) | 1.0002 | units | API RP 45 | 0.0005 |
| Iron, Fe | 0.27 | 0.01 | EPA 200.7 | 0.10 | Ionic strength | 0.008 | IS (µ) | (Calc.) | 0.001 |
| Magnesiumn, Mg | 10.3 | 0.85 | EPA 200.7 | 0.05 | pH | 7.73 | units | SM 4500 H B | ± 0.01 |
| Potassium, K | 2.87 | 0.07 | EPA 200.7 | 0.50 | Temperature | 68.0 | °F | SM 2550 B | ± 0.1 |
| Sodium, Na | 87.5 | 3.81 | EPA 200.7 | 5.00 | Total Diss. Solids (TDS)* | 537.8 | mg/L | (Calc.) | 0.1 |
| Strontium, Sr | 0.00 | 0.00 | EPA 200.7 | 0.01 | Total Susp. Solids (TSS) | NA | mg/L | SM 2540 D | 5.0 |

| Other | | | | | QC | Results | | Range | Limits |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Meas EC - Calc EC | 1.1 | | (0.9-1.1 ) EC | |
| Silica, as $SiO_2$ | 73.6 | N.A. | SM 3500-Si B | | TDS - EC Ratio | 0.70 | | (0.55-0.70) | >2500 TDS |
| Sodium, Na (Calc.) | 88.1 | 3.83 | API RP-45 2.10 | | Measured EC - Ion Sum | 0.9 | Cation | (0.9-1.1) EC | |
| | | | | | | 0.9 | Anion | (0.9-1.1) EC | |

**Notes**

PQL - Praactical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of prcision and accuracy of the analytical methodology.

N.D. - Not Detected (below PQL)

TDS* - Cation and anion summation.

N.A. - Not applicable to report.

QC____________ Date____________

***Calcium Carbonate***

***Stability Index***

(+) =CaCO3 will tend to precipitate.

(-) = CaCO3 will tend to dissolve.

(±) = CaCO3 is at equilibrium.

**References:**


1. APHA-AWWA; "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM; "Water," 1983 American Society for Testing and Material Vol11.01-02
3. EPA;"Methods for Chemical Analysis of Water and Wastes," 1983 EPA-600/4-79-020
4. API; "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Institute, API RP 45.
5. Patton, C.C.; "Applied Water Technology," 1986 C. C. Patton & Associates, Campbell Petroleum Series


Laboratory Director
Midway Laboratory, Inc.

________________ Date__________

## *Laboratory Report*

ELAP Cert. 1396A

### *Geo-Chemical Water Analysis*

Rev 12-16-09

| | | | |
|---|---|---|---|
| ***Customer:*** | Chevron Corporation | **Log # :** | 17433-8 |
| ***Address:*** | 9525 Camino Media | **Date In:** | 12/3/09 |
| | Bakersfield, CA 93311 | **Date Completed:** | 12/7/09 |
| ***Attention:*** | Ray Franze, Carla Semprun | **Date Reported:** | 12/14/09 |
| ***Sample Description:*** | Winspear 1000 | | |

| Anions | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Bicarbonate, $HCO_3^{-1}$ | 348.8 | . | 5.71 | SM2320 B | 0.20 |
| Carbonate, $CO_3^{-1}$ | 0.0 | . | 0.00 | SM2320 B | 0.20 |
| Chloride, $Cl^{-1}$ | 49.8 | . | 1.40 | SM4500-$Cl^{-1}$ | 0.05 |
| Hydroxide, $OH^{-1}$ | 0.0 | . | 0.00 | SM2320 B | 0.20 |
| Sulfate, $SO_4^{-2}$ | 0.8 | . | 0.02 | SM4500-$SO4^{-2}$ | 1.0 |
| Sulfide, $S^{-1}$ | 0.0 | X | 0.00 | SM4500-$S^{-2}$ | 1.0 |
| Sulfite, $SO_3^{-2}$ | 0.0 | X | 0.00 | SM4500-$SO3^{-2}$ | 1.0 |

| Calculations | Results | Units | Method # | PQL |
|---|---|---|---|---|
| Alkalinity, as CaCO3 (Total) | 285.9 | mg/l | SM 2320 B | NA |
| as CaCO3 (less Org. Alk.) | 285.9 | mg/l | SM 2320 B | NA |
| Hardness, as CaCO3 (Calc.) | 135.0 | mg/l | SM 2340 B | NA |
| Salinity, calc. Na+Cl | 417.0 | mg/l | (Calc.) | NA |
| Salinity, from Chlorosity | 90.0 | mg/l | (Calc.) | NA |
| ***Calcium Carbonate*** | | | | |
| Stability Index (Langlier) | 0.06 | (Notes) | SM 2330 B | NA |
| Stability Index (Stiff Davis) | -0.03 | NA | Ref. 4 | NA |

| Cations | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Ammonium, $NH4^{+1}$ | 0.00 | X | 0.00 | ASTM D 6919 | 0.10 |
| Barium, $Ba^{+2}$ | 0.14 | . | 0.00 | EPA 200.7 | 0.05 |
| Boron, $B^{+3}$ | 0.10 | . | 0.03 | EPA 200.7 | 0.10 |
| Calcium, $Ca^{+2}$ | 38.1 | . | 1.90 | EPA 200.7 | 0.05 |
| Iron, $Fe^{+3}$ | 0.51 | . | 0.03 | EPA 200.7 | 0.10 |
| Magnesium, $Mg^{+2}$ | 9.65 | . | 0.79 | EPA 200.7 | 0.05 |
| Potassium, $K^{+1}$ | 2.45 | . | 0.06 | EPA 200.7 | 0.50 |
| Sodium, $Na^{+1}$ | 99.3 | . | 4.32 | EPA 200.7 | 5.00 |
| Strontium, $Sr^{+2}$ | 0.00 | X | 0.00 | EPA 200.7 | 0.10 |

| Physical Data | Results | Units | Method # | PQL |
|---|---|---|---|---|
| Conductivity (Measured) | 800.0 | µmho's | SM 2510 B | 1000 |
| Resistivity | 12.500 | ohm's | (Calc.) | NA |
| Specific Gravity (60/60) | 1.0010 | units | API RP 45 | ±0.0001 |
| Ionic strength | 0.01 | IS (µ) | (Calc.) | NA |
| pH | 7.72 | units | SM 4500 H B | ± 0.01 |
| Temperature | 60.0 | °F | SM 2550 B | ± 0.2 |
| Total Diss. Solids (TDS)* | 549.7 | mg/L | (An-Cat Sum.) | NA |
| Total Diss. Solids @ 180 °c | NA | mg/L | Chevron | NA |

| Other | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Arsenic, As | 0.000 | . | 0.00 | EPA 200.7 | 0.002 |
| Silica, as SiO2 | 73.8 | . | 10.63 | EPA 200.7 | 0.10 |
| Sodium, $Na^{+1}$ (Calc.) | 99.3 | | 4.32 | API RP 45 | NA |
| Chloride, $Cl^{-1}$ (Calc.) | 49.8 | | 1.41 | API RP 45 | NA |
| Organic Alkalinity | 0.0 | X | 0.00 | Chevron Calc. | NA |

| QC (Quality Control) | Results | | Criteria | Limits |
|---|---|---|---|---|
| Meas EC - Calc EC = | 1.0 | *Note | (0.9 - 1.1) EC | >2500 |
| TDS - EC Ratio = | 0.69 | **Note | (0.55 - 0.70) | >2500 |
| Measured EC - Ion Sum = | 0.9 | Cation | (0.9 - 1.1) EC | |
| | 0.9 | Anion | (0.9 - 1.1) EC | |
| Calc. Na - Actual Na = | 1.00 | Na/Na | (0.98 - 1.02) | |
| NaCl/(NaCl Calc.) = | 1.00 | Na:Cl | (0.98 - 1.02) | |

**QC - Anion - Cation Balance Criteria**

| Anion Sum meq/L | meq/L SUM | Acceptable % Difference |
|---|---|---|
| 0 - 3.0 | NA | ± 0.2 meq |
| 3.0 - 10.0 | NA | ± 2 % |
| 10.0 - 800 | 14 | ± 2 - 5 % |
| Anion - Cation Balance = | 0.0 | % |

**Notes:**

MDL - Method Detection Limit .

PQL - Practical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of precision and accuracy of the analytical methodology (5X MDL).

N.D. - Not Detected (below PQL)

TDS* - Cation and anion sum..

NA - Not applicable to report.

∑ = Sum

** Dissociated ions may elevate this value ($Ca^{+2}$, $SO4^{-2}$ etc.)

X = Not Analyzed for

***Calcium Carbonate***

***Stability Index***

(+) =CaCO3 will tend to precipitate.

(-) = CaCO3 will tend to dissolve.

(±) = CaCO3 is at equilibrium.

**Comments:**


**References:**

1. APHA-AWWA; "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM; "Water," 2007 American Society for Testing and Material Vol. 11.01-02
3. EPA;"Methods for Chemical Analysis of Water and Waste," 1983 EPA-600/4-73-020
4. API; "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Institute, API RP 45.
5. Patton, C.C.; "Applied Water Technology," 1986 Campbell Petroleum Series.


**The Quality of the Analysis is Only as Good as the Quality of the Sample**

QC ____________ Date ____________

Date: ____________

**Laboratory Director** **Midway Laboratory, Inc**

## Laboratory Report

ELAP Cert. 1396A

### Geo-Chemical Water Analysis

Rev 12-16-09

**Customer:** Chevron Corporation
**Address:** 9525 Camino Media, Bakersfield, CA 93311
**Attention:** Ray Franze, Carla Semprun
**Sample Description:** Winspear 1000

Log # : 17630-5
Date In: 1/14/10
Date Completed: 1/20/10
Date Reported: 1/21/10

| Anions | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Bicarbonate, $HCO_3^{-1}$ | 357.2 | . | 5.85 | SM2320 B | 0.20 |
| Carbonate, $CO_3^{-1}$ | 0.0 | . | 0.00 | SM2320 B | 0.20 |
| Chloride, $Cl^{-1}$ | 61.8 | . | 1.74 | SM4500-$Cl^{-1}$ | 0.05 |
| Hydroxide, $OH^{-1}$ | 0.0 | . | 0.00 | SM2320 B | 0.20 |
| Sulfate, $SO_4^{-2}$ | 0.0 | . | 0.00 | SM4500-$SO4^{-2}$ | 1.0 |
| Sulfide, $S^{-1}$ | 0.0 | X | 0.00 | SM4500-$S^{-2}$ | 1.0 |
| Sulfite, $SO_3^{-2}$ | 0.0 | X | 0.00 | SM4500-$SO3^{-2}$ | 1.0 |

| Calculations | Results | Units | Method # | PQL |
|---|---|---|---|---|
| Alkalinity, as CaCO3 (Total) | 292.8 | mg/l | SM 2320 B | NA |
| as CaCO3 (less Org. Alk.) | 292.8 | mg/l | SM 2320 B | NA |
| Hardness, as CaCO3 (Calc.) | 144.4 | mg/l | SM 2340 B | NA |
| Salinity, calc. Na+Cl | 427.1 | mg/l | (Calc.) | NA |
| Salinity, from Chlorosity | 111.6 | mg/l | (Calc.) | NA |
| *Calcium Carbonate* | | | | |
| Stability Index (Langlier) | 0.03 | (Notes) | SM 2330 B | NA |
| Stability Index (Stiff Davis) | -0.06 | NA | Ref. 4 | NA |

| Cations | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Ammonium, $NH4^{+1}$ | 0.00 | X | 0.00 | ASTM D 6919 | 0.10 |
| Barium, $Ba^{+2}$ | 0.15 | . | 0.00 | EPA 200.7 | 0.05 |
| Boron, $B^{+3}$ | 0.13 | . | 0.04 | EPA 200.7 | 0.10 |
| Calcium, $Ca^{+2}$ | 40.3 | . | 2.01 | EPA 200.7 | 0.05 |
| Iron, $Fe^{+3}$ | 0.27 | . | 0.01 | EPA 200.7 | 0.10 |
| Magnesium, $Mg^{+2}$ | 10.6 | . | 0.87 | EPA 200.7 | 0.05 |
| Potassium, $K^{+1}$ | 3.03 | . | 0.08 | EPA 200.7 | 0.50 |
| Sodium, $Na^{+1}$ | 88.5 | . | 3.85 | EPA 200.7 | 5.00 |
| Strontium, $Sr^{+2}$ | 0.00 | X | 0.00 | EPA 200.7 | 0.10 |

| Physical Data | Results | Units | Method # | PQL |
|---|---|---|---|---|
| Conductivity (Measured) | 799.0 | μmho's | SM 2510 B | 1000 |
| Resistivity | 12.516 | ohm's | (Calc.) | NA |
| Specific Gravity (60/60) | 1.0008 | units | API RP 45 | ±0.0001 |
| Ionic strength | 0.01 | IS (μ) | (Calc.) | NA |
| pH | 7.66 | units | SM 4500 H B | ± 0.01 |
| Temperature | 60.0 | °F | SM 2550 B | ± 0.2 |
| Total Diss. Solids (TDS)* | 562.0 | mg/L | (An-Cat Sum.) | NA |
| Total Diss. Solids @ 180 °c | NA | mg/L | Chevron | NA |

| Other | mg/L | | meq/L | Method #. | PQL |
|---|---|---|---|---|---|
| Arsenic, As | 0.420 | . | 0.02 | EPA 200.7 | 0.002 |
| Silica, as SiO2 | 78.5 | . | 11.31 | EPA 200.7 | 0.10 |
| Sodium, $Na^{+1}$ (Calc.) | 88.5 | | 3.85 | API RP 45 | NA |
| Chloride, $Cl^{-1}$ (Calc.) | 35.9 | | 1.01 | API RP 45 | NA |
| Organic Alkalinity | 0.0 | X | 0.00 | Chevron Calc. | NA |

| QC (Quality Control) | Results | | Criteria | Limits |
|---|---|---|---|---|
| Meas EC - Calc EC = | 0.9 | *Note | (0.9 - 1.1) EC | >2500 |
| TDS - EC Ratio = | 0.70 | **Note | (0.55 - 0.70) | >2500 |
| Measured EC - Ion Sum = | 0.9 | Cation | (0.9 - 1.1) EC | |
| | 1.0 | Anion | (0.9 - 1.1) EC | |
| Calc. Na - Actual Na = | 1.00 | Na/Na | (0.98 - 1.02) | |
| NaCl/(NaCl Calc.) = | 1.00 | Na:Cl | (0.98 - 1.02) | |

**QC - Anion - Cation Balance Criteria**

| Anion Sum meq/l | meq/L SUM | Acceptable % Difference |
|---|---|---|
| 0 - 3.0 | NA | ± 0.2 meq |
| 3.0 - 10.0 | NA | ± 2 % |
| 10.0 - 800 | 14 | ± 2 - 5 % |
| Anion - Cation Balance = | -5.0 | % |

**Notes:**

MDL - Method Detection Limit .
PQL - Practical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of precision and accuracy of the analytical methodology (5X MDL).
N.D. - Not Detected (below PQL)
TDS* - Cation and anion sum..
NA - Not applicable to report.
∑ = Sum
** Dissociated ions may elevate this value ($Ca^{+2}$, $SO4^{-2}$ etc.)
X = Not Analyzed for
*Calcium Carbonate*
*Stability Index*
(+) =CaCO3 will tend to precipitate.
(-) = CaCO3 will tend to dissolve.
(±) = CaCO3 is at equilibrium.


**References:**

1. APHA-AWWA; "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM; "Water," 2007 American Society for Testing and Material Vol. 11.01-02
3. EPA;"Methods for Chemical Analysis of Water and Waste," 1983 EPA-600/4-73-020
4. API; "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Insitute, API RP 45.
5. Patton, C.C., "Applied Water Technology," 1986 Campbell Petroleum Series.


The Quality of the Analysis is Only as Good as the Quality of the Sample

Comments:

QC ____________ Date ____________

Date: ____________

Laboratory Director Midway Laboratory, Inc

## *Laboratory Report*

*ELAP Cert. 1396A*

### *Geochemical Water Analysis*

| | | | |
|---|---|---|---|
| ***Customer:*** | Chevron Corporation | ***Log # :*** | 17240-1 |
| ***Address:*** | 9525 Camino Media | ***Date In:*** | 10/28/09 |
| | Bakersfield, CA 93311 | ***Date out:*** | 11/9/09 |
| ***Attention:*** | Ray Franze, Carla S | | |
| ***Sample Description:*** | Total Interdiction Water (comingled point) 24" pipe | | Rev 10-3-08 |

| Anions | mg/L | meq/L | Method #. | PQL(mg/L) | Calculations | Results | Units | Method # | PQL(mg/L) |
|---|---|---|---|---|---|---|---|---|---|
| Bicarbonate, $HCO_3$ | 334.1 | 5.47 | SM2320 B | 0.20 | Alkalinity, as $CaCO_3$ (Total) | 273.8 | mg/l | SM 2320 B | 0.10 |
| Carbonate, $CO_3$ | 0.00 | 0.00 | SM2320 B | 0.20 | Hardness, as $CaCO_3$ (Total) | 87.6 | mg/l | SM 2340 B | 0.10 |
| Chloride, Cl | 81.4 | 2.30 | EPA 300.0 | 0.01 | Salinity, as NaCl | 147.1 | mg/l | (Calc.) | 1.00 |
| Hydroxide, OH | 0.00 | 0.00 | SM2320 B | 0.20 | ***Calcium Carbonate*** | | | | |
| Nitrate, NO3 | 0.00 | 0.00 | EPA 300.0 | 0.01 | Stability Index (Stiff Davis) | -0.18 | (Notes) | SM 2230 B | N.A. |
| Sulfate, $SO_4$ | 0.50 | 0.01 | EPA 300.0 | 0.02 | Langelier Saturation Index | -0.09 | (Notes) | SM 203 | N.A. |

| Cations | mg/L | meq/L | Method #. | PQL(mg/L) | Physical Data | Results | | Method # | PQL |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia, NH2 | 0.00 | 0.00 | EPA 200.7 | 0.01 | | | | | |
| Arsenic, As | 0.00 | NA | ASTM D 6919 | 0.10 | | | | | |
| Barium, Ba | 0.00 | 0.00 | SM3500-Ba B | 0.50 | Conductivity (Measured) | 850.0 | µmho's | SM 2510 B | 0.100 |
| | | | | | Resistivity | 11.7647 | ohm's | (Calc.) | 0.0005 |
| Calcium, Ca | 23.5 | 1.17 | SM3500-Ca B | 0.50 | Specific Gravity (60/60) | 1.0005 | units | API RP 45 | 0.0005 |
| Iron, Fe | 0.00 | 0.00 | SM3500-Fe B | 1.00 | Ionic strength | 0.009 | IS (µ) | (Calc.) | 0.001 |
| Magnesiumn, Mg | 7.00 | 0.58 | SM3500-Mg B | 0.50 | pH | 7.80 | units | SM 4500 H B | ± 0.01 |
| Potassium, K | 1.80 | 0.05 | SM3500-K B | 0.50 | Temperature | 68.0 | °F | SM 2550 B | ± 0.1 |
| Sodium, Na | 135 | 5.87 | SM3500-Na B | 5.00 | Total Diss. Solids (TDS)* | 583.3 | mg/L | (Calc.) | 0.1 |
| Strontium, Sr | 0.00 | 0.00 | EPA 200.7 | 0.01 | Total Susp. Solids (TSS) | NA | mg/L | SM 2540 D | 5.0 |

| *Other* | | | | QC | Results | | Range | Limits |
|---|---|---|---|---|---|---|---|---|
| | | | | Meas EC - Calc EC | 1.0 | | (0.9-1.1 ) EC | |
| Silica, as $SiO_2$ | 48.8 | N.A. | SM 3500-Si B | TDS - EC Ratio | 0.69 | | (0.55-0.70) | >2500 TDS |
| Sodium, Na (Calc.) | 135.2 | 5.88 | API RP-45 2.10 | Measured EC - Ion Sum | 0.9 | Cation | (0.9-1.1) EC | |
| | | | | | 0.9 | Anion | (0.9-1.1) EC | |

***Notes***

PQL - Praactical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of prcision and accuracy of the analytical methodology.

N.D. - Not Detected (below PQL)

TDS* - Cation and anion summation.

N.A. - Not applicable to report.

***Calcium Carbonate***
***Stability Index***

(+) =CaCO3 will tend to precipitate.

(-) = CaCO3 will tend to dissolve.

(±) = CaCO3 is at equilibrium.

QC____________Date____________


***References:***

1. APHA-AWWA; "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM, "Water," 1983 American Society for Testing and Material Vol11.01-02
3. EPA,"Methods for Chemical Analysis of Water and Wastes," 1983 EPA-600/4-79-020
4. API; "Analysis of Oil-Field Waters," 1981 2nd. Ed. American Petroleum Institute, API RP 45.
5. Patton, C.C.; "Applied Water Technology," 1986 C. C. Patton & Associates, Campbell Petroleum Series.


Laboratory Director
Midway Laboratory, Inc.

____________________Date____________

## *Laboratory Report*

*ELAP Cert. 1398A*

### *Geochemical Water Analysis*

| | | | |
|---|---|---|---|
| *Customer:* | Chevron Corporation | *Log # :* | 17240-1 |
| *Address:* | 9525 Camino Media | *Date in:* | 10/28/09 |
| | Bakersfield, CA 93311 | *Date out:* | 11/16/09 |
| *Attention:* | Ray Franze, Carla S | | |
| *Sample Description:* | Total Interdiction Water (comingled point) 24" pipe | | Rev 10-3-08 |

| Anions | mg/L | meq/L | Method #. | PQL(mg/L) | Calculations | Results | Units | Method # | PQL(mg/L) |
|---|---|---|---|---|---|---|---|---|---|
| Bicarbonate, $HCO_3$ | 334.1 | 5.47 | SM2320 B | 0.20 | Alkalinity, as $CaCO_3$ (Total) | 273.8 | mg/l | SM 2320 B | 0.10 |
| Carbonate, $CO_3$ | 0.00 | 0.00 | SM2320 B | 0.20 | Hardness, as $CaCO_3$ (Total) | 87.6 | mg/l | SM 2340 B | 0.10 |
| Chloride, Cl | 81.4 | 2.30 | EPA 300.0 | 0.01 | Salinity, as NaCl | 147.1 | mg/l | (Calc.) | 1.00 |
| Hydroxide, OH | 0.00 | 0.00 | SM2320 B | 0.20 | ***Calcium Carbonate*** | | | | |
| Nitrate, $NO_3$ | 0.00 | 0.00 | EPA 300.0 | 0.01 | Stability Index (Stiff Davis) | -0.18 | (Notes) | SM 2230 B | N.A. |
| Sulfate, $SO_4$ | 0.50 | 0.01 | EPA 300.0 | 0.02 | Langelier Saturation Index | -0.09 | (Notes) | SM 203 | N.A. |

| Cations | mg/L | meq/L | Method #. | PQL(mg/L) | Physical Data | Results | | Method # | PQL |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia, NH2 | 0.000 | 0.00 | EPA 200.7 | 0.01 | | | | | |
| Arsenic, As | 0.00 | NA | ASTM D 6919 | 0.10 | | | | | |
| Barium, Ba | 0.00 | 0.00 | SM3500-Ba B | 0.50 | Conductivity (Measured) | 850.0 | µmho's | SM 2510 B | 0.100 |
| Boron, B | 0.14 | 0.04 | EPA 200.7 | 0.10 | Resistivity | 11.7647 | ohm's | (Calc.) | 0.0005 |
| Calcium, Ca | 23.5 | 1.17 | SM3500-Ca B | 0.50 | Specific Gravity (60/60) | 1.0005 | units | API RP 45 | 0.0005 |
| Iron, Fe | 0.00 | 0.00 | SM3500-Fe B | 1.00 | Ionic strength | 0.009 | IS (µ) | (Calc.) | 0.001 |
| Magnesiumn, Mg | 7.00 | 0.58 | SM3500-Mg B | 0.50 | pH | 7.80 | units | SM 4500 H B | ± 0.01 |
| Potassium, K | 1.80 | 0.05 | SM3500-K B | 0.50 | Temperature | 68.0 | °F | SM 2550 B | ± 0.1 |
| Sodium, Na | 135 | 5.87 | SM3500-Na B | 5.00 | Total Diss. Solids (TDS)* | 583.4 | mg/L | (Calc.) | 0.1 |
| Strontium, Sr | 0.00 | 0.00 | EPA 200.7 | 0.01 | Total Susp. Solids (TSS) | NA | mg/L | SM 2540 D | 5.0 |

| Other | | | | QC | Results | | Range | Limits |
|---|---|---|---|---|---|---|---|---|
| | | | | Meas EC - Calc EC | 1.0 | | (0.9-1.1 ) EC | |
| Silica, as $SiO_2$ | 48.8 | N.A. | SM 3500-Si B | TDS - EC Ratio | 0.69 | | (0.55-0.70) | >2500 TDS |
| Sodium, Na (Calc.) | 135.1 | 5.88 | API RP-45 2.10 | Measured EC - Ion Sum | 0.9 | Cation | (0.9-1.1) EC | |
| | | | | | 0.9 | Anion | (0.9-1.1) EC | |

**Notes**

PQL - Praactical Quantitation Limit - The lowest level that can be reliably achieved within specific limits of prcision and accuracy of the analytical methodology.

N.D. - Not Detected (below PQL)

TDS* - Cation and anion summation.

N.A. - Not applicable to report.

*Calcium Carbonate*

***Stability Index***

(+) =CaCO3 will tend to precipitate.

(-) = CaCO3 will tend to dissolve.

(±) = CaCO3 is at equilibrium.

* Boron not analyzed

QC____________Date____________


***References:***

1. APHA-AWWA; "Standard Methods for the Examination of Water and Waste Water," 18-20 th. Ed. 1992-98
2. ASTM; "Water," 1983 American Society for Testing and Material Vol11.01-02
3. EPA;"Methods for Chemical Analysis of Water and Wastes," 1983 EPA-600/4-79-020
4. API; "Analysis of Oil-Field Waters," 1981 2nd. Ed American Petroleum Insitute, API RP 45
5. Patton, C.C., "Applied Water Technology," 1986 C. C. Patton & Associates, Campbell Petroleum Series.


Laboratory Director
Midway Laboratory, Inc.

________________Date__________

Date of Report: 06/16/2014

Dennis Gatson

McMor Chlorination, Inc.
6734 Charity Ave. #8
Bakersfield, CA 93308

Client Project: Chevron
BCL Project: Bacteriological
BCL Work Order: 1412972
Invoice ID:

Enclosed are the results of analyses for samples received by the laboratory on 6/11/2014. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Contact Person: Misty Orton
Client Service Rep

Authorized Signature

Certifications: CA ELAP #1186; NV #CA00014; AK UST101

# Table of Contents

| | | | |
|---|---|---|---|
| McMor Chlorination, Inc. | | **Reported:** | 06/16/2014 14:51 |
| 6734 Charity Ave. #8 | | Project: | Bacteriological |
| Bakersfield, CA 93308 | | Project Number: | Chevron |
| | | Project Manager: | Dennis Gatson |

# Laboratory / Client Sample Cross Reference

| Laboratory | Client Sample Information | | | |
|---|---|---|---|---|
| **1412972-01** | **COC Number:** | --- | **Receive Date:** | 06/11/2014 08:10 |
| | **Project Number:** | --- | **Sampling Date:** | 06/11/2014 07:19 |
| | **Sampling Location:** | --- | **Sample Depth:** | --- |
| | **Sampling Point:** | Chevron, Monte Cristo Well | **Lab Matrix:** | Water |
| | **Sampled By:** | K. Stanley | **Sample Type:** | Water |
| | | | District ID: | |
| | | | System Number: | |
| | | | Station Number: | |
| | | | Sample Site: Other | |
| | | | Residual Chlorine, ppm: | |
| | | | Lab Temperature, C: 8.9 | |

McMor Chlorination, Inc.
6734 Charity Ave. #8
Bakersfield, CA 93308

**Reported:** 06/16/2014 14:51
Project: Bacteriological
Project Number: Chevron
Project Manager: Dennis Gatson

**1412972-01**

# Water Analysis (Bacteriological)

| | | | |
|---|---|---|---|
| **COC Number:** | --- | **District ID:** | |
| **Project Number:** | --- | **System Number:** | |
| **Sampling Location:** | --- | **Station Number:** | |
| **Sampling Point:** | Chevron, Monte Cristo Well | **Sample Site:** | Other |
| **Sampled By:** | K. Stanley | **Residual Chlorine, ppm:** | |
| **Receive Date:** | 06/11/2014 08:10 | **Temperature, C:** | 8.9 |
| **Sampling Date:** | 06/11/2014 07:19 | | |
| **Sample Depth:** | --- | | |
| **Sample Matrix:** | Water | | |

## Colilert (10 Tubes)

| Constituent | Result | Units | Method | Analyst | Initial Dilution | Date Started | Date Completed | Lab Quals |
|---|---|---|---|---|---|---|---|---|
| Total Coliform, Confirmed Test | 0 | Positive Tubes | SM-9223B | FBV | 1 | 06/11/2014 10:30 | 06/12/2014 | |
| Total Coliform, Density | < 1.1 | MPN/100ml | SM-9223B | FBV | 1 | 06/11/2014 10:30 | 06/12/2014 | |
| E. Coli, Confirmed Test | 0 | Positive Tubes | SM-9223B | FBV | 1 | 06/11/2014 10:30 | 06/12/2014 | |
| E. Coli, Density | < 1.1 | MPN/100ml | SM-9223B | FBV | 1 | 06/11/2014 10:30 | 06/12/2014 | |

| | | | |
|---|---|---|---|
| McMor Chlorination, Inc. | | **Reported:** | 06/16/2014 14:51 |
| 6734 Charity Ave. #8 | | Project: | Bacteriological |
| Bakersfield, CA 93308 | | Project Number: | Chevron |
| | | Project Manager: | Dennis Gatson |

## Notes And Definitions

| | |
|---|---|
| MPN | Most Probable Number |

Date of Report: 05/20/2014

Dennis Gatson

McMor Chlorination, Inc.
6734 Charity Ave. #8
Bakersfield, CA 93308

| | |
|---|---|
| Client Project: | EH - 563 Chevron Monte Cristo Road |
| BCL Project: | Drinking Water Samples |
| BCL Work Order: | 1410663 |
| Invoice ID: | |

Enclosed are the results of analyses for samples received by the laboratory on 5/13/2014. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Contact Person: Misty Orton
Client Service Rep

Authorized Signature

# Table of Contents

BC Laboratories, Inc.
Environmental Testing Laboratory Since 1949

# BC Laboratories, Inc. Chain of Custody Form RUSH!

Page 1 of 1

| | |
|---|---|
| Report To: Client: McMor | Project #: EH-563 |
| Attn: D. Hutson | Project Name: Chevron |
| Street Address: | Monte Cristo Road |
| City, State, Zip: | Sampler(s): |
| Phone: Fax: | K. Stanley |
| Email Address: | |
| Work Order #: 14-10663 | |

Please refer to the back of this page for completion instructions and method legend.

Comments:

Are there any tests with holding times less than or equal to 48 hours? ☐ Yes ☐ No

* Standard Turnaround = 10 work days

| Sample # | Description | Date Sampled | Time Sampled | Analysis Requested: Irrigation Analysis | Flouride | Arsenic | Uranium | EDB/DBCP | Sample Matrix: Soil | Sludge | Drinking Water | Ground Water | Waste Water | Other | Turnaround # of work days* | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -1 | Well Discharge<br>KSI yard - Monte Cristo Rd | 5/13/14 | 10:44 | X | X | X | X | X | | | X | | | | | |

SHORT HOLDING TIME
$Cr^{+6}$ $NO_2$ $NO_3$ OP SS
DO $Cl_2$ BOD MBAS COT

CHK BY: NW
DISTRIBUTION: MLFMTSUM ☐
SUB-OUT ☐

**Billing** ☒ Same as above
Client:
Address:
City: State Zip
Attn:
PO#:

EDF Required? Geotracker ☒ Yes ☐ No

Send Copy to State of CA? (EDT) ☐ Yes ☒ No

Global ID (Needed for EDF)

System # (Needed for EDT)

| Relinquished By | Date | Time | Received By | Date | Time |
|---|---|---|---|---|---|
| 1. K Stanley | 5-13-14 | 15:23 | 1. [signature] | 5/13/14 | 1523 |
| 2. | | | 2. | | |
| 3. | | | 3. | | |

BC Laboratories, Inc. – 4100 Atlas Ct. – Bakersfield, CA 93308 – 661.327.4911 – Fax: 661.327.1918 – www.bclabs.com

**Chain of Custody and Cooler Receipt Form for 1410663 Page 2 of 2**

BC LABORATORIES INC. **COOLER RECEIPT FORM** Rev. No. 15 07/01/13 Page 1 Of 1

**Submission #:** 14-10663

| SHIPPING INFORMATION | SHIPPING CONTAINER | FREE LIQUID |
|---|---|---|
| Federal Express ☐ UPS ☐ Hand Delivery ☒<br>BC Lab Field Service ☐ Other ☐ (Specify)____ | Ice Chest ☒ None ☐ Box ☐<br>Other ☐ (Specify)____ | YES ☐ NO ☐ |

Refrigerant: Ice ☐ Blue Ice ☒ None ☐ Other ☐ Comments:

Custody Seals: Ice Chest ☐ (Intact? Yes ☐ No ☐) Containers ☐ (Intact? Yes ☐ No ☐) None ☒ Comments:

All samples received? Yes ☒ No ☐ All samples containers intact? Yes ☒ No ☐ Description(s) match COC? Yes ☒ No ☐

COC Received ☒ YES ☐ NO

Emissivity: 0.95 Container: Other Thermometer ID: 207 Date/Time 5/13/14

Temperature: (A) 21.8 °C / (C) 21.8 °C Analyst Init MAM 1523

| SAMPLE CONTAINERS | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| QT GENERAL MINERAL/ GENERAL | BC | | | | | | | | | |
| PT PE UNPRESERVED | | | | | | | | | | |
| QT INORGANIC CHEMICAL METALS | | | | | | | | | | |
| PT INORGANIC CHEMICAL METALS | D | | | | | | | | | |
| PT CYANIDE | | | | | | | | | | |
| PT NITROGEN FORMS | | | | | | | | | | |
| PT TOTAL SULFIDE | | | | | | | | | | |
| 2oz. NITRATE / NITRITE | | | | | | | | | | |
| PT TOTAL ORGANIC CARBON | | | | | | | | | | |
| PT TOX | | | | | | | | | | |
| PT CHEMICAL OXYGEN DEMAND | | | | | | | | | | |
| PtA PHENOLICS | | | | | | | | | | |
| 40ml VOA VIAL TRAVEL BLANK | | | | | | | | | | |
| 40ml VOA VIAL | ( ) | ( ) | ( ) | ( ) | ( ) | ( ) | ( ) | ( ) | ( ) | ( ) |
| QT EPA 413.1, 413.2, 418.1 | | | | | | | | | | |
| PT ODOR | | | | | | | | | | |
| RADIOLOGICAL | | | | | | | | | | |
| BACTERIOLOGICAL | | | | | | | | | | |
| 40 ml VOA VIAL- 504 | A(3) | | | | | | | | | |
| QT EPA 508/608/8080 | | | | | | | | | | |
| QT EPA 515.1/8150 | | | | | | | | | | |
| QT EPA 525 | | | | | | | | | | |
| QT EPA 525 TRAVEL BLANK | | | | | | | | | | |
| 100ml EPA 547 | | | | | | | | | | |
| 100ml EPA 531.1 | | | | | | | | | | |
| QT EPA 548 | | | | | | | | | | |
| QT EPA 549 | | | | | | | | | | |
| QT EPA 632 | | | | | | | | | | |
| QT EPA 8015M | | | | | | | | | | |
| QT AMBER | | | | | | | | | | |
| 8 OZ. JAR | | | | | | | | | | |
| 32 OZ. JAR | | | | | | | | | | |
| SOIL SLEEVE | | | | | | | | | | |
| PCB VIAL | | | | | | | | | | |
| PLASTIC BAG | | | | | | | | | | |
| FERROUS IRON | | | | | | | | | | |
| ENCORE | | | | | | | | | | |
| SMART KIT | | | | | | | | | | |
| Summa Canister | | | | | | | | | | |

Comments:

Sample Numbering Completed By: MVI Date/Time: 5/13/14 @ 1550

| | | | |
|---|---|---|---|
| McMor Chlorination, Inc. | | **Reported:** | 05/20/2014 15:15 |
| 6734 Charity Ave. #8 | | Project: | Drinking Water Samples |
| Bakersfield, CA 93308 | | Project Number: | EH - 563 Chevron Monte Cristo Road |
| | | Project Manager: | Dennis Gatson |

# Laboratory / Client Sample Cross Reference

| Laboratory | Client Sample Information | | | |
|---|---|---|---|---|
| **1410663-01** | **COC Number:** | --- | **Receive Date:** | 05/13/2014 15:23 |
| | **Project Number:** | --- | **Sampling Date:** | 05/13/2014 10:54 |
| | **Sampling Location:** | --- | **Sample Depth:** | --- |
| | **Sampling Point:** | Well Discharge - KSI Yard - Monte Cristo Rd. | **Lab Matrix:** | Water |
| | **Sampled By:** | K. Stanley | **Sample Type:** | Drinking Water |

McMor Chlorination, Inc.
6734 Charity Ave. #8
Bakersfield, CA 93308

**Reported:** 05/20/2014 15:15
Project: Drinking Water Samples
Project Number: EH - 563 Chevron Monte Cristo Road
Project Manager: Dennis Gatson

# EDB/DBCP Analysis (EPA Method 504.1)

**BCL Sample ID:** 1410663-01 **Client Sample Name:** Well Discharge - KSI Yard - Monte Cristo Rd., 5/13/2014 10:54:00AM, K. Stanley

| Constituent | Result | Units | PQL | MDL | Method | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| 1,2-Dibromo-3-chloropropane | <0.010 | ug/L | 0.010 | | EPA-504.1 | ND | | 1 |
| Ethylene dibromide | <0.010 | ug/L | 0.010 | | EPA-504.1 | ND | | 1 |

| Run # | Method | Prep Date | Run Date/Time | Analyst | Instrument | Dilution | QC Batch ID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-504.1 | 05/15/14 | 05/16/14 15:19 | VH1 | GC-4 | 0.949 | BXE1366 |

McMor Chlorination, Inc.
6734 Charity Ave. #8
Bakersfield, CA 93308

**Reported:** 05/20/2014 15:15
Project: Drinking Water Samples
Project Number: EH - 563 Chevron Monte Cristo Road
Project Manager: Dennis Gatson

# Water Analysis (General Chemistry)

**BCL Sample ID:** 1410663-01 | **Client Sample Name:** Well Discharge - KSI Yard - Monte Cristo Rd., 5/13/2014 10:54:00AM, K. Stanley

| Constituent | Result | Units | PQL | MDL | Method | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| **Dissolved Calcium** | **83** | **mg/L** | **0.10** | | **EPA-6010B** | ND | | 1 |
| **Dissolved Magnesium** | **2.4** | **mg/L** | **0.050** | | **EPA-6010B** | ND | | 1 |
| **Dissolved Sodium** | **78** | **mg/L** | **0.50** | | **EPA-6010B** | ND | | 1 |
| **Dissolved Potassium** | **3.5** | **mg/L** | **1.0** | | **EPA-6010B** | ND | | 1 |
| **Bicarbonate** | **38** | **mg/L** | **5.0** | | **EPA-310.1** | ND | | 2 |
| Carbonate | <2.5 | mg/L | 2.5 | | EPA-310.1 | ND | | 2 |
| Hydroxide | <1.4 | mg/L | 1.4 | | EPA-310.1 | ND | | 2 |
| **Chloride** | **160** | **mg/L** | **0.50** | | **EPA-300.0** | ND | | 3 |
| Fluoride | <0.050 | mg/L | 0.050 | | EPA-300.0 | ND | | 3 |
| Nitrate as N | <0.10 | mg/L | 0.10 | | EPA-300.0 | ND | | 3 |
| Nitrate as NO3 | <0.44 | mg/L | 0.44 | | Calc | ND | | 4 |
| **Sulfate** | **150** | **mg/L** | **1.0** | | **EPA-300.0** | ND | | 3 |
| **Dissolved Total Cations** | **7.8** | **meq/L** | **0.10** | | **Calc** | ND | | 4 |
| **Total Anions** | **8.2** | **meq/L** | **0.10** | | **Calc** | ND | | 4 |
| **Adjusted Sodium Adsorption Ratio (SAR-adj)** | **2.9** | **NA** | **0.010** | | **Calc** | ND | | 4 |
| **Extractable Sodium Percentage (ESP)** | **2.1** | **NA** | **0.010** | | **Calc** | ND | | 4 |
| Gypsum Requirement | <0.010 | #100% gyp/hr/100 gal | 0.010 | | Calc | ND | | 4 |
| **Dissolved Hardness as CaCO3** | **220** | **mg/L** | **0.50** | | **Calc** | ND | | 4 |
| **pHc** | **8.1** | **NA** | **0.010** | | **Calc** | ND | | 4 |
| **Sodium Adsorption Ratio (SAR)** | **2.3** | **NA** | **0.10** | | **Calc** | ND | | 4 |
| **TDS (by summation)** | **500** | **mg/L** | **10** | | **Calc** | ND | | 4 |
| **pH** | **7.76** | **pH Units** | **0.05** | | **EPA-150.1** | | **S05** | 5 |
| **Electrical Conductivity @ 25 C** | **853** | **umhos/cm** | **1.00** | | **EPA-120.1** | | | 6 |

| Run # | Method | Prep Date | Run Date/Time | Analyst | Instrument | Dilution | QC Batch ID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-6010B | 05/14/14 | 05/16/14 16:22 | ARD | PE-OP1 | 1 | BXE1092 |
| 2 | EPA-310.1 | 05/14/14 | 05/14/14 12:10 | RML | MET-1 | 1 | BXE1212 |
| 3 | EPA-300.0 | 05/13/14 | 05/14/14 01:54 | LD1 | IC2 | 1 | BXE1198 |
| 4 | Calc | 05/13/14 | 05/19/14 16:36 | TMS | Calc | 1 | BXE1137 |
| 5 | EPA-150.1 | 05/14/14 | 05/14/14 12:10 | RML | MET-1 | 1 | BXE1212 |
| 6 | EPA-120.1 | 05/14/14 | 05/14/14 12:10 | RML | MET-1 | 1 | BXE1212 |

| | | |
|---|---|---|
| McMor Chlorination, Inc. | **Reported:** | 05/20/2014 15:15 |
| 6734 Charity Ave. #8 | Project: | Drinking Water Samples |
| Bakersfield, CA 93308 | Project Number: | EH - 563 Chevron Monte Cristo Road |
| | Project Manager: | Dennis Gatson |

# Metals Analysis

**BCL Sample ID:** 1410663-01 **Client Sample Name:** Well Discharge - KSI Yard - Monte Cristo Rd., 5/13/2014 10:54:00AM, K. Stanley

| Constituent | Result | Units | PQL | MDL | Method | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| **Dissolved Boron** | **0.14** | **mg/L** | **0.10** | | **EPA-6010B** | ND | | 1 |
| Total Recoverable Arsenic | <2.0 | ug/L | 2.0 | | EPA-200.8 | ND | | 2 |
| Total Recoverable Uranium | <0.67 | pCi/L | 0.67 | | EPA-200.8 | ND | | 2 |

| Run # | Method | Prep Date | Run Date/Time | Analyst | Instrument | Dilution | QC Batch ID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-6010B | 05/14/14 | 05/16/14 16:22 | ARD | PE-OP1 | 1 | BXE1092 |
| 2 | EPA-200.8 | 05/14/14 | 05/15/14 20:27 | EAR | PE-EL2 | 1 | BXE1266 |

| | | |
|---|---|---|
| McMor Chlorination, Inc. | **Reported:** | 05/20/2014 15:15 |
| 6734 Charity Ave. #8 | Project: | Drinking Water Samples |
| Bakersfield, CA 93308 | Project Number: | EH - 563 Chevron Monte Cristo Road |
| | Project Manager: | Dennis Gatson |

# EDB/DBCP Analysis (EPA Method 504.1)

## Quality Control Report - Method Blank Analysis

| Constituent | QC Sample ID | MB Result | Units | PQL | MDL | Lab Quals |
|---|---|---|---|---|---|---|
| **QC Batch ID: BXE1366** | | | | | | |
| 1,2-Dibromo-3-chloropropane | BXE1366-BLK1 | <0.010 | ug/L | 0.010 | | |
| Ethylene dibromide | BXE1366-BLK1 | <0.010 | ug/L | 0.010 | | |

McMor Chlorination, Inc.
6734 Charity Ave. #8
Bakersfield, CA 93308

**Reported:** 05/20/2014 15:15
Project: Drinking Water Samples
Project Number: EH - 563 Chevron Monte Cristo Road
Project Manager: Dennis Gatson

# EDB/DBCP Analysis (EPA Method 504.1)

## Quality Control Report - Laboratory Control Sample

| Constituent | QC Sample ID | Type | Result | Spike Level | Units | Percent Recovery | RPD | Control Limits: Percent Recovery | Control Limits: RPD | Lab Quals |
|---|---|---|---|---|---|---|---|---|---|---|
| **QC Batch ID: BXE1366** | | | | | | | | | | |
| 1,2-Dibromo-3-chloropropane | BXE1366-BS1 | LCS | 0.34829 | 0.35714 | ug/L | 97.5 | | 50 - 140 | | |
| Ethylene dibromide | BXE1366-BS1 | LCS | 0.37817 | 0.35714 | ug/L | 106 | | 60 - 150 | | |

| | | |
|---|---|---|
| McMor Chlorination, Inc.<br>6734 Charity Ave. #8<br>Bakersfield, CA 93308 | **Reported:**<br>Project:<br>Project Number:<br>Project Manager: | 05/20/2014 15:15<br>Drinking Water Samples<br>EH - 563 Chevron Monte Cristo Road<br>Dennis Gatson |

# EDB/DBCP Analysis (EPA Method 504.1)

## Quality Control Report - Precision & Accuracy

| Constituent | Type | Source Sample ID | Source Result | Result | Spike Added | Units | RPD | Percent Recovery | Control Limits RPD | Control Limits Percent Recovery | Lab Quals |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **QC Batch ID: BXE1366** | Used client sample: N | | | | | | | | | | |
| 1,2-Dibromo-3-chloropropane | MS | 1407468-70 | ND | 0.34360 | 0.35714 | ug/L | | 96.2 | | 30 - 150 | |
| | MSD | 1407468-70 | ND | 0.41269 | 0.35714 | ug/L | 18.3 | 116 | 30 | 30 - 150 | |
| Ethylene dibromide | MS | 1407468-70 | ND | 0.39869 | 0.35714 | ug/L | | 112 | | 40 - 160 | |
| | MSD | 1407468-70 | ND | 0.47463 | 0.35714 | ug/L | 17.4 | 133 | 30 | 40 - 160 | |

| McMor Chlorination, Inc. | **Reported:** | 05/20/2014 15:15 |
|---|---|---|
| 6734 Charity Ave. #8 | Project: | Drinking Water Samples |
| Bakersfield, CA 93308 | Project Number: | EH - 563 Chevron Monte Cristo Road |
| | Project Manager: | Dennis Gatson |

# Water Analysis (General Chemistry)

## Quality Control Report - Method Blank Analysis

| Constituent | QC Sample ID | MB Result | Units | PQL | MDL | Lab Quals |
|---|---|---|---|---|---|---|
| **QC Batch ID: BXE1092** | | | | | | |
| Dissolved Calcium | BXE1092-BLK1 | <0.10 | mg/L | 0.10 | | |
| Dissolved Magnesium | BXE1092-BLK1 | <0.050 | mg/L | 0.050 | | |
| Dissolved Sodium | BXE1092-BLK1 | <0.50 | mg/L | 0.50 | | |
| Dissolved Potassium | BXE1092-BLK1 | <1.0 | mg/L | 1.0 | | |
| **QC Batch ID: BXE1137** | | | | | | |
| Nitrate as NO3 | BXE1137-BLK1 | <0.44 | mg/L | 0.44 | | |
| Dissolved Total Cations | BXE1137-BLK1 | <0.10 | meq/L | 0.10 | | |
| Total Anions | BXE1137-BLK1 | <0.10 | meq/L | 0.10 | | |
| Adjusted Sodium Adsorption Ratio (SAR-adj) | BXE1137-BLK1 | <0.010 | NA | 0.010 | | |
| Extractable Sodium Percentage (ESP) | BXE1137-BLK1 | <0.010 | NA | 0.010 | | |
| Gypsum Requirement | BXE1137-BLK1 | <0.010 | 100% gyp/hr/100 ga | 0.010 | | |
| Dissolved Hardness as CaCO3 | BXE1137-BLK1 | <0.50 | mg/L | 0.50 | | |
| pHc | BXE1137-BLK1 | <0.010 | NA | 0.010 | | |
| Sodium Adsorption Ratio (SAR) | BXE1137-BLK1 | <0.10 | NA | 0.10 | | |
| TDS (by summation) | BXE1137-BLK1 | <10 | mg/L | 10 | | |
| **QC Batch ID: BXE1198** | | | | | | |
| Chloride | BXE1198-BLK1 | <0.50 | mg/L | 0.50 | | |
| Fluoride | BXE1198-BLK1 | <0.050 | mg/L | 0.050 | | |
| Nitrate as N | BXE1198-BLK1 | <0.10 | mg/L | 0.10 | | |
| Sulfate | BXE1198-BLK1 | <1.0 | mg/L | 1.0 | | |
| **QC Batch ID: BXE1212** | | | | | | |
| Bicarbonate | BXE1212-BLK1 | <5.0 | mg/L | 5.0 | | |
| Carbonate | BXE1212-BLK1 | <2.5 | mg/L | 2.5 | | |
| Hydroxide | BXE1212-BLK1 | <1.4 | mg/L | 1.4 | | |

| | | |
|---|---|---|
| McMor Chlorination, Inc. | **Reported:** | 05/20/2014 15:15 |
| 6734 Charity Ave. #8 | Project: | Drinking Water Samples |
| Bakersfield, CA 93308 | Project Number: | EH - 563 Chevron Monte Cristo Road |
| | Project Manager: | Dennis Gatson |

# Water Analysis (General Chemistry)

## Quality Control Report - Laboratory Control Sample

| Constituent | QC Sample ID | Type | Result | Spike Level | Units | Percent Recovery | RPD | Control Limits: Percent Recovery | Control Limits: RPD | Lab Quals |
|---|---|---|---|---|---|---|---|---|---|---|
| **QC Batch ID: BXE1092** | | | | | | | | | | |
| Dissolved Calcium | BXE1092-BS1 | LCS | 9.8422 | 10.000 | mg/L | 98.4 | | 85 - 115 | | |
| Dissolved Magnesium | BXE1092-BS1 | LCS | 10.340 | 10.000 | mg/L | 103 | | 85 - 115 | | |
| Dissolved Sodium | BXE1092-BS1 | LCS | 9.8701 | 10.000 | mg/L | 98.7 | | 85 - 115 | | |
| Dissolved Potassium | BXE1092-BS1 | LCS | 9.6385 | 10.000 | mg/L | 96.4 | | 85 - 115 | | |
| **QC Batch ID: BXE1198** | | | | | | | | | | |
| Chloride | BXE1198-BS1 | LCS | 52.254 | 50.000 | mg/L | 105 | | 90 - 110 | | |
| Fluoride | BXE1198-BS1 | LCS | 0.93900 | 1.0000 | mg/L | 93.9 | | 90 - 110 | | |
| Nitrate as N | BXE1198-BS1 | LCS | 5.2700 | 5.0000 | mg/L | 105 | | 90 - 110 | | |
| Sulfate | BXE1198-BS1 | LCS | 105.16 | 100.00 | mg/L | 105 | | 90 - 110 | | |
| **QC Batch ID: BXE1212** | | | | | | | | | | |
| pH | BXE1212-BS2 | LCS | 7.0300 | 7.0000 | pH Units | 100 | | 95 - 105 | | |
| Electrical Conductivity @ 25 C | BXE1212-BS1 | LCS | 306.70 | 303.00 | umhos/cm | 101 | | 90 - 110 | | |

# BC Laboratories, Inc.
Environmental Testing Laboratory Since 1949

| | |
|---|---|
| McMor Chlorination, Inc.<br>6734 Charity Ave. #8<br>Bakersfield, CA 93308 | **Reported:** 05/20/2014 15:15<br>Project: Drinking Water Samples<br>Project Number: EH - 563 Chevron Monte Cristo Road<br>Project Manager: Dennis Gatson |

## Water Analysis (General Chemistry)

### Quality Control Report - Precision & Accuracy

| Constituent | Type | Source Sample ID | Source Result | Result | Spike Added | Units | RPD | Percent Recovery | Control Limits RPD | Control Limits Percent Recovery | Lab Quals |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **QC Batch ID: BXE1092** | Used client sample: Y - Description: Well Discharge - KSI Yard - Monte Cristo Rd., 05/13/2014 10:54 | | | | | | | | | | |
| Dissolved Calcium | DUP | 1410663-01 | 83.041 | 82.939 | | mg/L | 0.1 | | 20 | | |
| | MS | 1410663-01 | 83.041 | 92.527 | 10.204 | mg/L | | 93.0 | | 75 - 125 | |
| | MSD | 1410663-01 | 83.041 | 91.772 | 10.204 | mg/L | 0.8 | 85.6 | 20 | 75 - 125 | |
| Dissolved Magnesium | DUP | 1410663-01 | 2.4150 | 2.4373 | | mg/L | 0.9 | | 20 | | |
| | MS | 1410663-01 | 2.4150 | 12.538 | 10.204 | mg/L | | 99.2 | | 75 - 125 | |
| | MSD | 1410663-01 | 2.4150 | 12.621 | 10.204 | mg/L | 0.7 | 100 | 20 | 75 - 125 | |
| Dissolved Sodium | DUP | 1410663-01 | 77.602 | 77.057 | | mg/L | 0.7 | | 20 | | |
| | MS | 1410663-01 | 77.602 | 87.874 | 10.204 | mg/L | | 101 | | 75 - 125 | |
| | MSD | 1410663-01 | 77.602 | 86.486 | 10.204 | mg/L | 1.6 | 87.1 | 20 | 75 - 125 | |
| Dissolved Potassium | DUP | 1410663-01 | 3.4764 | 3.4383 | | mg/L | 1.1 | | 20 | | |
| | MS | 1410663-01 | 3.4764 | 13.598 | 10.204 | mg/L | | 99.2 | | 75 - 125 | |
| | MSD | 1410663-01 | 3.4764 | 13.391 | 10.204 | mg/L | 1.5 | 97.2 | 20 | 75 - 125 | |
| **QC Batch ID: BXE1198** | Used client sample: N | | | | | | | | | | |
| Chloride | DUP | 1410650-01 | 67.802 | 67.699 | | mg/L | 0.2 | | 10 | | |
| | MS | 1410650-01 | 67.802 | 119.40 | 50.505 | mg/L | | 102 | | 80 - 120 | |
| | MSD | 1410650-01 | 67.802 | 119.36 | 50.505 | mg/L | 0.0 | 102 | 10 | 80 - 120 | |
| Fluoride | DUP | 1410650-01 | 0.29400 | 0.29700 | | mg/L | 1.0 | | 10 | | |
| | MS | 1410650-01 | 0.29400 | 1.2859 | 1.0101 | mg/L | | 98.2 | | 80 - 120 | |
| | MSD | 1410650-01 | 0.29400 | 1.2848 | 1.0101 | mg/L | 0.1 | 98.1 | 10 | 80 - 120 | |
| Nitrate as N | DUP | 1410650-01 | 4.1820 | 4.1290 | | mg/L | 1.3 | | 10 | | |
| | MS | 1410650-01 | 4.1820 | 9.5505 | 5.0505 | mg/L | | 106 | | 80 - 120 | |
| | MSD | 1410650-01 | 4.1820 | 9.5505 | 5.0505 | mg/L | 0 | 106 | 10 | 80 - 120 | |
| Sulfate | DUP | 1410650-01 | 104.96 | 104.55 | | mg/L | 0.4 | | 10 | | |
| | MS | 1410650-01 | 104.96 | 212.15 | 101.01 | mg/L | | 106 | | 80 - 120 | |
| | MSD | 1410650-01 | 104.96 | 211.97 | 101.01 | mg/L | 0.1 | 106 | 10 | 80 - 120 | |
| **QC Batch ID: BXE1212** | Used client sample: N | | | | | | | | | | |
| Bicarbonate | DUP | 409339-01RE1 | 387.30 | 387.87 | | mg/L | 0.1 | | 10 | | |
| Carbonate | DUP | 409339-01RE1 | ND | <2.5 | | mg/L | | | 10 | | |
| Hydroxide | DUP | 409339-01RE1 | ND | <1.4 | | mg/L | | | 10 | | |
| pH | DUP | 409339-01RE1 | 7.4200 | 7.4300 | | pH Units | 0.1 | | 20 | | |
| Electrical Conductivity @ 25 C | DUP | 409339-01RE1 | 934.80 | 931.40 | | umhos/cm | 0.4 | | 10 | | |

| | |
|---|---|
| McMor Chlorination, Inc.<br>6734 Charity Ave. #8<br>Bakersfield, CA 93308 | **Reported:** 05/20/2014 15:15<br>Project: Drinking Water Samples<br>Project Number: EH - 563 Chevron Monte Cristo Road<br>Project Manager: Dennis Gatson |

# Metals Analysis

## Quality Control Report - Method Blank Analysis

| Constituent | QC Sample ID | MB Result | Units | PQL | MDL | Lab Quals |
|---|---|---|---|---|---|---|
| **QC Batch ID: BXE1092** | | | | | | |
| Dissolved Boron | BXE1092-BLK1 | <0.10 | mg/L | 0.10 | | |
| **QC Batch ID: BXE1266** | | | | | | |
| Total Recoverable Arsenic | BXE1266-BLK1 | <2.0 | ug/L | 2.0 | | |
| Total Recoverable Uranium | BXE1266-BLK1 | <0.67 | pCi/L | 0.67 | | |

McMor Chlorination, Inc.
6734 Charity Ave. #8
Bakersfield, CA 93308

**Reported:** 05/20/2014 15:15
Project: Drinking Water Samples
Project Number: EH - 563 Chevron Monte Cristo Road
Project Manager: Dennis Gatson

# Metals Analysis

## Quality Control Report - Laboratory Control Sample

| Constituent | QC Sample ID | Type | Result | Spike Level | Units | Percent Recovery | RPD | Control Limits Percent Recovery | Control Limits RPD | Lab Quals |
|---|---|---|---|---|---|---|---|---|---|---|
| **QC Batch ID: BXE1092** | | | | | | | | | | |
| Dissolved Boron | BXE1092-BS1 | LCS | 0.98407 | 1.0000 | mg/L | 98.4 | | 85 - 115 | | |
| **QC Batch ID: BXE1266** | | | | | | | | | | |
| Total Recoverable Arsenic | BXE1266-BS1 | LCS | 109.20 | 100.00 | ug/L | 109 | | 85 - 115 | | |
| Total Recoverable Uranium | BXE1266-BS1 | LCS | 29.786 | 26.800 | pCi/L | 111 | | 85 - 115 | | |

| | |
|---|---|
| McMor Chlorination, Inc. | **Reported:** 05/20/2014 15:15 |
| 6734 Charity Ave. #8 | Project: Drinking Water Samples |
| Bakersfield, CA 93308 | Project Number: EH - 563 Chevron Monte Cristo Road |
| | Project Manager: Dennis Gatson |

# Metals Analysis

## Quality Control Report - Precision & Accuracy

| Constituent | Type | Source Sample ID | Source Result | Result | Spike Added | Units | RPD | Percent Recovery | Control Limits RPD | Control Limits Percent Recovery | Lab Quals |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **QC Batch ID: BXE1092** | Used client sample: Y - Description: Well Discharge - KSI Yard - Monte Cristo Rd., 05/13/2014 10:54 | | | | | | | | | | |
| Dissolved Boron | DUP | 1410663-01 | 0.13614 | 0.13412 | | mg/L | 1.5 | | 20 | | |
| | MS | 1410663-01 | 0.13614 | 1.1901 | 1.0204 | mg/L | | 103 | | 75 - 125 | |
| | MSD | 1410663-01 | 0.13614 | 1.1889 | 1.0204 | mg/L | 0.1 | 103 | 20 | 75 - 125 | |
| **QC Batch ID: BXE1266** | Used client sample: Y - Description: Well Discharge - KSI Yard - Monte Cristo Rd., 05/13/2014 10:54 | | | | | | | | | | |
| Total Recoverable Arsenic | DUP | 1410663-01 | ND | <2.0 | | ug/L | | | 20 | | |
| | MS | 1410663-01 | ND | 127.92 | 102.04 | ug/L | | 125 | | 70 - 130 | |
| | MSD | 1410663-01 | ND | 125.41 | 102.04 | ug/L | 2.0 | 123 | 20 | 70 - 130 | |
| Total Recoverable Uranium | DUP | 1410663-01 | ND | <0.67 | | pCi/L | | | 20 | | |
| | MS | 1410663-01 | ND | 30.536 | 27.347 | pCi/L | | 112 | | 70 - 130 | |
| | MSD | 1410663-01 | ND | 31.962 | 27.347 | pCi/L | 4.6 | 117 | 20 | 70 - 130 | |

| | | | |
|---|---|---|---|
| McMor Chlorination, Inc. | | **Reported:** | 05/20/2014 15:15 |
| 6734 Charity Ave. #8 | | Project: | Drinking Water Samples |
| Bakersfield, CA 93308 | | Project Number: | EH - 563 Chevron Monte Cristo Road |
| | | Project Manager: | Dennis Gatson |

## Notes And Definitions

| | |
|---|---|
| MDL | Method Detection Limit |
| ND | Analyte Not Detected at or above the reporting limit |
| PQL | Practical Quantitation Limit |
| RPD | Relative Percent Difference |
| S05 | The sample holding time was exceeded. |

SHEET

# ENVIRONMENTAL HEALTH SERVICES DEPARTMENT

**RESERVOIR (Use for all distribution storage, chlorine contact tanks, sand traps, etc.)**

(1) Place and Owner: PM. 9175 (PORTION OF NE 1/4, SW 1/4, SEC. 8, T29S, R28E, MDM.
OWNER: RIVER RANCHES MUTUAL WATER COMPANY, INC.

(2) Source of Information: ELWOOD CHAMPNESS

Collected by: FRED PORTER Date: 6-30-99

| | | |
|---|---|---|
| (3) Number or Name | STORAGE TANKS #1 & #2 | HORIZONTAL PRESSURE VESSEL |
| Date constructed: | N/A | N/A |
| Purpose (storage, sand trap, etc.): | STORAGE | STORAGE & SURGE PROTECTION |
| Capacity: | 10,000 GAL EACH | 4000 GAL |
| (4) Location: (specific) | SW COR. PAR 2, PM 9175 | SW COR. PAR 2, PM 9175 |
| Neighborhood: | RIVER RANCHES | RIVER RANCHES |
| Size of lot: | 10,000 SQ. FT | 10,000 SQ. FT. |
| Fencing: | CHAIN LINK, 6' HIGH | CHAIN LINK, 6' HIGH |
| (5) Construction: | | |
| Material: | | |
| Sides: | 12 GA. STEEL | 1/4" STEEL WALLS & HEADS |
| Floor: | 12 GA. STEEL | N/A |
| Cover or roof: | 12 GA STEEL | N/A |
| Height top of walls above ground: | 12'-6" | 8' |
| Surface drainage to reservoir possible? | NO | NO |
| Ventilation: | OVERFLOW PIPE | NO (CLOSED SYSTEM) |
| Screening: | YES | NO |
| (6) Inlet and Outlet Arrangement: | | |
| Inlet: | | |
| Location: | 4"⌀ NEAR BOTTOM | 6"⌀ @ EAST END |
| Distance above bottom: | 12" | @ BOTTOM |
| Outlet: | | |
| Distance from inlet: | 10' | 15' I |
| Distance above bottom: | 12" | @ BOTTOM |
| Drain to where: | TO STREET | CLOSED SYSTEM, N/A |
| Overflow to where: | SPLASH PAD & TO STREET | N/A |
| Sewer or other hazardous connection (if so, make sketch on back) | NONE | NONE |
| (7) Relation to System: | | |
| Receives from: | WELL #1 & WELL #2 | BOOSTER PUMPS |
| Delivers to: | BOOSTER PUMPS | DISTRIBUTION SYSTEM |
| (8) Defects and Remarks: (Include statements on cleaning practices, condition of structure--particularly of roof, dimensions and shape of reservoir, leakage, kind and location of access openings, protection against insects, birds and rodents.) | STORAGE TANKS ARE 12' DIA x 12' HIGH WITH AN 18" DIA MH. @ TOP WITH LOCABLE COVER. THE OVERFLOW IS PROTECTED W/A SCREEN | PRESSURE VESSEL IS 6' DIA x 21' LONG WITH A BOLTED ACCESS MANHOLE @ ONE END. (CLOSED SYSTEM) |

W18

COUNTY OF KERN
ENVIRONMENTAL HEALTH SERVICES DEPARTMENT

SHE!

WELL DATA

PM 9175 (PORTION OF NE1/4, SW1/4, SEC 8, T.29S, R.28E. MDM)

(1) Place and Owner RIVER RANCHES MUTUAL WATER COMPANY, INC

(2) Source of Information ELWOOD CHAMPNESS

Collected by FRED PORTER Date 6-30-99

| | | | |
|---|---|---|---|
| (3) Number or Name | WELL #1 | WELL #2 | |
| Date drilled | UNKNOWN | UNKNOWN | |
| (4) Location: Neighborhood | PM 9175 | PM 9175 | |
| Size of lot | 10,000 SF | 10,000 SF | |
| Distance to: Sewer | N/A | N/A | |
| Sewage Disposal | NONE NEARBY | NONE NEARBY | |
| Abandoned well | UNKNOWN | UNKNOWN | |
| Nearest property line | 75' | 40' | |
| (5) Housing: Type | NONE | NONE | |
| Condition | N/A | N/A | |
| Pit depth (if any) | N/A | N/A | |
| Floor (material) | N/A | N/A | |
| Drainage | N/A | N/A | |
| (6) Well depth | 970' | 131' | |
| (7) Casing: Depth | 970' | 131' | |
| Diameter | 12" | 12" | |
| Kind | STEEL | STEEL | |
| Height above floor | 12" | 12" | |
| Distance to highest perforation | 497 FT. | 80 FT. | |
| Surface sealed (yes or no) | YES | YES | |
| Gravel pack (yes or no) | YES | YES | |
| Second casing depth | N/A | N/A | |
| Second casing diameter | N/A | N/A | |
| Annular seal (depth) | NONE | NONE | |
| (8) Impervious Strata: Penetrated (Thickness | UNKNOWN | UNKNOWN | |
| (Depth to | UNKNOWN | UNKNOWN | |
| (9) Water Levels: Depth to (Surface | 228 FT | 32 FT | |
| (Static | 228 FT | 32 FT | |
| (When pumping | UNKNOWN | UNKNOWN | |
| (10) Pump: Make | INGERSOLL-DRESSER | CARVER | |
| Type | VERT. TURBINE | SUBMERSIBLE | |
| Capacity, g.p.m. | 300 | 100 | |
| Lubrication | OIL | WATER | |
| Power | 50 HP 230/460V, 3PH | 10 HP 230/460 V 3PH | |
| Auxiliary power | NONE | GENERATOR ELECTRICAL | |
| Control | LIQ. LEVEL | LIQ. LEVEL (WARRICK) | |
| Discharge location | 55' SOUTH | 120' SOUTH | |
| Discharge to | STORAGE TANKS | STORAGE TANKS | |
| (11) Frequency of Use | EVERY DAY | EMERGENCY | |
| (12) Flood Hazard | NONE | NONE | |

(13) Remarks and Defects
(Use other side if necessary)

(14) Attach Well Driller's Report

V18

(WELL DRILLER'S REPORTS ARE NOT AVAILABLE)

ELWOOD CHAMPNESS / JIMMIE ICARDO
RIVER RANCHES
5279 Fallgatter Street
Bakersfield, CA 93308

MAY - 9 2000

May 8, 2000

Kern County Environmental Health
2700 M Street
Bakersfield, CA 93301

Re: River Ranches Water System

Attn.: Gale Frye

Dear Ms. Frye:

Enclosed are copies of the latest analysis on our water well. Please send copies of the Department approvals to the following addresses:

River Ranches
c/o Elwood Champness
5279 Fallgatter Street
Bakersfield, CA 93308

Porter Robertson Engineering
Fred Porter
1200 East 21st Street
Bakersfield, CA 93301

Thank you for your assistance in this matter.

Sincerely,

Elwood Champness/wjc

Elwood Champness

**TRUESDAIL LABORATORIES, INC.**

INDEPENDENT TESTING, FORENSIC SCIENCE, AND ENVIRONMENTAL ANALYSES

Established 193

14201 FRANKLIN AVENUE
TUSTIN, CALIFORNIA 92780-700
(714) 730-6239 · FAX (714) 730-646
www.truesdail.com

# REPORT

**CLIENT:** BC LABORATORES INC
4100 Atlas Court
Bakersfield, CA 93308
ATTENTION: Tina Green

**DATE:** 4/14/00

**RECEIVED:** 4/04/00

**LABORATORY NO.** 421533

**SAMPLE:** WATER/1

**INVESTIGATION:** TOTAL URANIUM ANALYSIS PER EPA 908.0

## RESULTS

| Sample ID | pCi/L | Two Sigma Error |
|---|---|---|
| 00-03939-1 | 0.39 | +/- 0.46 |

Analysis complete: 4/13/00

Respectfully submitted,
TRUESDAIL LABORATORIES, INC.

Christine Brown, Project Manager
Water and Waste Laboratory

RIVER RANCHES
Attn.: ELWOOD CHAMPNESS 661-327-9588

627 WILLIAMS STREET
BAKERSFIELD, CA 93305

RADIOACTIVITY ANALYSES

Date of Report: 04/14/2000
Laboratory Name: B C Laboratories, Inc.
Name of Sampler ELWOOD CHAMPNESS
Date/Time Sample Collected: 03/31/00 10:00AM

Lab Sample ID No.: 00-03939-1
Signature of Lab Director
Employed By: RIVER RANCHES

Date/Time Sample Received @ Lab: 03/31/00 11:00AM

Date Analysis Completed: 04/13/2000

System: Name: RIVER RANCHES

System Number:

Name or Number Of Sample Source: PARCEL #9175

User ID: | | | |  Station Number: | | | | | | | | | | | | | | | |

Date/Time of Sample: |0|0|0|3|3|1|1|0|0|0|
Y Y M M D D T T T T

Laboratory Code: |9|4|6|9|

Submitted by: ____________ Phone #: ____________

| MCL | REPORTING UNITS | CONSTITUENT | ENTRY # | ANALYSES RESULTS |
|---|---|---|---|---|
| 15 | pCi/L | Total Alpha | 01501 | |
| | pCi/L | Total Alpha Counting Error | 01502 | |
| 50 | pCi/L | Total Beta | 03501 | |
| | pCi/L | Total Beta Counting Error | 03502 | |
| 20 | pCi/L | Natural Uranium | 28012 | 0.39 |
| | pCi/L | Natural Uranium Counting Error | A-028 | +/-0.46 |
| 3 | pCi/L | Total Radium 226 | 09501 | |
| | pCi/L | Total Radium 226 Counting Error | 09502 | |
| | pCi/L | Total Radium 228 | 11501 | |
| | pCi/L | Total Radium 228 Counting Error | 11502 | |
| 5 | pCi/L | Ra 226 + Ra 228 | 11503 | |
| | pCi/L | Ra 226 + Ra 228 Counting Error | 11504 | |
| | pCi/L | Radon 222 | 82303 | |
| | pCi/L | Radon 222 Counting Error | 82302 | |
| 20,000 | pCi/L | Total Tritium | 07000 | |
| | pCi/L | Total Tritium Counting Error | 07001 | |
| 8 | pCi/L | Total Strontium-90 | 13501 | |
| | pCi/L | Total Strontium-90 Counting Error | 13502 | |

Note: Radiological analyzed by Truesdail Laboratories - Certification #1237

BC LABORATORIES INC. SAMPLE RECEIPT FORM Rev. No.6 10/13/98 Page 1 Of 1

Submission #: 00-03939 | Project Code: | TB Batch #

**SHIPPING INFORMATION**

Federal Express ☐ UPS ☐ Hand Delivery ☒
BC Lab Field Service ☐ Other ☐ (Specify)________

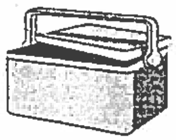
**SHIPPING CONTAINER**

Ice Chest ☐ None ☒
Box ☐ Other ☐ (Specify)________

Refrigerant: Ice ☐ Blue Ice ☐ None ☒ Other ☐ Comments:

Custody Seals: Ice Chest ☐ Intact? Yes ☐ No ☐ | Containers ☐ Intact? Yes ☐ No ☐ | None ☒ Comments:

All samples received? Yes ☒ No ☐ All samples containers intact? Yes ☒ No ☐ Description(s) match COC? Yes ☒ No ☐



Ice Chest ID ____ Date/Time 3/31 1120
Temperature: 22.4 °C
Thermometer ID: 48 Analyst Init JH
Emissivity 90
Container QTE

Ice Chest ID ____ Date/Time ____
Temperature: ____ °C
Thermometer ID: ____ Analyst Init ____
Emissivity ____
Container ____

| SAMPLE CONTAINERS | SAMPLE NUMBERS | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| QT GENERAL MINERAL/ GENERAL PHYSICAL | | | | | | | | | | | | | | | | | | | | | | | |
| PT PE UNPRESERVED | | | | | | | | | | | | | | | | | | | | | | | |
| QT INORGANIC CHEMICAL METALS | | | | | | | | | | | | | | | | | | | | | | | |
| PT INORGANIC CHEMICAL METALS | | | | | | | | | | | | | | | | | | | | | | | |
| PT CYANIDE | | | | | | | | | | | | | | | | | | | | | | | |
| PT NITROGEN FORMS | | | | | | | | | | | | | | | | | | | | | | | |
| PT TOTAL SULFIDE | | | | | | | | | | | | | | | | | | | | | | | |
| 2oz. NITRATE / NITRITE | | | | | | | | | | | | | | | | | | | | | | | |
| 100ml TOTAL ORGANIC CARBON | | | | | | | | | | | | | | | | | | | | | | | |
| QT TOX | | | | | | | | | | | | | | | | | | | | | | | |
| PT CHEMICAL OXYGEN DEMAND | | | | | | | | | | | | | | | | | | | | | | | |
| 100ml PHENOLICS | | | | | | | | | | | | | | | | | | | | | | | |
| 40ml VOA VIAL TRAVEL BLANK | | | | | | | | | | | | | | | | | | | | | | | |
| 40ml VOA VIAL | | | | | | | | | | | | | | | | | | | | | | | |
| QT EPA 413.1, 413.2, 418.1 | | | | | | | | | | | | | | | | | | | | | | | |
| PT ODOR | | | | | | | | | | | | | | | | | | | | | | | |
| RADIOLOGICAL | 1 | | | | | | | | | | | | | | | | | | | | | | |
| BACTERIOLOGICAL | | | | | | | | | | | | | | | | | | | | | | | |
| PT EPA 504 | | | | | | | | | | | | | | | | | | | | | | | |
| QT EPA 508/608/8080 | | | | | | | | | | | | | | | | | | | | | | | |
| QT EPA 515.1/8150 | | | | | | | | | | | | | | | | | | | | | | | |
| QT EPA 525 | | | | | | | | | | | | | | | | | | | | | | | |
| QT EPA 525 TRAVEL BLANK | | | | | | | | | | | | | | | | | | | | | | | |
| 100ml EPA 547 | | | | | | | | | | | | | | | | | | | | | | | |
| 100ml EPA 531.1 | | | | | | | | | | | | | | | | | | | | | | | |
| QT EPA 548 | | | | | | | | | | | | | | | | | | | | | | | |
| QT EPA 549 | | | | | | | | | | | | | | | | | | | | | | | |
| QT EPA 632 | | | | | | | | | | | | | | | | | | | | | | | |
| QT EPA 8015M | | | | | | | | | | | | | | | | | | | | | | | |
| QT QA/QC | | | | | | | | | | | | | | | | | | | | | | | |
| QT AMBER | | | | | | | | | | | | | | | | | | | | | | | |
| 8 OZ. JAR | | | | | | | | | | | | | | | | | | | | | | | |
| 32 OZ. JAR | | | | | | | | | | | | | | | | | | | | | | | |
| SOIL SLEEVE | | | | | | | | | | | | | | | | | | | | | | | |
| PCB VIAL | | | | | | | | | | | | | | | | | | | | | | | |
| PLASTIC BAG | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |

October 13, 1999

Comments:________

Sample Numbering Completed By: JRB Date/Time: 3/31 1130

[F:\WP80\LAB_DOCS\FORMS\SAMREC2.WPD]

ELWOOD CHAMPNESS
805-323-4896

5279 FALLGATTER ST.
BAKERSFIELD, CA 93308

# RADIOACTIVITY ANALYSES

Date of Report: 10/13/99
Laboratory Name: B C Laboratories, Inc.
Name of Sampler
Date/Time Sample Collected: 09/21/99 02:30PM
Date/Time Sample Received @ Lab: 09/21/99 03:30PM
Lab Sample ID No.: 99-11130-1
Signature of Lab Director
Employed By:
Date Analysis Completed: 10/01/99

System: Name: PARCEL MAP 9175
System Number:

Name or Number Of Sample Source: WELL #1

User ID:
Station Number:
Date/Time of Sample: 9 9 0 9 2 1 1 4 3 0 (Y Y M M D D T T T T)
Laboratory Code: 9 4 6 9
Submitted by:
Phone #:

| MCL | REPORTING UNITS | CONSTITUENT | ENTRY # | ANALYSES RESULTS |
|---|---|---|---|---|
| 15 | pCi/L | Total Alpha | 01501 | |
| | pCi/L | Total Alpha Counting Error | 01502 | |
| 50 | pCi/L | Total Beta | 03501 | |
| | pCi/L | Total Beta Counting Error | 03502 | |
| 20 | pCi/L | Natural Uranium | 28012 | 0.50 |
| | pCi/L | Natural Uranium Counting Error | A-028 | +/-0.55 |
| 3 | pCi/L | Total Radium 226 | 09501 | |
| | pCi/L | Total Radium 226 Counting Error | 09502 | |
| | pCi/L | Total Radium 228 | 11501 | |
| | pCi/L | Total Radium 228 Counting Error | 11502 | |
| 5 | pCi/L | Ra 226 + Ra 228 | 11503 | |
| | pCi/L | Ra 226 + Ra 228 Counting Error | 11504 | |
| | pCi/L | Radon 222 | 82303 | |
| | pCi/L | Radon 222 Counting Error | 82302 | |
| 20,000 | pCi/L | Total Tritium | 07000 | |
| | pCi/L | Total Tritium Counting Error | 07001 | |
| 8 | pCi/L | Total Strontium-90 | 13501 | |
| | pCi/L | Total Strontium-90 Counting Error | 13502 | |

Note: Radiological analyzed by Truesdail Laboratories - Certification #1237

ELWOOD CHAMPNESS
5279 FALLGATTER ST.
BAKERSFIELD, CA 93308
805-323-4896

Date Reported: 01-19-99
Date Received: 01-13-99
Laboratory No.: 99-00456-1

## COLILERT BACTERIOLOGICAL WATER ANALYSIS

Sample Description

WELL #1, PARCEL MAP #9175 - SAMPLED BY ELWOOD CHAMPNESS

System Number.

Sample Site:

Temperature: 18.5 C

| | |
|---|---|
| Date/Time Sample Collected: | 01/13/99 @ 08:00AM |
| Date/Time Sample Received at Lab: | 01/13/99 @ 08:30AM |
| Date/Time Analysis Started: | 01/13/99 @ 09:30AM |
| Date Analysis Completed: | 01/14/99 |

| Constituent | Present/ Absent |
|---|---|
| Total Coliform | Absent |
| E. Coli | Absent |

B C LABORATORIES, INC.

BY ____________________
Department Supervisor

# BC
## Laboratories, Inc.

Celebrating our 50th Year

February 01, 1999

E.CHAMPNESS
ELWOOD CHAMPNESS
5279 FALLGATTER ST.
BAKERSFIELD, CA 93308

Subject: Laboratory Submission No.: 99-00458
Samples Received: 01/13/99

Dear Mr. Champness:

The samples(s) listed on the Chain of Custody report were received by BC Laboratories, Inc. on 01/13/99.

Enclosed please find the analytical data for the testing requested. If you have any questions regarding this report please contact me at (805)327-4911, ext. 281.

Any unused sample will be stored on our premises for a minimum of 30 days (excluding bacteriologicals) at which time they will be disposed unless otherwise requested at the time of sample receipt. A disposal fee of $5 per sample may apply for solid sample matrices.

Please refer to submission number 99-00458 when calling for assistance.

Sincerely,

Ina Green

fr.

Michelle Owen
Client Services
BC Laboratories, Inc.

BC LABORATORIES, INC. 4100 Atlas Court - Bakersfield, CA 93308 (805) 327-4911 - FAX (805) 327-1918

# CHAIN OF CUSTODY

**Report To:**

Name: E. Champness
Address: 5279 Fallgatter
City: Bakersfield
State: Ca Zip: 93308
Attn:
Phone: 323-4896

Project:
Project #:
Sampler Name:

**Submission #** 99-458

**Analysis Requested:** GMP I, 504; ~~MSC VL LN~~ MATRIX 4551065

**MATRIX:** DW - Drinking Water, GW - Ground Water, WW - Waste Water, S - Soil, O - Oil, SL - Sludge, M - Miscellaneous

| Lab # | Sample Description | Date & Time Sampled | GMP I | 504 | Matrix | Turn Around Time Requested | Number and Container Type |
|---|---|---|---|---|---|---|---|
| 1 | Well #1 Parcel map 9175 | 1/13/99 8:00A | X | X | DW | normal | |

NUMBERING CHECKED BY [initials]

* No date or Time on samples. DJ 1/13/99

**Billing Information:**

Name:
Address:
City: Same State Zip
Attention:
PO #

**BC Lab. Field Service**

Time : Miles:
Equipment: Flat Rate:

Report Drinking Water on State Form ? (Y) N
Send Copy to State of Calif. Y (N)

Comments: [redacted]

| Relinquished by: (Signature) | Received by: (Signature) | Date: | Time: |
|---|---|---|---|
| | Stacey Strickland | 1/13/99 | 835 |
| E. Champness | | | |
| | | | |
| | | | |

BC LABORATORIES INC. SAMPLE RECEIPT FORM Rev. No.6 10/13/98 Page ___ Of 1

Submission #: 99-458 Project Code:

## SHIPPING INFORMATION

Federal Express ☐ UPS ☐ Hand Delivery ☑
BC Lab Field Service ☐ Other ☐ (Specify) ________

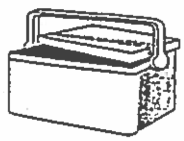
## SHIPPING CONTAINER

Ice Chest ☐ None ☑
Box ☐ Other ☐ (Specify) ________

Refrigerant: Ice ☐ Blue Ice ☐ None ☑ Other ☐ Comments:

Custody Seals: Ice Chest ☐ Intact? Yes ☐ No ☐ | Containers ☐ Intact? Yes ☐ No ☐ | None ☑ Comments:

All samples received? Yes ☑ No ☐ All samples containers intact? Yes ☑ No ☐ Description(s) match COC? Yes ☑ No ☐



Ice Chest ID: NONE Date/Time: 1/13/99 835
Temperature: 18.5 °C
Thermometer ID: -17 Analyst Init: SS
Emissivity: .90
Container: D+PE

Ice Chest ID ________ Date/Time ________
Temperature: ________ °C
Thermometer ID: ________ Analyst Init ________
Emissivity ________
Container ________

| SAMPLE CONTAINERS | SAMPLE NUMBERS | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| QT GENERAL MINERAL/ GENERAL PHYSICAL | ✓ | | | | | | | | | | | | | | | | | | | | | | | |
| PT PE UNPRESERVED | | | | | | | | | | | | | | | | | | | | | | | | |
| QT INORGANIC CHEMICAL METALS | | | | | | | | | | | | | | | | | | | | | | | | |
| PT INORGANIC CHEMICAL METALS | ✓ | | | | | | | | | | | | | | | | | | | | | | | |
| PT CYANIDE | ✓ | | | | | | | | | | | | | | | | | | | | | | | |
| PT NITROGEN FORMS | | | | | | | | | | | | | | | | | | | | | | | | |
| PT TOTAL SULFIDE | | | | | | | | | | | | | | | | | | | | | | | | |
| 2oz. NITRATE / NITRITE | ✓ | | | | | | | | | | | | | | | | | | | | | | | |
| 100ml TOTAL ORGANIC CARBON | | | | | | | | | | | | | | | | | | | | | | | | |
| QT TOX | | | | | | | | | | | | | | | | | | | | | | | | |
| PT CHEMICAL OXYGEN DEMAND | | | | | | | | | | | | | | | | | | | | | | | | |
| 100ml PHENOLICS | | | | | | | | | | | | | | | | | | | | | | | | |
| 40ml VOA VIAL TRAVEL BLANK | | | | | | | | | | | | | | | | | | | | | | | | |
| 40ml VOA VIAL | | | | | | | | | | | | | | | | | | | | | | | | |
| QT EPA 413.1, 413.2, 418.1 | | | | | | | | | | | | | | | | | | | | | | | | |
| PT ODOR | ✓ | | | | | | | | | | | | | | | | | | | | | | | |
| RADIOLOGICAL | | | | | | | | | | | | | | | | | | | | | | | | |
| BACTERIOLOGICAL | | | | | | | | | | | | | | | | | | | | | | | | |
| PT EPA 504 | ✓ | | | | | | | | | | | | | | | | | | | | | | | |
| QT EPA 508/608/8080 | | | | | | | | | | | | | | | | | | | | | | | | |
| QT EPA 515.1/8150 | | | | | | | | | | | | | | | | | | | | | | | | |
| QT EPA 525 | | | | | | | | | | | | | | | | | | | | | | | | |
| QT EPA 525 TRAVEL BLANK | | | | | | | | | | | | | | | | | | | | | | | | |
| 100ml EPA 547 | | | | | | | | | | | | | | | | | | | | | | | | |
| 100ml EPA 531.1 | | | | | | | | | | | | | | | | | | | | | | | | |
| QT EPA 548 | | | | | | | | | | | | | | | | | | | | | | | | |
| QT EPA 549 | | | | | | | | | | | | | | | | | | | | | | | | |
| QT EPA 632 | | | | | | | | | | | | | | | | | | | | | | | | |
| QT EPA 8015M | | | | | | | | | | | | | | | | | | | | | | | | |
| QT QA/QC | | | | | | | | | | | | | | | | | | | | | | | | |
| QT AMBER | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 OZ. JAR | | | | | | | | | | | | | | | | | | | | | | | | |
| 32 OZ. JAR | | | | | | | | | | | | | | | | | | | | | | | | |
| SOIL SLEEVE | | | | | | | | | | | | | | | | | | | | | | | | |
| PCB VIAL | | | | | | | | | | | | | | | | | | | | | | | | |
| PLASTIC BAG | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | |

Comments: ________

Sample Numbering Completed By: DJ Date/Time: 1/13 9:25

ELWOOD CHAMPNESS
Attn.: E.CHAMPNESS 805-323-4896

5279 FALLGATTER ST.
BAKERSFIELD, CA 93308

GENERAL MINERAL, PHYSICAL & INORGANIC CHEMICAL ANALYSES

Date of Report: 01/28/99
Laboratory Name: B C Laboratories, Inc.
Name of Sampler ELWOOD CHAMPNESS
Date/Time Sample Collected: 01/13/99 08:00AM
Lab Sample ID No.: 99-00458-1
Signature of Lab Director
Employed By: ELWOOD CHAMPNESS
Date/Time Sample Received @ Lab: 01/13/99 08:35AM
Date Analysis Completed: 01/22/99

System: Name:
System Number:

Name or Number Of Sample Source: WELL #1 PAROUL MAP 9/75

User ID:
Station Number:
Date/Time of Sample: 9 9 0 1 1 3 0 8 0 0 (Y Y M M D D T T T T)
Laboratory Code: 5 8 0 6
Submitted by:
Phone #:

| MCL | REPORTING UNITS | CONSTITUENT | ENTRY # | ANALYSES RESULTS | DLR |
|---|---|---|---|---|---|
| | mg/L | Total Hardness (as CaCO3) | 00900 | 77. | |
| | mg/L | Calcium (Ca) | 00916 | 25. | |
| | mg/L | Magnesium (Mg) | 00927 | 3.5 | |
| | mg/L | Sodium (Na) | 00929 | 30. | |
| | mg/L | Potassium (K) | 00937 | 1.7 | |
| Total Cations | meq/L | Value: 2.88 | | | |
| | mg/L | Total Alkalinity (as CaCO3) | 00410 | 107. | |
| | mg/L | Hydroxide (OH) | 71830 | < 0.8 | |
| | mg/L | Carbonate (CO3) | 00445 | < 2.6 | |
| | mg/L | Bicarbonate (HCO3) | 00440 | 130. | |
| * | mg/L | Sulfate (SO4) | 00945 | 13. | 0.5 |
| * | mg/L | Chloride (Cl) | 00940 | 13. | |
| 45 | mg/L | Nitrate (NO3) | 71850 | < 0.4 | 2 |
| 1.4-2.4 | mg/L | Fluoride (F) Temp. Depend. | 00951 | 0.24 | 0.1 |
| Total Anions | meq/L | Value: 2.78 | | | |
| | Std Units + | pH (Laboratory) | 00403 | 7.45 | |
| ** | µmho/cm + | Specific Conductance (E.C.) | 00095 | 292. | |
| *** | mg/L + | Total Filterable Residue at 180 C (TDS) | 70300 | 187. | |
| 15. | UNITS | Apparent Color (Unfiltered) | 00081 | 2. | |
| 3. | TON | Odor Threshold at 60 C | 00086 | 8 | |
| 5. | NTU | Lab Turbidity | 82079 | 0.79 | |
| 0.5 | mg/L + | MBAS | 38260 | < 0.05 | |

* 250-500-600 ** 900-1600-2200 *** 500-1000-1500
Recommended - Upper - Short Term

ELWOOD CHAMPNESS
Attn.: E.CHAMPNESS 805-323-4896

5279 FALLGATTER ST.
BAKERSFIELD, CA 93308

Lab. #99-00458-1

## INORGANIC CHEMICALS



| MCL | REPORTING UNITS | CONSTITUENT | ENTRY # | ANALYSES RESULTS | DLR µg/L |
|---|---|---|---|---|---|
| 1000 | µg/L | Aluminum (Al) | 01105 | < 50. | 50. |
| 6 | µg/L | Antimony | 01097 | < 1. | 6. |
| 50 | µg/L | Arsenic (As) | 01002 | < 2. | 2. |
| 1000 | µg/L | Barium (Ba) | 01007 | < 100. | 100. |
| 4 | µg/L | Beryllium | 01012 | < 0.2 | 1. |
| 5 | µg/L | Cadmium (Cd) | 01027 | < 1. | 1. |
| 50 | µg/L | Chromium (Total Cr) | 01034 | < 10. | 10. |
| 1000 | µg/L + | Copper (Cu) | 01042 | < 10. | 50. |
| 300 | µg/L + | Iron (Fe) | 01045 | 63. | 100. |
| | µg/L | Lead (Pb) | 01051 | < 5. | 5. |
| 50 | µg/L + | Manganese (Mn) | 01055 | 102. | 30. |
| 2 | µg/L | Mercury (Hg) | 71900 | < 0.2 | 1. |
| 100 | µg/L | Nickel | 01067 | < 5. | 10. |
| 50 | µg/L | Selenium (Se) | 01147 | < 2. | 5. |
| 100 | µg/L + | Silver (Ag) | 01077 | < 10. | 10. |
| 2 | µg/L | Thallium | 01059 | < 1. | 1. |
| 5000 | µg/L | Zinc (Zn) | 01092 | < 50. | 50. |

## ADDITIONAL ANALYSES

| MCL | REPORTING UNITS | CONSTITUENT | ENTRY # | ANALYSES RESULTS | DLR µg/L |
|---|---|---|---|---|---|
| | NTU | Field Turbidity | 82078 | | |
| | C | Source Temperature | 00010 | | |
| | | Langelier Index Source Temp. | 71814 | | |
| | | Langelier Index at 60 C | 71813 | | |
| | Std Units | Field pH | 00400 | | |
| | | Aggressiveness Index | 82383 | | |
| | mg/L | Silica | 00955 | | |
| | mg/L | Phosphate | 00650 | | |
| | mg/L | Iodide | 71865 | | |
| | | Sodium Absorption Ration | 00931 | | |
| 7 | MFL | Asbestos (*) | 81855 | | 0.2 |
| | mg/L | Boron | 01020 | | |
| 10000 | µg/L | Nitrate + Nitrite as N | A-029 | | 400. |
| 1000 | µg/L | Nitrite as N (Nitrogen) | 00620 | < 20. | 400. |
| 200 | µg/L | Cyanide | 01291 | < 20. | 100. |
| | mg/L | Ammonia as N | 00612 | | |
| | µg/L | Lithium | 01132 | | |
| | mg/L | Bromide | 82298 | | |
| | mg/L | Bromate | A-027 | | |

DLR = Detection Limit for Reporting purposes
\+ = Indicates Secondary Drinking Water Standards
(*) MFL = Million Fibers Per Liter

ELWOOD CHAMPNESS
Attn.: E.CHAMPNESS 805-323-4896

5279 FALLGATTER ST.
BAKERSFIELD, CA 93308

## ORGANIC CHEMICAL ANALYSIS

Date of Report: 01/20/99
Laboratory Name: B C Laboratories, Inc.
Name of Sampler ELWOOD CHAMPNESS

Lab Sample ID No:: 99-00458-1
Signature of Lab Director
Employed By: ELWOOD CHAMPNESS

Date/Time Sample Collected: 01/13/99 08:00AM
Date/Time Sample Received @ Lab: 01/13/99 08:35AM
Date Analysis Completed: 01/18/99

System Name:
System Number:

Name or Number Of Sample Source: WELL #1 PAROUL MAP 9/75

User ID: | | | |
Station Number: | | | | | | | | | | | | | | |
Date/Time of Sample: |9|9|0|1|1|3|0|8|0|0|
Y Y M M D D T T T T
Laboratory Code: |5|8|0|6|
Submitted by:
Phone #:

### REGULATED ORGANIC CHEMICALS

| TEST METHOD | CONSTITUENT ALL CONSTITUENTS REPORTED µg/L | ENTRY # | ANALYSIS RESULTS | MCL µg/L | DLR µg/L |
|---|---|---|---|---|---|
| | Bromodichloromethane | 32101 | | | 0.5 |
| | Bromoform | 32104 | | | 0.5 |
| | Chloroform (Trichloromethane) | 32106 | | | 0.5 |
| | Dibromochloromethane | 32105 | | | 0.5 |
| | Total Trihalomethanes (THM's/TTHM) | 82080 | | 100 | 0.5 |
| | Benzene | 34030 | | 1 | 0.5 |
| | Carbon tetrachloride | 32102 | | 0.5 | 0.5 |
| | 1,2-Dichlorobenzene (o-DCB) | 34536 | | 600 | 0.5 |
| | 1,4-Dichlorobenzene (p-DCB) | 34571 | | 5 | 0.5 |
| | 1,1-Dichloroethane (1,1-DCA) | 34496 | | 5 | 0.5 |
| | 1,2-Dichloroethane (1,2-DCA) | 34531 | | 0.5 | 0.5 |
| | 1,1-Dichloroethylene (1,1-DCE) | 34501 | | 6 | 0.5 |
| | cis-1,2-Dichloroethylene | 77093 | | 6 | 0.5 |
| | trans-1,2-Dichloroethylene | 34546 | | 10 | 0.5 |
| | Dichloromethane (Methylene Chloride) | 34423 | | 5 | 0.5 |
| | 1,2-Dichloropropane | 34541 | | 5 | 0.5 |
| | Total 1,3-Dichloropropene | 34561 | | 0.5 | 0.5 |
| | Ethyl benzene | 34371 | | 700 | 0.5 |
| | Monochlorobenzene (Chlorobenzene) | 34301 | | 70 | 0.5 |
| | Styrene | 77128 | | 100 | 0.5 |
| | 1,1,2,2-Tetrachloroethane | 34516 | | 1 | 0.5 |
| | Tetrachloroethylene (PCE) | 34475 | | 5 | 0.5 |
| | Toluene | 34010 | | 150 | 0.5 |
| | 1,2,4-Trichlorobenzene | 34551 | | 70 | 0.5 |
| | 1,1,1-Trichloroethane (1,1,1-TCA) | 34506 | | 200 | 0.5 |
| | 1,1,2-Trichloroethane (1,1,2-TCA) | 34511 | | 5 | 0.5 |
| | Trichloroethylene (TCE) | 39180 | | 5 | 0.5 |

ELWOOD CHAMPNESS
Attn.: E.CHAMPNESS 805-323-4896

5279 FALLGATTER ST.
BAKERSFIELD, CA 93308

Lab. #99-00458-1 REGULATED ORGANIC CHEMICALS (CONTINUED) 

| TEST METHOD | CONSTITUENT ALL CONSTITUENTS REPORTED µg/L | ENTRY # | ANALYSIS RESULTS | MCL µg/L | DLR µg/L |
|---|---|---|---|---|---|
| | Trichlorofluoromethane (Freon 11) | 34488 | | 150 | 5. |
| | Trichlorotrifluoroethane (Freon 113) | 81611 | | 1200 | 10. |
| | Vinyl Chloride (VC) | 39175 | | 0.5 | 0.5 |
| | m,p-Xylene | A-014 | | | 0.5 |
| | o-Xylene | 77135 | | | 0.5 |
| | Total Xylenes (m,p, & o) | 81551 | | *1750 | 0.5 |
| 504.1 | Dibromochloropropane (DBCP) | 38761 | < 0.01 | 0.2 | 0.01 |
| 504.1 | Ethylene Dibromide (EDB) | 77651 | < 0.01 | 0.05 | 0.02 |
| | Endrin | 39390 | | 2. | 0.1 |
| | Lindane (gamma-BHC) | 39340 | | 0.2 | 0.2 |
| | Methoxychlor | 39480 | | 40 | 10. |
| | Toxaphene | 39400 | | 3 | 1. |
| | Chlordane | 39350 | | 0.1 | 0.1 |
| | Diethylhexylphthalate (DEHP) | 39100 | | 4. | 3. |
| | Heptachlor | 39410 | | 0.01 | 0.01 |
| | Heptachlor epoxide | 39420 | | 0.01 | 0.01 |
| | Atrazine (AAtrex) | 39033 | | 3 | 1. |
| | Molinate (Ordram) | 82199 | | 20 | 2. |
| | Simazine (Princep) | 39055 | | 4 | 1. |
| | Thiobencarb (Bolero) | A-001 | | + 70 | 1. |
| | Alachlor (Alanex) | 77825 | | 2 | 1. |
| | Bentazon (Basagran) | 38710 | | 18 | 2. |
| | Benzo (a) pyrene | 34247 | | 0.2 | 0.1 |
| | 2,3,7,8-TCDD (Dioxin) | 34676 | | 3 e-5 | 5 e-6 |
| | 2,4-D | 39730 | | 70 | 10. |
| | 2,4,5-TP (Silvex) | 39045 | | 50 | 1. |
| | Carbofuran (Furadan) | 81405 | | 18 | 5. |
| | Dalapon | 38432 | | 200 | 10. |
| | Dinoseb (DNBP) | 81287 | | 7 | 2. |
| | Diquat | 78885 | | 20 | 4. |
| | Di (2-ethylhexyl) adipate | A-026 | | 400 | 5. |
| | Endothall | 38926 | | 100 | 45. |
| | Glyphosate | 79743 | | 700 | 25. |
| | Hexachlorobenzene | 39700 | | 1 | 0.5 |
| | Hexachlorocyclopentadiene | 34386 | | 50 | 1. |
| | Oxamyl (Vydate) | 38865 | | 200 | 20. |
| | Pentachlorophenol (PCP) | 39032 | | 1 | 0.2 |
| | Picloram | 39720 | | 500 | 1. |
| | Polychlorinated Biphenyls (Total PCB's) | 39516 | | 0.5 | 0.5 |

* MCL is for either single isomer or the sum of the isomers

+ Indicates Secondary Drinking Water Standards

ELWOOD CHAMPNESS
Attn.: E.CHAMPNESS 805-323-4896

5279 FALLGATTER ST.
BAKERSFIELD, CA 93308

Lab. #99-00458-1

UNREGULATED ORGANIC CHEMICALS



| TEST METHOD | CONSTITUENT ALL CONSTITUENTS REPORTED µg/L | ENTRY # | ANALYSIS RESULTS | MCL µg/L | DLR * µg/L |
|---|---|---|---|---|---|
| | Bromobenzene | 81555 | | | 0.5 |
| | Bromochloromethane | A-012 | | | 0.5 |
| | Bromomethane (Methyl Bromide) | 34413 | | | 0.5 |
| | n-Butylbenzene | A-010 | | | 0.5 |
| | sec-Butylbenzene | 77350 | | | 0.5 |
| | tert-Butylbenzene | 77353 | | | 0.5 |
| | Chloroethane | 34311 | | | 0.5 |
| | 2-Chloroethylvinyl ether | 34576 | | | 1.0 |
| | Chloromethane (Methyl Chloride) | 34418 | | | 0.5 |
| | 2-Chlorotoluene | A-008 | | | 0.5 |
| | 4-Chlorotoluene | A-009 | | | 0.5 |
| | Dibromomethane | 77596 | | | 0.5 |
| | 1,3-Dichlorobenzene (m-DCB) | 34566 | | | 0.5 |
| | Dichlorodifluoromethane | 34668 | | | 1.0 |
| | 1,3-Dichloropropane | 77173 | | | 0.5 |
| | 2,2-Dichloropropane | 77170 | | | 0.5 |
| | 1,1-Dichloropropene | 77168 | | | 0.5 |
| | Hexachlorobutadiene | 34391 | | | 0.5 |
| | Isopropylbenzene (Cumene) | 77223 | | | 0.5 |
| | p-Isopropyltoluene | A-011 | | | 0.5 |
| | Naphthalene | 34696 | | | 0.5 |
| | n-Propylbenzene | 77224 | | | 0.5 |
| | 1,1,1,2-Tetrachloroethane | 77562 | | | 0.5 |
| | 1,2,3-Trichlorobenzene | 77613 | | | 0.5 |
| | 1,2,3-Trichloropropane | 77443 | | | 0.5 |
| | 1,2,4-Trimethylbenzene | 77222 | | | 0.5 |
| | 1,3,5-Trimethylbenzene | 77226 | | | 0.5 |
| | Methyl Ethyl Ketone (MEK, Butanone) | 81595 | | | 5.0 |
| | Methyl Isobutyl Ketone (MIBK) | 81596 | | | 5.0 |
| | bis (2-Chloroethyl) Ether | 34273 | | | 5.0 |
| | | | | | |
| | Aldicarb (Temik) | 39053 | | | 3.0 |
| | Aldicarb sulfone | A-020 | | | 4. |
| | Aldicarb sulfoxide | A-019 | | | 3. |
| | Aldrin | 39330 | | | 0.075 |
| | Bromacil (Hyvar) | 82198 | | | 10. |
| | Butachlor | 77860 | | | 0.38 |
| | Carbaryl (Sevin) | 77700 | | | 5. |
| | Chlorothalonil (Daconil, Bravo) | 70314 | | | 5.0 |
| | Diazinon | 39570 | | | 0.25 |
| | Dicamba (Banvel) | 82052 | | | 0.081 |
| | Dieldrin | 39380 | | | 0.02 |
| | Dimethoate (Cygon) | 38458 | | | 10. |
| | Diuron | 39650 | | | 1. |
| | 3-Hydroxycarbofuran | A-021 | | | 3. |
| | Methomyl | 39051 | | | 2. |
| | Metoalachlor | 39356 | | | 1. |
| | Metribuzin | 81408 | | | 1. |
| | Prometryn (Caparol) | 39057 | | | 2.0 |
| | Propachlor | 38533 | | | 0.5 |
| | Methyl-tetra-butyl Ether (MTBE) | | | | 5. |

California D.O.H.S. Cert. #1186

Laboratory comments and description of any additional compounds found:

MOORE TWINING ASSOCIATES, INC.

California ELAP Certificate #1371

**2527 Fresno Street**
**Fresno, CA 93721**
**(559) 268-7021 Phone**
**(559) 268-0740 Fax**

January 16, 2015

Work Order #: AL19034

Anthony Toto
RWQCB - Fresno
1685 E Street
Fresno, CA 93706-2007

RE: 13-014-150

Enclosed are the analytical results for samples received by our laboratory on 12/19/14 . For your reference, these analyses have been assigned laboratory work order number AL19034 .

All analyses have been performed according to our laboratory's quality assurance program. All results are intended to be considered in their entirety, Moore Twining Associates, Inc. (MTA) is not responsible for use of less than complete reports. Results apply only to samples analyzed.

If you have any questions, please feel free to contact us at the number listed above.

Sincerely,

**Moore Twining Associates, Inc.**

Julio Morales
Client Services Supervisor

MOORE TWINING ASSOCIATES, INC.

California ELAP Certificate #1371

2527 Fresno Street
Fresno, CA 93721
(559) 268-7021 Phone
(559) 268-0740 Fax

| | | |
|---|---|---|
| RWQCB - Fresno | Project: 13-014-150 | |
| 1685 E Street | Project Number: River Ranch HOA Deep Well | **Reported:** |
| Fresno CA, 93706-2007 | Project Manager: Anthony Toto | 1/16/2015 |

## ANALYTICAL REPORT FOR SAMPLES

| Sample ID | Laboratory ID | Matrix | Date Sampled | Date Received |
|---|---|---|---|---|
| DLW-121914-1 | AL19034-01 | Drinking Water - Public/Routine | 12/19/14 10:54 | 12/19/14 15:45 |

AMENDED REPORT:

Nitrate is now included.

MOORE TWINING ASSOCIATES, INC.

California ELAP Certificate #1371

2527 Fresno Street
Fresno, CA 93721
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| | | |
|---|---|---|
| RWQCB - Fresno | Project: 13-014-150 | |
| 1685 E Street | Project Number: River Ranch HOA Deep Well | **Reported:** |
| Fresno CA, 93706-2007 | Project Manager: Anthony Toto | 1/16/2015 |

## DLW-121914-1

AL19034-01 (Drinking Water - Public/Routine) Sampled:12/19/14 10:54

| Analyte | Flag | Result | Reporting Limit | MDL | Units | Dilution | Batch | Analyst | Prepared | Analyzed | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Inorganics** | | | | | | | | | | | |
| **Total Alkalinity as CaCO3** | | **82** | 1.0 | 0.23 | mg/L | 1 | U4L1926 | CMG | 12/19/14 17:11 | 12/19/14 21:38 | SM2320B |
| **Bicarbonate Alkalinity as HCO3** | | **100** | 1.3 | 0.23 | mg/L | 1 | U4L1926 | CMG | 12/19/14 17:11 | 12/19/14 21:38 | SM2320B |
| Carbonate Alkalinity as CO3 | | ND | 1.0 | 0.23 | mg/L | 1 | U4L1926 | CMG | 12/19/14 17:11 | 12/19/14 21:38 | SM2320B |
| Hydroxide Alkalinity as OH | | ND | 1.0 | 0.23 | mg/L | 1 | U4L1926 | CMG | 12/19/14 17:11 | 12/19/14 21:38 | SM2320B |
| **Cation/Anion Balance (% Difference)** | | **1.0** | | | % | 1 | U5A0717 | JAA | 1/7/15 14:28 | 1/7/15 14:36 | CALC |
| **Chloride** | | **12** | 2.0 | 0.018 | mg/L | 1 | U4L1925 | ETH | 12/19/14 16:35 | 12/20/14 13:58 | EPA 300.0 |
| **Specific Conductance (EC)** | | **270** | 1.0 | 0.26 | µS/cm | 1 | U4L1926 | CMG | 12/19/14 17:11 | 12/19/14 21:38 | SM2510B |
| **Nitrate as Nitrogen** | | **1.2** | 0.45 | 0.0040 | mg/L | 1 | [CALC] | MCM | 12/20/14 13:58 | 12/20/14 13:58 | EPA 300.0 |
| **Nitrate as NO3** | | **5.5** | 2.0 | 0.018 | mg/L | 1 | U4L1925 | MCM | 12/19/14 16:35 | 12/20/14 13:58 | EPA 300.0 |
| Orthophosphate as P | | ND | 0.25 | 0.0028 | mg/L | 1 | U4L1925 | ETH | 12/19/14 16:35 | 12/20/14 13:58 | EPA 300.0 |
| **Sulfate as SO4** | | **20** | 2.0 | 0.0094 | mg/L | 1 | U4L1925 | ETH | 12/19/14 16:35 | 12/20/14 13:58 | EPA 300.0 |
| **Total Dissolved Solids** | | **170** | 10 | 8.1 | mg/L | 1 | U4L2213 | MVY | 12/22/14 14:45 | 12/23/14 15:10 | SM 2540C |
| **Metals - Dissolved** | | | | | | | | | | | |
| **Antimony** | J | **0.44** | 1.0 | 0.068 | µg/L | 1 | U4L2309 | JTN | 12/24/14 9:15 | 12/24/14 13:34 | EPA 200.8 |
| **Arsenic** | J | **0.76** | 1.0 | 0.15 | µg/L | 1 | U4L2309 | JTN | 12/24/14 9:15 | 12/24/14 13:34 | EPA 200.8 |
| **Barium** | | **38** | 1.0 | 0.042 | µg/L | 1 | U4L2309 | JTN | 12/24/14 9:15 | 12/24/14 13:34 | EPA 200.8 |
| Beryllium | | ND | 1.0 | 0.20 | µg/L | 1 | U4L2309 | JTN | 12/24/14 9:15 | 12/24/14 13:34 | EPA 200.8 |
| **Boron** | | **150** | 20 | 7.8 | µg/L | 1 | U4L2309 | JTN | 12/24/14 9:15 | 12/24/14 13:34 | EPA 200.8 |
| Cadmium | | ND | 0.20 | 0.079 | µg/L | 1 | U4L2309 | JTN | 12/24/14 9:15 | 12/24/14 13:34 | EPA 200.8 |
| **Calcium** | | **19** | 0.10 | 0.0076 | mg/L | 1 | U5A0602 | DAR | 1/6/15 8:33 | 1/6/15 11:33 | EPA 200.7 |
| **Chromium** | J | **0.93** | 1.0 | 0.17 | µg/L | 1 | U4L2309 | JTN | 12/24/14 9:15 | 12/24/14 13:34 | EPA 200.8 |
| **Cobalt** | J | **0.18** | 1.0 | 0.024 | µg/L | 1 | U4L2309 | JTN | 12/24/14 9:15 | 12/24/14 13:34 | EPA 200.8 |
| **Copper** | J | **0.71** | 2.0 | 0.060 | µg/L | 1 | U4L2309 | JTN | 12/24/14 9:15 | 12/24/14 13:34 | EPA 200.8 |
| **Hardness** | | **60** | 0.66 | 0.056 | mg equiv. CaCO3/L | 1 | [CALC] | DAR | 1/6/15 11:33 | 1/6/15 11:33 | [CALC] |
| **Iron** | | **65** | 20 | 5.9 | µg/L | 1 | U4L2309 | JTN | 12/24/14 9:15 | 12/24/14 13:34 | EPA 200.8 |
| **Lead** | J | **0.060** | 1.0 | 0.029 | µg/L | 1 | U4L2309 | JTN | 12/24/14 9:15 | 12/24/14 13:34 | EPA 200.8 |
| **Magnesium** | | **3.0** | 0.10 | 0.0091 | mg/L | 1 | U5A0602 | DAR | 1/6/15 8:33 | 1/6/15 11:33 | EPA 200.7 |
| **Manganese** | | **58** | 1.0 | 0.051 | µg/L | 1 | U4L2309 | JTN | 12/24/14 9:15 | 12/24/14 13:34 | EPA 200.8 |
| Mercury | | ND | 0.20 | 0.062 | µg/L | 1 | U4L2309 | JTN | 12/24/14 9:15 | 12/24/14 13:34 | EPA 245.1 |
| **Molybdenum** | | **9.7** | 1.0 | 0.025 | µg/L | 1 | U4L2309 | JTN | 12/24/14 9:15 | 12/24/14 13:34 | EPA 200.8 |
| **Nickel** | J | **0.52** | 1.0 | 0.027 | µg/L | 1 | U4L2309 | JTN | 12/24/14 9:15 | 12/24/14 13:34 | EPA 200.8 |
| **Potassium** | | **1.7** | 1.0 | 0.077 | mg/L | 1 | U5A0602 | DAR | 1/6/15 8:33 | 1/6/15 11:33 | EPA 200.7 |
| **Selenium** | J | **0.21** | 1.0 | 0.17 | µg/L | 1 | U4L2309 | JTN | 12/24/14 9:15 | 12/24/14 13:34 | EPA 200.8 |

MOORE TWINING ASSOCIATES, INC.
Since 1898

California ELAP Certificate #1371

**2527 Fresno Street**
**Fresno, CA 93721**
**(559) 268-7021 Phone**
**(559) 268-0740 Fax**

| | | |
|---|---|---|
| RWQCB - Fresno | Project: 13-014-150 | |
| 1685 E Street | Project Number: River Ranch HOA Deep Well | **Reported:** |
| Fresno CA, 93706-2007 | Project Manager: Anthony Toto | 1/16/2015 |

**DLW-121914-1**

AL19034-01 (Drinking Water - Public/Routine) Sampled:12/19/14 10:54

| Analyte | Flag | Result | Reporting Limit | MDL | Units | Dilution | Batch | Analyst | Prepared | Analyzed | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Metals - Dissolved** | | | | | | | | | | | |
| Silver | | ND | 1.0 | 0.15 | µg/L | 1 | U4L2309 | JTN | 12/24/14 9:15 | 12/24/14 13:34 | EPA 200.8 |
| **Sodium** | | **30** | 1.0 | 0.26 | mg/L | 1 | U5A0602 | DAR | 1/6/15 8:33 | 1/6/15 11:33 | EPA 200.7 |
| Thallium | | ND | 1.0 | 0.064 | µg/L | 1 | U4L2309 | JTN | 12/24/14 9:15 | 12/24/14 13:34 | EPA 200.8 |
| **Vanadium** | | **2.3** | 1.0 | 0.21 | µg/L | 1 | U4L2309 | JTN | 12/24/14 9:15 | 12/24/14 13:34 | EPA 200.8 |
| **Zinc** | J | **4.4** | 5.0 | 0.060 | µg/L | 1 | U4L2309 | JTN | 12/24/14 9:15 | 12/24/14 13:34 | EPA 200.8 |
| **Semi-Volatile Organics** | | | | | | | | | | | |
| N-Nitrosodimethylamine | | ND | 5.0 | 1.4 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| Phenol | | ND | 5.0 | 0.63 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| Bis(2-chloroethyl)ether | | ND | 5.0 | 0.51 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| 2-Chlorophenol | | ND | 5.0 | 0.69 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| 1,3-Dichlorobenzene | | ND | 5.0 | 0.29 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| 1,4-Dichlorobenzene | | ND | 5.0 | 0.59 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| 1,2-Dichlorobenzene | | ND | 5.0 | 0.32 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| Bis(2-chloroisopropyl)ether | | ND | 5.0 | 0.46 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| 2-Methylphenol | | ND | 5.0 | 0.93 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| Hexachloroethane | | ND | 5.0 | 0.98 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| 3-Methylphenol | | ND | 5.0 | 0.96 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| 4-Methylphenol | | ND | 5.0 | 1.1 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| N-Nitrosodi-n-propylamine | | ND | 5.0 | 0.36 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| Nitrobenzene | | ND | 5.0 | 0.66 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| Isophorone | | ND | 5.0 | 0.42 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| 2-Nitrophenol | | ND | 5.0 | 1.3 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| 2,4-Dimethylphenol | | ND | 5.0 | 1.2 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| Bis(2-chloroethoxy)methane | | ND | 5.0 | 0.28 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| 2,4-Dichlorophenol | | ND | 5.0 | 0.79 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| 1,2,4-Trichlorobenzene | | ND | 5.0 | 0.22 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| Naphthalene | | ND | 5.0 | 0.29 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| 4-Chloroaniline | | ND | 5.0 | 0.78 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| Hexachlorobutadiene | | ND | 5.0 | 0.62 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| 4-Chloro-3-methylphenol | | ND | 5.0 | 0.57 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| 2-Methylnaphthalene | | ND | 5.0 | 0.35 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| Hexachlorocyclopentadiene | | ND | 5.0 | 0.83 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| 2,4,5-Trichlorophenol | | ND | 5.0 | 2.3 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |

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| | | |
|---|---|---|
| RWQCB - Fresno<br>1685 E Street<br>Fresno CA, 93706-2007 | Project: 13-014-150<br>Project Number: River Ranch HOA Deep Well<br>Project Manager: Anthony Toto | **Reported:**<br>1/16/2015 |

**DLW-121914-1**

AL19034-01 (Drinking Water - Public/Routine) Sampled:12/19/14 10:54

| Analyte | Flag | Result | Reporting Limit | MDL | Units | Dilution | Batch | Analyst | Prepared | Analyzed | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile Organics** | | | | | | | | | | | |
| 2,4,6-Trichlorophenol | | ND | 5.0 | 2.5 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| 2-Chloronaphthalene | | ND | 5.0 | 0.29 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| 2-Nitroaniline | | ND | 5.0 | 0.88 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| Dimethyl phthalate | | ND | 5.0 | 0.27 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| Acenaphthylene | | ND | 5.0 | 0.27 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| 2,6-Dinitrotoluene | | ND | 5.0 | 1.0 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| 3-Nitroaniline | | ND | 5.0 | 0.98 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| Acenaphthene | | ND | 5.0 | 0.59 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| 2,4-Dinitrophenol | | ND | 5.0 | 1.9 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| Dibenzofuran | | ND | 5.0 | 0.21 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| 4-Nitrophenol | | ND | 5.0 | 1.6 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| 2,4-Dinitrotoluene | | ND | 5.0 | 0.70 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| Fluorene | | ND | 5.0 | 0.50 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| Diethyl phthalate | | ND | 5.0 | 0.32 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| 4-Chlorophenyl phenyl ether | | ND | 5.0 | 0.45 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| 4-Nitroaniline | | ND | 5.0 | 1.6 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| Diphenylamine | | ND | 5.0 | 0.48 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| 1,2-Diphenylhydrazine | | ND | 5.0 | 0.49 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| Benzidine | | ND | 5.0 | 1.2 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| N-Nitrosodiphenylamine | | ND | 5.0 | 0.58 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| 4,6-Dinitro-2-methylphenol | | ND | 5.0 | 0.51 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| 4-Bromophenyl phenyl ether | | ND | 5.0 | 0.52 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| Hexachlorobenzene | | ND | 5.0 | 0.42 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| Pentachlorophenol | | ND | 5.0 | 1.3 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| Phenanthrene | | ND | 5.0 | 0.26 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| Anthracene | | ND | 5.0 | 0.31 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| Di-n-butyl phthalate | | ND | 5.0 | 0.65 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| Fluoranthene | | ND | 5.0 | 0.34 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| Pyrene | | ND | 5.0 | 0.26 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| Butyl benzyl phthalate | | ND | 5.0 | 0.76 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| Benzo (a) anthracene | | ND | 5.0 | 0.56 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| Chrysene | | ND | 5.0 | 0.25 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| Bis(2-ethylhexyl) phthalate | | ND | 5.0 | 0.58 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| Di-n-octyl phthalate | | ND | 5.0 | 0.36 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |

MOORE TWINING ASSOCIATES, INC.

California ELAP Certificate #1371

2527 Fresno Street
Fresno, CA 93721
(559) 268-7021 Phone
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| | | |
|---|---|---|
| RWQCB - Fresno<br>1685 E Street<br>Fresno CA, 93706-2007 | Project: 13-014-150<br>Project Number: River Ranch HOA Deep Well<br>Project Manager: Anthony Toto | Reported:<br>1/16/2015 |

## DLW-121914-1

AL19034-01 (Drinking Water - Public/Routine) Sampled:12/19/14 10:54

| Analyte | Flag | Result | Reporting Limit | MDL | Units | Dilution | Batch | Analyst | Prepared | Analyzed | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile Organics** | | | | | | | | | | | |
| Benzo (b) fluoranthene | | ND | 5.0 | 0.67 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| Benzo (k) fluoranthene | | ND | 5.0 | 0.70 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| Benzo (a) pyrene | | ND | 5.0 | 0.46 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| 3,3'-Dichlorobenzidine | | ND | 5.0 | 1.1 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| Indeno(1,2,3-cd)pyrene | | ND | 5.0 | 0.58 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| Dibenzo(a,h)anthracene | | ND | 5.0 | 0.39 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| Benzo(ghi)perylene | | ND | 5.0 | 0.36 | µg/L | 1 | U4L2307 | FFP | 12/23/14 12:57 | 12/30/14 0:13 | EPA 8270C |
| *Surrogate: 2-Fluorophenol* | | *44.0 %* | *22-92* | | | | *U4L2307* | | 12/23/14 12:57 | 12/30/14 0:13 | *EPA 8270C* |
| *Surrogate: Phenol-d5* | | *27.8 %* | *10-94* | | | | *U4L2307* | | 12/23/14 12:57 | 12/30/14 0:13 | *EPA 8270C* |
| *Surrogate: Nitrobenzene-d5* | | *66.7 %* | *41-110* | | | | *U4L2307* | | 12/23/14 12:57 | 12/30/14 0:13 | *EPA 8270C* |
| *Surrogate: 2-Fluorobiphenyl* | | *65.1 %* | *40-92* | | | | *U4L2307* | | 12/23/14 12:57 | 12/30/14 0:13 | *EPA 8270C* |
| *Surrogate: 2,4,6-Tribromophenol* | | *72.3 %* | *49-138* | | | | *U4L2307* | | 12/23/14 12:57 | 12/30/14 0:13 | *EPA 8270C* |
| *Surrogate: d14-Terphenyl* | | *105 %* | *44-131* | | | | *U4L2307* | | 12/23/14 12:57 | 12/30/14 0:13 | *EPA 8270C* |
| **Diesel** | **J** | **27** | 50 | 25 | µg/L | 1 | U5A0205 | RND | 1/2/15 8:41 | 1/6/15 1:35 | EPA 8015B |
| *Surrogate: o-Terphenyl* | | *76.7 %* | *34-150* | | | | *U5A0205* | | 1/2/15 8:41 | 1/6/15 1:35 | *EPA 8015B* |
| Motor Oil | | ND | 100 | 25 | µg/L | 1 | U5A0204 | RND | 1/2/15 8:39 | 1/6/15 1:35 | EPA 8015B |
| **Volatile Organics** | | | | | | | | | | | |
| Dichlorodifluoromethane (CFC-12) | | ND | 0.50 | 0.19 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| Chloromethane | | ND | 0.50 | 0.16 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| Vinyl chloride | | ND | 0.50 | 0.16 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| Bromomethane | | ND | 1.0 | 0.32 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| Chloroethane | | ND | 0.50 | 0.16 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| 1,1-Dichloroethene | | ND | 0.50 | 0.14 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| Carbon disulfide | | ND | 0.50 | 0.14 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| Acrolein | | ND | 10 | 1.5 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| Methylene chloride | | ND | 1.0 | 0.20 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| trans-1,2-Dichloroethene | | ND | 0.50 | 0.11 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| Methyl tert-Butyl Ether (MTBE) | | ND | 1.0 | 0.36 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| 1,1-Dichloroethane | | ND | 0.50 | 0.12 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| Acrylonitrile | | ND | 5.0 | 2.9 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| cis-1,2-Dichloroethene | | ND | 0.50 | 0.15 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| 2,2-Dichloropropane | | ND | 1.0 | 0.24 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| Bromochloromethane | | ND | 0.50 | 0.20 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |

MOORE TWINING ASSOCIATES, INC.

*California ELAP Certificate #1371*

**2527 Fresno Street**
**Fresno, CA 93721**
**(559) 268-7021 Phone**
**(559) 268-0740 Fax**

| | | |
|---|---|---|
| RWQCB - Fresno | Project: 13-014-150 | |
| 1685 E Street | Project Number: River Ranch HOA Deep Well | **Reported:** |
| Fresno CA, 93706-2007 | Project Manager: Anthony Toto | 1/16/2015 |

## DLW-121914-1

AL19034-01 (Drinking Water - Public/Routine) Sampled:12/19/14 10:54

| Analyte | Flag | Result | Reporting Limit | MDL | Units | Dilution | Batch | Analyst | Prepared | Analyzed | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics** | | | | | | | | | | | |
| Chloroform | | ND | 0.50 | 0.14 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| Carbon tetrachloride | | ND | 0.50 | 0.16 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| 1,1,1-Trichloroethane (TCA) | | ND | 0.50 | 0.16 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| 1,1-Dichloropropene | | ND | 0.50 | 0.12 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| Benzene | | ND | 0.50 | 0.10 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| 1,2-Dichloroethane (1,2-DCA) | | ND | 0.50 | 0.10 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| Trichloroethene (TCE) | | ND | 0.50 | 0.17 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| Dibromomethane | | ND | 0.50 | 0.14 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| 1,2-Dichloropropane | | ND | 0.50 | 0.10 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| Bromodichloromethane | | ND | 0.50 | 0.13 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| cis-1,3-Dichloropropene | | ND | 0.50 | 0.11 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| Toluene | | ND | 0.50 | 0.27 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| trans-1,3-Dichloropropene | | ND | 0.50 | 0.14 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| Tetrachloroethene (PCE) | | ND | 0.50 | 0.12 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| Dibromochloromethane | | ND | 0.50 | 0.11 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| 1,3-Dichloropropane | | ND | 0.50 | 0.10 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| 1,2-Dibromoethane (EDB) | | ND | 0.50 | 0.22 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| Ethylbenzene | | ND | 0.50 | 0.10 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| Chlorobenzene | | ND | 0.50 | 0.10 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| 1,1,1,2-Tetrachloroethane | | ND | 0.50 | 0.12 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| m,p-Xylene | | ND | 1.0 | 0.20 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| o-Xylene | | ND | 0.50 | 0.10 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| Bromoform | | ND | 1.0 | 0.12 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| Isopropylbenzene | | ND | 1.0 | 0.10 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| Bromobenzene | | ND | 0.50 | 0.10 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| n-Propylbenzene | | ND | 1.0 | 0.10 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| 1,3,5-Trimethylbenzene | | ND | 0.50 | 0.11 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| 2-Chlorotoluene | | ND | 0.50 | 0.10 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| 1,2,3-Trichloropropane (123TCP) | | ND | 0.50 | 0.29 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| 4-Chlorotoluene | | ND | 0.50 | 0.10 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| tert-Butylbenzene | | ND | 1.0 | 0.10 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| 1,2,4-Trimethylbenzene | | ND | 1.0 | 0.10 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| sec-Butylbenzene | | ND | 0.50 | 0.10 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| p-Isopropyltoluene | | ND | 1.0 | 0.10 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |

MOORE TWINING ASSOCIATES, INC.
Since 1898

California ELAP Certificate #1371

2527 Fresno Street
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(559) 268-0740 Fax

| | | |
|---|---|---|
| RWQCB - Fresno | Project: 13-014-150 | |
| 1685 E Street | Project Number: River Ranch HOA Deep Well | Reported: |
| Fresno CA, 93706-2007 | Project Manager: Anthony Toto | 1/16/2015 |

## DLW-121914-1

AL19034-01 (Drinking Water - Public/Routine) Sampled:12/19/14 10:54

| Analyte | Flag | Result | Reporting Limit | MDL | Units | Dilution | Batch | Analyst | Prepared | Analyzed | Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics** | | | | | | | | | | | |
| 1,3-Dichlorobenzene | | ND | 0.50 | 0.040 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| 1,4-Dichlorobenzene | | ND | 0.50 | 0.10 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| n-Butylbenzene | | ND | 0.50 | 0.13 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| 1,2-Dichlorobenzene | | ND | 0.50 | 0.12 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| 1,2-Dibromo-3-chloropropane (DBCP) | | ND | 5.0 | 0.39 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| 1,2,4-Trichlorobenzene | | ND | 1.0 | 0.10 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| Hexachlorobutadiene | | ND | 1.0 | 0.10 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| Naphthalene | | ND | 0.50 | 0.15 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| 1,2,3-Trichlorobenzene | | ND | 0.50 | 0.10 | µg/L | 1 | U4L2908 | DTH | 12/29/14 11:00 | 12/30/14 10:21 | EPA 8260B |
| *Surrogate: 4-Bromofluorobenzene* | | *96.6 %* | *70-130* | | | | *U4L2908* | | 12/29/14 11:00 | 12/30/14 10:21 | *EPA 8260B* |
| *Surrogate: Dibromofluoromethane* | | *109 %* | *70-130* | | | | *U4L2908* | | 12/29/14 11:00 | 12/30/14 10:21 | *EPA 8260B* |
| *Surrogate: Toluene-d8* | | *104 %* | *70-130* | | | | *U4L2908* | | 12/29/14 11:00 | 12/30/14 10:21 | *EPA 8260B* |

## Notes and Definitions

| | |
|---|---|
| RPD | The RPD result exceeded the QC control limits. However, both percent recoveries were acceptable. |
| J | Detected but below the Reporting Limit; therefore, result is an estimated concentration (CLP J-Flag). Same as DNQ - Detected, but Not Quantified. |
| BS2 | Recovery for this analyte was biased low. Results were accepted based on duplicate results. |
| BS1 | Recovery for this analyte was biased high. Results were accepted based on duplicate results. |
| * | The BS was inadvertently double spiked with motor oil and surrogate. |
| ug/L | micrograms per liter (parts per billion concentration units) |
| mg/kg | milligrams per kilogram (parts per million concentration units) |
| mg/L | milligrams per Liter (parts per million concentration units) |
| ND | Analyte NOT DETECTED at or above the Minimum Detection Limit (MDL) |
| RPD | Relative Percent Difference |

MOORE TWINING ASSOCIATES, INC.

*California ELAP Certificate #1371*

**2527 Fresno Street**
**Fresno, CA 93721**
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**(559) 268-0740 Fax**

| | | |
|---|---|---|
| RWQCB - Fresno<br>1685 E Street<br>Fresno CA, 93706-2007 | Project: 13-014-150<br>Project Number: River Ranch HOA Deep Well<br>Project Manager: Anthony Toto | **Reported:**<br>1/16/2015 |

# Inorganics - Quality Control

## Batch U4L1925 - EPA 300.0

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **Blank (U4L1925-BLK1)** | | | | Prepared & Analyzed: 12/19/14 | | | | | | |
| Chloride | ND | 2.0 | mg/L | | | | | | | |
| Orthophosphate as P | ND | 0.25 | mg/L | | | | | | | |
| Nitrate as NO3 | ND | 2.0 | mg/L | | | | | | | |
| Sulfate as SO4 | ND | 2.0 | mg/L | | | | | | | |
| **LCS (U4L1925-BS1)** | | | | Prepared & Analyzed: 12/19/14 | | | | | | |
| Orthophosphate as P | 4.78 | 0.25 | mg/L | 5.00 | | 95.5 | 90-110 | | 20 | |
| Chloride | 49.7 | 2.0 | mg/L | 50.0 | | 99.4 | 90-110 | | 20 | |
| Nitrate as NO3 | 48.6 | 2.0 | mg/L | 50.0 | | 97.3 | 90-110 | | 20 | |
| Sulfate as SO4 | 49.1 | 2.0 | mg/L | 50.0 | | 98.3 | 90-110 | | 20 | |
| **LCS Dup (U4L1925-BSD1)** | | | | Prepared & Analyzed: 12/19/14 | | | | | | |
| Orthophosphate as P | 4.82 | 0.25 | mg/L | 5.00 | | 96.3 | 90-110 | 0.826 | 20 | |
| Chloride | 49.6 | 2.0 | mg/L | 50.0 | | 99.2 | 90-110 | 0.153 | 20 | |
| Nitrate as NO3 | 49.0 | 2.0 | mg/L | 50.0 | | 98.0 | 90-110 | 0.738 | 20 | |
| Sulfate as SO4 | 49.0 | 2.0 | mg/L | 50.0 | | 98.0 | 90-110 | 0.290 | 20 | |
| **Matrix Spike (U4L1925-MS1)** | | **Source: AL19006-01** | | Prepared & Analyzed: 12/19/14 | | | | | | |
| Chloride | 116 | 4.0 | mg/L | 100 | 16.5 | 99.1 | 48-147 | | 15 | |
| Orthophosphate as P | 8.96 | 0.50 | mg/L | 10.0 | ND | 89.6 | 80-120 | | 20 | |
| Nitrate as NO3 | 109 | 4.0 | mg/L | 100 | 11.6 | 97.0 | 70-130 | | 20 | |
| Sulfate as SO4 | 101 | 4.0 | mg/L | 100 | 2.81 | 98.5 | 70-130 | | 20 | |
| **Matrix Spike (U4L1925-MS2)** | | **Source: AL19031-01** | | Prepared: 12/19/14 Analyzed: 12/20/14 | | | | | | |
| Chloride | 100 | 4.0 | mg/L | 100 | 7.24 | 93.0 | 48-147 | | 15 | |
| Orthophosphate as P | 8.90 | 0.50 | mg/L | 10.0 | ND | 89.0 | 80-120 | | 20 | |
| Nitrate as NO3 | 99.8 | 4.0 | mg/L | 100 | 9.29 | 90.5 | 70-130 | | 20 | |
| Sulfate as SO4 | 105 | 4.0 | mg/L | 100 | 13.3 | 91.9 | 70-130 | | 20 | |
| **Matrix Spike Dup (U4L1925-MSD1)** | | **Source: AL19006-01** | | Prepared & Analyzed: 12/19/14 | | | | | | |
| Orthophosphate as P | 8.60 | 0.50 | mg/L | 10.0 | ND | 86.0 | 80-120 | 4.14 | 20 | |
| Chloride | 110 | 4.0 | mg/L | 100 | 16.5 | 93.6 | 48-147 | 4.89 | 15 | |
| Nitrate as NO3 | 103 | 4.0 | mg/L | 100 | 11.6 | 91.1 | 70-130 | 5.57 | 20 | |
| Sulfate as SO4 | 96.4 | 4.0 | mg/L | 100 | 2.81 | 93.6 | 70-130 | 4.94 | 20 | |
| **Matrix Spike Dup (U4L1925-MSD2)** | | **Source: AL19031-01** | | Prepared: 12/19/14 Analyzed: 12/20/14 | | | | | | |
| Chloride | 102 | 4.0 | mg/L | 100 | 7.24 | 94.6 | 48-147 | 1.61 | 15 | |
| Orthophosphate as P | 9.23 | 0.50 | mg/L | 10.0 | ND | 92.3 | 80-120 | 3.69 | 20 | |
| Nitrate as NO3 | 103 | 4.0 | mg/L | 100 | 9.29 | 93.4 | 70-130 | 2.83 | 20 | |

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| 1685 E Street | Project Number: River Ranch HOA Deep Well | **Reported:** |
| Fresno CA, 93706-2007 | Project Manager: Anthony Toto | 1/16/2015 |

# Inorganics - Quality Control

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| ***Batch U4L1925 - EPA 300.0*** | | | | | | | | | | |
| **Matrix Spike Dup (U4L1925-MSD2)** | | **Source: AL19031-01** | | Prepared: 12/19/14 Analyzed: 12/20/14 | | | | | | |
| Sulfate as SO4 | 107 | 4.0 | mg/L | 100 | 13.3 | 93.5 | 70-130 | 1.52 | 20 | |
| ***Batch U4L1926 - SM2510B*** | | | | | | | | | | |
| **Blank (U4L1926-BLK1)** | | | | Prepared & Analyzed: 12/19/14 | | | | | | |
| Specific Conductance (EC) | ND | 1.0 | µS/cm | | | | | | | |
| Total Alkalinity as CaCO3 | 0.340 | 1.0 | mg/L | | | | | | | J |
| Bicarbonate Alkalinity as HCO3 | 0.420 | 1.3 | mg/L | | | | | | | J |
| Carbonate Alkalinity as CO3 | ND | 1.0 | mg/L | | | | | | | |
| Hydroxide Alkalinity as OH | ND | 1.0 | mg/L | | | | | | | |
| **LCS (U4L1926-BS1)** | | | | Prepared & Analyzed: 12/19/14 | | | | | | |
| Specific Conductance (EC) | 525 | 1.0 | µS/cm | 500 | | 105 | 80-120 | | 20 | |
| **LCS (U4L1926-BS3)** | | | | Prepared & Analyzed: 12/19/14 | | | | | | |
| Total Alkalinity as CaCO3 | 208 | 1.0 | mg/L | 250 | | 83.1 | 80-120 | | 20 | |
| **LCS Dup (U4L1926-BSD1)** | | | | Prepared & Analyzed: 12/19/14 | | | | | | |
| Specific Conductance (EC) | 524 | 1.0 | µS/cm | 500 | | 105 | 80-120 | 0.193 | 20 | |
| **LCS Dup (U4L1926-BSD3)** | | | | Prepared & Analyzed: 12/19/14 | | | | | | |
| Total Alkalinity as CaCO3 | 203 | 1.0 | mg/L | 250 | | 81.2 | 80-120 | 2.37 | 20 | |
| **Duplicate (U4L1926-DUP1)** | | **Source: AL17043-01** | | Prepared & Analyzed: 12/19/14 | | | | | | |
| Total Alkalinity as CaCO3 | 123 | 1.0 | mg/L | | 127 | | | 3.51 | 20 | |
| Specific Conductance (EC) | 755 | 1.0 | µS/cm | | 755 | | | 0.00 | 20 | |
| Bicarbonate Alkalinity as HCO3 | 150 | 1.3 | mg/L | | 155 | | | 3.50 | 20 | |
| Carbonate Alkalinity as CO3 | ND | 1.0 | mg/L | | ND | | | | 20 | |
| Hydroxide Alkalinity as OH | ND | 1.0 | mg/L | | ND | | | | 20 | |
| **Duplicate (U4L1926-DUP2)** | | **Source: AL19025-03** | | Prepared & Analyzed: 12/19/14 | | | | | | |
| Total Alkalinity as CaCO3 | 311 | 1.0 | mg/L | | 299 | | | 3.71 | 20 | |
| Specific Conductance (EC) | 934 | 1.0 | µS/cm | | 933 | | | 0.108 | 20 | |
| Bicarbonate Alkalinity as HCO3 | 379 | 1.3 | mg/L | | 365 | | | 3.70 | 20 | |
| Carbonate Alkalinity as CO3 | ND | 1.0 | mg/L | | ND | | | | 20 | |
| Hydroxide Alkalinity as OH | ND | 1.0 | mg/L | | ND | | | | 20 | |
| ***Batch U4L2213 - SM 2540C*** | | | | | | | | | | |
| **Blank (U4L2213-BLK1)** | | | | Prepared: 12/22/14 Analyzed: 12/23/14 | | | | | | |
| Total Dissolved Solids | ND | 10 | mg/L | | | | | | | |

## Inorganics - Quality Control

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| ***Batch U4L2213 - SM 2540C*** | | | | | | | | | | |
| **LCS (U4L2213-BS1)** | | | | Prepared: 12/22/14 Analyzed: 12/23/14 | | | | | | |
| Total Dissolved Solids | 240 | 10 | mg/L | 240 | | 100 | 80-120 | | 20 | |
| **LCS Dup (U4L2213-BSD1)** | | | | Prepared: 12/22/14 Analyzed: 12/23/14 | | | | | | |
| Total Dissolved Solids | 247 | 10 | mg/L | 240 | | 103 | 80-120 | 2.87 | 20 | |
| **Duplicate (U4L2213-DUP1)** | | **Source: AL16045-01** | | Prepared: 12/22/14 Analyzed: 12/23/14 | | | | | | |
| Total Dissolved Solids | 628 | 10 | mg/L | | 654 | | | 4.06 | 20 | |
| **Duplicate (U4L2213-DUP2)** | | **Source: AL18033-01** | | Prepared: 12/22/14 Analyzed: 12/23/14 | | | | | | |
| Total Dissolved Solids | 278 | 10 | mg/L | | 279 | | | 0.359 | 20 | |

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| 1685 E Street | Project Number: River Ranch HOA Deep Well | Reported: |
| Fresno CA, 93706-2007 | Project Manager: Anthony Toto | 1/16/2015 |

# Metals - Dissolved - Quality Control

## Batch U4L2309 - EPA 200.8

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **Blank (U4L2309-BLK1)** | | | | Prepared & Analyzed: 12/24/14 | | | | | | |
| Iron | ND | 20 | µg/L | | | | | | | |
| Molybdenum | 0.0276 | 1.0 | µg/L | | | | | | | J |
| Nickel | ND | 1.0 | µg/L | | | | | | | |
| Vanadium | ND | 1.0 | µg/L | | | | | | | |
| Thallium | ND | 1.0 | µg/L | | | | | | | |
| Arsenic | ND | 1.0 | µg/L | | | | | | | |
| Beryllium | ND | 1.0 | µg/L | | | | | | | |
| Barium | ND | 1.0 | µg/L | | | | | | | |
| Selenium | ND | 1.0 | µg/L | | | | | | | |
| Silver | 0.315 | 1.0 | µg/L | | | | | | | J |
| Boron | ND | 20 | µg/L | | | | | | | |
| Mercury | ND | 0.20 | µg/L | | | | | | | |
| Cobalt | ND | 1.0 | µg/L | | | | | | | |
| Manganese | 0.133 | 1.0 | µg/L | | | | | | | J |
| Lead | ND | 1.0 | µg/L | | | | | | | |
| Copper | 0.102 | 2.0 | µg/L | | | | | | | J |
| Chromium | ND | 1.0 | µg/L | | | | | | | |
| Zinc | 0.226 | 5.0 | µg/L | | | | | | | J |
| Antimony | 0.165 | 1.0 | µg/L | | | | | | | J |
| Cadmium | ND | 0.20 | µg/L | | | | | | | |
| **LCS (U4L2309-BS1)** | | | | Prepared & Analyzed: 12/24/14 | | | | | | |
| Arsenic | 51.0 | 1.0 | µg/L | 50.0 | | 102 | 85-115 | | 20 | |
| Antimony | 49.2 | 1.0 | µg/L | 50.0 | | 98.3 | 85-115 | | 20 | |
| Barium | 50.4 | 1.0 | µg/L | 50.0 | | 101 | 85-115 | | 20 | |
| Iron | 2550 | 20 | µg/L | 2500 | | 102 | 85-115 | | 20 | |
| Boron | 257 | 20 | µg/L | 250 | | 103 | 85-115 | | 20 | |
| Molybdenum | 50.0 | 1.0 | µg/L | 50.0 | | 100 | 85-115 | | 20 | |
| Cobalt | 49.9 | 1.0 | µg/L | 50.0 | | 99.7 | 85-115 | | 20 | |
| Copper | 50.8 | 2.0 | µg/L | 50.0 | | 102 | 85-115 | | 20 | |
| Nickel | 50.9 | 1.0 | µg/L | 50.0 | | 102 | 85-115 | | 20 | |
| Thallium | 50 | 1.0 | µg/L | 50.0 | | 101 | 85-115 | | 20 | |
| Beryllium | 50.2 | 1.0 | µg/L | 50.0 | | 100 | 85-115 | | 20 | |
| Manganese | 49.2 | 1.0 | µg/L | 50.0 | | 98.4 | 85-115 | | 20 | |
| Cadmium | 49.8 | 0.20 | µg/L | 50.0 | | 99.7 | 85-115 | | 20 | |

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| 1685 E Street | Project Number: River Ranch HOA Deep Well | Reported: |
| Fresno CA, 93706-2007 | Project Manager: Anthony Toto | 1/16/2015 |

## Metals - Dissolved - Quality Control

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch U4L2309 - EPA 200.8** | | | | | | | | | | |
| **LCS (U4L2309-BS1)** | | | | Prepared & Analyzed: 12/24/14 | | | | | | |
| Silver | 49.8 | 1.0 | µg/L | 50.0 | | 99.6 | 85-115 | | 20 | |
| Chromium | 49.7 | 1.0 | µg/L | 50.0 | | 99.5 | 85-115 | | 20 | |
| Selenium | 50.5 | 1.0 | µg/L | 50.0 | | 101 | 85-115 | | 20 | |
| Zinc | 50.7 | 5.0 | µg/L | 50.0 | | 101 | 85-115 | | 20 | |
| Lead | 50 | 1.0 | µg/L | 50.0 | | 99.8 | 85-115 | | 20 | |
| Mercury | 0.997 | 0.20 | µg/L | 1.00 | | 99.7 | 80-115 | | 20 | |
| Vanadium | 49.4 | 1.0 | µg/L | 50.0 | | 98.9 | 85-115 | | 20 | |
| **LCS Dup (U4L2309-BSD1)** | | | | Prepared & Analyzed: 12/24/14 | | | | | | |
| Iron | 2220 | 20 | µg/L | 2500 | | 89.0 | 85-115 | 13.7 | 20 | |
| Vanadium | 41.0 | 1.0 | µg/L | 50.0 | | 81.9 | 85-115 | 18.7 | 20 | BS2 |
| Chromium | 57.1 | 1.0 | µg/L | 50.0 | | 114 | 85-115 | 13.7 | 20 | |
| Copper | 42.5 | 2.0 | µg/L | 50.0 | | 85.0 | 85-115 | 17.8 | 20 | |
| Lead | 62 | 1.0 | µg/L | 50.0 | | 124 | 85-115 | 21.8 | 20 | BS1 |
| Nickel | 43.0 | 1.0 | µg/L | 50.0 | | 86.1 | 85-115 | 16.7 | 20 | |
| Manganese | 43.0 | 1.0 | µg/L | 50.0 | | 86.0 | 85-115 | 13.5 | 20 | |
| Molybdenum | 41.9 | 1.0 | µg/L | 50.0 | | 83.8 | 85-115 | 17.8 | 20 | BS2 |
| Boron | 217 | 20 | µg/L | 250 | | 86.9 | 85-115 | 16.9 | 20 | |
| Beryllium | 42.0 | 1.0 | µg/L | 50.0 | | 83.9 | 85-115 | 17.9 | 20 | BS2 |
| Mercury | 1.24 | 0.20 | µg/L | 1.00 | | 124 | 80-115 | 21.5 | 20 | BS1 |
| Selenium | 43.0 | 1.0 | µg/L | 50.0 | | 86.0 | 85-115 | 15.9 | 20 | |
| Barium | 62.6 | 1.0 | µg/L | 50.0 | | 125 | 85-115 | 21.6 | 20 | BS1 |
| Arsenic | 42.3 | 1.0 | µg/L | 50.0 | | 84.6 | 85-115 | 18.7 | 20 | BS2 |
| Silver | 41.8 | 1.0 | µg/L | 50.0 | | 83.5 | 85-115 | 17.5 | 20 | BS2 |
| Antimony | 41.3 | 1.0 | µg/L | 50.0 | | 82.5 | 85-115 | 17.5 | 20 | BS2 |
| Cobalt | 41.2 | 1.0 | µg/L | 50.0 | | 82.4 | 85-115 | 19.0 | 20 | BS2 |
| Thallium | 62 | 1.0 | µg/L | 50.0 | | 124 | 85-115 | 20.4 | 20 | BS1 |
| Cadmium | 41.9 | 0.20 | µg/L | 50.0 | | 83.8 | 85-115 | 17.3 | 20 | BS2 |
| Zinc | 42.8 | 5.0 | µg/L | 50.0 | | 85.5 | 85-115 | 16.9 | 20 | |
| **Batch U5A0602 - EPA 200.7** | | | | | | | | | | |
| **Blank (U5A0602-BLK1)** | | | | Prepared & Analyzed: 01/06/15 | | | | | | |
| Magnesium | ND | 0.10 | mg/L | | | | | | | |
| Sodium | ND | 1.0 | mg/L | | | | | | | |
| Potassium | ND | 1.0 | mg/L | | | | | | | |

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| 1685 E Street | Project Number: River Ranch HOA Deep Well | **Reported:** |
| Fresno CA, 93706-2007 | Project Manager: Anthony Toto | 1/16/2015 |

# Metals - Dissolved - Quality Control

## Batch U5A0602 - EPA 200.7

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **Blank (U5A0602-BLK1)** | | | | Prepared & Analyzed: 01/06/15 | | | | | | |
| Calcium | ND | 0.10 | mg/L | | | | | | | |
| **LCS (U5A0602-BS1)** | | | | Prepared & Analyzed: 01/06/15 | | | | | | |
| Sodium | 2.27 | 1.0 | mg/L | 2.00 | | 114 | 85-115 | | 20 | |
| Potassium | 1.89 | 1.0 | mg/L | 2.00 | | 94.4 | 85-115 | | 20 | |
| Magnesium | 1.95 | 0.10 | mg/L | 2.00 | | 97.3 | 85-115 | | 20 | |
| Calcium | 1.00 | 0.10 | mg/L | 1.00 | | 100 | 85-115 | | 20 | |
| **LCS Dup (U5A0602-BSD1)** | | | | Prepared & Analyzed: 01/06/15 | | | | | | |
| Magnesium | 1.95 | 0.10 | mg/L | 2.00 | | 97.7 | 85-115 | 0.428 | 20 | |
| Calcium | 1.00 | 0.10 | mg/L | 1.00 | | 100 | 85-115 | 0.0546 | 20 | |
| Potassium | 1.92 | 1.0 | mg/L | 2.00 | | 95.9 | 85-115 | 1.57 | 20 | |
| Sodium | 2.23 | 1.0 | mg/L | 2.00 | | 112 | 85-115 | 1.92 | 20 | |

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| 1685 E Street | Project Number: River Ranch HOA Deep Well | Reported: |
| Fresno CA, 93706-2007 | Project Manager: Anthony Toto | 1/16/2015 |

## Semi-Volatile Organics - Quality Control

### Batch U4L2307 - EPA 8270C

**Blank (U4L2307-BLK1)** Prepared: 12/23/14 Analyzed: 12/29/14

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| *Surrogate: 2-Fluorophenol* | *44.7* | | *µg/L* | *100* | | *44.7* | *22-92* | | | |
| *Surrogate: Phenol-d5* | *29.5* | | *µg/L* | *100* | | *29.5* | *10-94* | | | |
| *Surrogate: Nitrobenzene-d5* | *34.8* | | *µg/L* | *50.0* | | *69.7* | *41-110* | | | |
| *Surrogate: 2-Fluorobiphenyl* | *34.7* | | *µg/L* | *50.0* | | *69.4* | *40-92* | | | |
| *Surrogate: 2,4,6-Tribromophenol* | *77.4* | | *µg/L* | *100* | | *77.4* | *49-138* | | | |
| *Surrogate: d14-Terphenyl* | *66.4* | | *µg/L* | *50.0* | | *133* | *44-131* | | | |
| N-Nitrosodimethylamine | ND | 5.0 | µg/L | | | | | | | |
| Phenol | ND | 5.0 | µg/L | | | | | | | |
| Bis(2-chloroethyl)ether | ND | 5.0 | µg/L | | | | | | | |
| 2-Chlorophenol | ND | 5.0 | µg/L | | | | | | | |
| 1,3-Dichlorobenzene | ND | 5.0 | µg/L | | | | | | | |
| 1,4-Dichlorobenzene | ND | 5.0 | µg/L | | | | | | | |
| 1,2-Dichlorobenzene | ND | 5.0 | µg/L | | | | | | | |
| Bis(2-chloroisopropyl)ether | ND | 5.0 | µg/L | | | | | | | |
| 2-Methylphenol | ND | 5.0 | µg/L | | | | | | | |
| Hexachloroethane | ND | 5.0 | µg/L | | | | | | | |
| 3-Methylphenol | ND | 5.0 | µg/L | | | | | | | |
| 4-Methylphenol | ND | 5.0 | µg/L | | | | | | | |
| N-Nitrosodi-n-propylamine | ND | 5.0 | µg/L | | | | | | | |
| Nitrobenzene | ND | 5.0 | µg/L | | | | | | | |
| Isophorone | ND | 5.0 | µg/L | | | | | | | |
| 2-Nitrophenol | ND | 5.0 | µg/L | | | | | | | |
| 2,4-Dimethylphenol | ND | 5.0 | µg/L | | | | | | | |
| Bis(2-chloroethoxy)methane | ND | 5.0 | µg/L | | | | | | | |
| 2,4-Dichlorophenol | ND | 5.0 | µg/L | | | | | | | |
| 1,2,4-Trichlorobenzene | ND | 5.0 | µg/L | | | | | | | |
| Naphthalene | ND | 5.0 | µg/L | | | | | | | |
| 4-Chloroaniline | ND | 5.0 | µg/L | | | | | | | |
| Hexachlorobutadiene | ND | 5.0 | µg/L | | | | | | | |
| 4-Chloro-3-methylphenol | ND | 5.0 | µg/L | | | | | | | |
| 2-Methylnaphthalene | ND | 5.0 | µg/L | | | | | | | |
| Hexachlorocyclopentadiene | ND | 5.0 | µg/L | | | | | | | |
| 2,4,5-Trichlorophenol | ND | 5.0 | µg/L | | | | | | | |
| 2,4,6-Trichlorophenol | ND | 5.0 | µg/L | | | | | | | |

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| 1685 E Street | Project Number: River Ranch HOA Deep Well | **Reported:** |
| Fresno CA, 93706-2007 | Project Manager: Anthony Toto | 1/16/2015 |

## Semi-Volatile Organics - Quality Control

### Batch U4L2307 - EPA 8270C

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **Blank (U4L2307-BLK1)** | | | | Prepared: 12/23/14 Analyzed: 12/29/14 | | | | | | |
| 2-Chloronaphthalene | ND | 5.0 | µg/L | | | | | | | |
| 2-Nitroaniline | ND | 5.0 | µg/L | | | | | | | |
| Dimethyl phthalate | ND | 5.0 | µg/L | | | | | | | |
| Acenaphthylene | ND | 5.0 | µg/L | | | | | | | |
| 2,6-Dinitrotoluene | ND | 5.0 | µg/L | | | | | | | |
| 3-Nitroaniline | ND | 5.0 | µg/L | | | | | | | |
| Acenaphthene | ND | 5.0 | µg/L | | | | | | | |
| 2,4-Dinitrophenol | ND | 5.0 | µg/L | | | | | | | |
| Dibenzofuran | ND | 5.0 | µg/L | | | | | | | |
| 4-Nitrophenol | ND | 5.0 | µg/L | | | | | | | |
| 2,4-Dinitrotoluene | ND | 5.0 | µg/L | | | | | | | |
| Fluorene | ND | 5.0 | µg/L | | | | | | | |
| Diethyl phthalate | ND | 5.0 | µg/L | | | | | | | |
| 4-Chlorophenyl phenyl ether | ND | 5.0 | µg/L | | | | | | | |
| 4-Nitroaniline | ND | 5.0 | µg/L | | | | | | | |
| Diphenylamine | ND | 5.0 | µg/L | | | | | | | |
| 1,2-Diphenylhydrazine | ND | 5.0 | µg/L | | | | | | | |
| Benzidine | ND | 5.0 | µg/L | | | | | | | |
| N-Nitrosodiphenylamine | ND | 5.0 | µg/L | | | | | | | |
| 4,6-Dinitro-2-methylphenol | ND | 5.0 | µg/L | | | | | | | |
| 4-Bromophenyl phenyl ether | ND | 5.0 | µg/L | | | | | | | |
| Hexachlorobenzene | ND | 5.0 | µg/L | | | | | | | |
| Pentachlorophenol | ND | 5.0 | µg/L | | | | | | | |
| Phenanthrene | ND | 5.0 | µg/L | | | | | | | |
| Anthracene | ND | 5.0 | µg/L | | | | | | | |
| Di-n-butyl phthalate | ND | 5.0 | µg/L | | | | | | | |
| Fluoranthene | ND | 5.0 | µg/L | | | | | | | |
| Pyrene | ND | 5.0 | µg/L | | | | | | | |
| Butyl benzyl phthalate | ND | 5.0 | µg/L | | | | | | | |
| Benzo (a) anthracene | ND | 5.0 | µg/L | | | | | | | |
| Chrysene | ND | 5.0 | µg/L | | | | | | | |
| Bis(2-ethylhexyl) phthalate | ND | 5.0 | µg/L | | | | | | | |
| Di-n-octyl phthalate | ND | 5.0 | µg/L | | | | | | | |
| Benzo (b) fluoranthene | ND | 5.0 | µg/L | | | | | | | |

MOORE TWINING ASSOCIATES, INC.

California ELAP Certificate #1371

2527 Fresno Street
Fresno, CA 93721
(559) 268-7021 Phone
(559) 268-0740 Fax

| | | |
|---|---|---|
| RWQCB - Fresno | Project: 13-014-150 | |
| 1685 E Street | Project Number: River Ranch HOA Deep Well | Reported: |
| Fresno CA, 93706-2007 | Project Manager: Anthony Toto | 1/16/2015 |

# Semi-Volatile Organics - Quality Control

## Batch U4L2307 - EPA 8270C

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **Blank (U4L2307-BLK1)** | | | | Prepared: 12/23/14 Analyzed: 12/29/14 | | | | | | |
| Benzo (k) fluoranthene | ND | 5.0 | µg/L | | | | | | | |
| Benzo (a) pyrene | ND | 5.0 | µg/L | | | | | | | |
| 3,3'-Dichlorobenzidine | ND | 5.0 | µg/L | | | | | | | |
| Indeno(1,2,3-cd)pyrene | ND | 5.0 | µg/L | | | | | | | |
| Dibenzo(a,h)anthracene | ND | 5.0 | µg/L | | | | | | | |
| Benzo(ghi)perylene | ND | 5.0 | µg/L | | | | | | | |
| **LCS (U4L2307-BS1)** | | | | Prepared: 12/23/14 Analyzed: 12/29/14 | | | | | | |
| *Surrogate: 2-Fluorophenol* | *48.7* | | *µg/L* | *100* | | *48.7* | *22-92* | | | |
| *Surrogate: Phenol-d5* | *30.9* | | *µg/L* | *100* | | *30.9* | *10-94* | | | |
| *Surrogate: Nitrobenzene-d5* | *36.2* | | *µg/L* | *50.0* | | *72.4* | *41-110* | | | |
| *Surrogate: 2-Fluorobiphenyl* | *35.7* | | *µg/L* | *50.0* | | *71.4* | *40-92* | | | |
| *Surrogate: 2,4,6-Tribromophenol* | *83.6* | | *µg/L* | *100* | | *83.6* | *49-138* | | | |
| *Surrogate: d14-Terphenyl* | *63.4* | | *µg/L* | *50.0* | | *127* | *44-131* | | | |
| Phenol | 15.4 | 5.0 | µg/L | 50.0 | | 30.9 | 5-112 | | 20 | |
| 2-Chlorophenol | 34.6 | 5.0 | µg/L | 50.0 | | 69.3 | 23-134 | | 20 | |
| 1,4-Dichlorobenzene | 12.6 | 5.0 | µg/L | 25.0 | | 50.6 | 20-124 | | 20 | |
| N-Nitrosodi-n-propylamine | 17.3 | 5.0 | µg/L | 25.0 | | 69.3 | 5-230 | | 20 | |
| 1,2,4-Trichlorobenzene | 14.7 | 5.0 | µg/L | 25.0 | | 58.9 | 44-142 | | 20 | |
| 4-Chloro-3-methylphenol | 38.5 | 5.0 | µg/L | 50.0 | | 76.9 | 22-147 | | 20 | |
| Acenaphthene | 18.3 | 5.0 | µg/L | 25.0 | | 73.1 | 47-145 | | 20 | |
| 2,4-Dinitrotoluene | 17.0 | 5.0 | µg/L | 25.0 | | 68.0 | 39-139 | | 20 | |
| Pyrene | 25.0 | 5.0 | µg/L | 25.0 | | 100 | 52-115 | | 20 | |
| **LCS Dup (U4L2307-BSD1)** | | | | Prepared: 12/23/14 Analyzed: 12/29/14 | | | | | | |
| *Surrogate: 2-Fluorophenol* | *50.1* | | *µg/L* | *100* | | *50.1* | *22-92* | | | |
| *Surrogate: Phenol-d5* | *34.7* | | *µg/L* | *100* | | *34.7* | *10-94* | | | |
| *Surrogate: Nitrobenzene-d5* | *42.0* | | *µg/L* | *50.0* | | *84.0* | *41-110* | | | |
| *Surrogate: 2-Fluorobiphenyl* | *43.6* | | *µg/L* | *50.0* | | *87.2* | *40-92* | | | |
| *Surrogate: 2,4,6-Tribromophenol* | *90.3* | | *µg/L* | *100* | | *90.3* | *49-138* | | | |
| *Surrogate: d14-Terphenyl* | *61.0* | | *µg/L* | *50.0* | | *122* | *44-131* | | | |
| Phenol | 17.2 | 5.0 | µg/L | 50.0 | | 34.4 | 5-112 | 10.9 | 20 | |
| 2-Chlorophenol | 38.1 | 5.0 | µg/L | 50.0 | | 76.2 | 23-134 | 9.48 | 20 | |
| 1,4-Dichlorobenzene | 16.0 | 5.0 | µg/L | 25.0 | | 64.1 | 20-124 | 23.7 | 20 | RPD |
| N-Nitrosodi-n-propylamine | 18.5 | 5.0 | µg/L | 25.0 | | 73.9 | 5-230 | 6.51 | 20 | |
| 1,2,4-Trichlorobenzene | 18.1 | 5.0 | µg/L | 25.0 | | 72.5 | 44-142 | 20.7 | 20 | RPD |

MOORE TWINING ASSOCIATES, INC.

California ELAP Certificate #1371

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| | | |
|---|---|---|
| RWQCB - Fresno | Project: 13-014-150 | |
| 1685 E Street | Project Number: River Ranch HOA Deep Well | Reported: |
| Fresno CA, 93706-2007 | Project Manager: Anthony Toto | 1/16/2015 |

# Semi-Volatile Organics - Quality Control

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch U4L2307 - EPA 8270C** | | | | | | | | | | |
| **LCS Dup (U4L2307-BSD1)** | | | | Prepared: 12/23/14 Analyzed: 12/29/14 | | | | | | |
| 4-Chloro-3-methylphenol | 38.2 | 5.0 | µg/L | 50.0 | | 76.4 | 22-147 | 0.710 | 20 | |
| Acenaphthene | 21.2 | 5.0 | µg/L | 25.0 | | 84.9 | 47-145 | 14.9 | 20 | |
| 2,4-Dinitrotoluene | 18.9 | 5.0 | µg/L | 25.0 | | 75.6 | 39-139 | 10.6 | 20 | |
| Pyrene | 24.7 | 5.0 | µg/L | 25.0 | | 98.7 | 52-115 | 1.45 | 20 | |
| **Batch U5A0204 - EPA 8015B** | | | | | | | | | | |
| **Blank (U5A0204-BLK1)** | | | | Prepared: 01/02/15 Analyzed: 01/05/15 | | | | | | |
| *Surrogate: o-Terphenyl* | *40.8* | | *µg/L* | *40.0* | | *102* | *0-200* | | | |
| Motor Oil | ND | 100 | µg/L | | | | | | | |
| **LCS (U5A0204-BS1)** | | | | Prepared: 01/02/15 Analyzed: 01/05/15 | | | | | | |
| *Surrogate: o-Terphenyl* | *105* | | *µg/L* | *40.0* | | *262* | *62-132* | | | * |
| Motor Oil | 1050 | 100 | µg/L | 1000 | | 105 | 62-132 | | 20 | * |
| **LCS Dup (U5A0204-BSD1)** | | | | Prepared: 01/02/15 Analyzed: 01/05/15 | | | | | | |
| *Surrogate: o-Terphenyl* | *39.0* | | *µg/L* | *40.0* | | *97.4* | *62-132* | | | |
| Motor Oil | 536 | 100 | µg/L | 500 | | 107 | 62-132 | 64.5 | 20 | |
| **Batch U5A0205 - EPA 8015B** | | | | | | | | | | |
| **Blank (U5A0205-BLK1)** | | | | Prepared: 01/02/15 Analyzed: 01/05/15 | | | | | | |
| *Surrogate: o-Terphenyl* | *32.5* | | *µg/L* | *40.0* | | *81.2* | *34-150* | | | |
| Diesel | 32.5 | 50 | µg/L | | | | | | | J |
| **LCS (U5A0205-BS1)** | | | | Prepared: 01/02/15 Analyzed: 01/05/15 | | | | | | |
| *Surrogate: o-Terphenyl* | *45.6* | | *µg/L* | *40.0* | | *114* | *34-150* | | | |
| Diesel | 454 | 50 | µg/L | 500 | | 90.9 | 70-130 | | 20 | |
| **LCS Dup (U5A0205-BSD1)** | | | | Prepared: 01/02/15 Analyzed: 01/05/15 | | | | | | |
| *Surrogate: o-Terphenyl* | *41.3* | | *µg/L* | *40.0* | | *103* | *34-150* | | | |
| Diesel | 514 | 50 | µg/L | 500 | | 103 | 70-130 | 12.2 | 20 | |

MOORE TWINING ASSOCIATES, INC.
Since 1898

California ELAP Certificate #1371

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Fresno, CA 93721
(559) 268-7021 Phone
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| | | |
|---|---|---|
| RWQCB - Fresno | Project: 13-014-150 | |
| 1685 E Street | Project Number: River Ranch HOA Deep Well | Reported: |
| Fresno CA, 93706-2007 | Project Manager: Anthony Toto | 1/16/2015 |

# Volatile Organics - Quality Control

## Batch U4L2908 - EPA 8260B

**Blank (U4L2908-BLK1)** Prepared & Analyzed: 12/29/14

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| *Surrogate: 4-Bromofluorobenzene* | *24.3* | | *µg/L* | *25.0* | | *97.2* | *70-130* | | | |
| *Surrogate: Dibromofluoromethane* | *26.4* | | *µg/L* | *25.0* | | *106* | *70-130* | | | |
| *Surrogate: Toluene-d8* | *25.6* | | *µg/L* | *25.0* | | *102* | *70-130* | | | |
| Dichlorodifluoromethane (CFC-12) | ND | 0.50 | µg/L | | | | | | | |
| Chloromethane | ND | 0.50 | µg/L | | | | | | | |
| Vinyl chloride | ND | 0.50 | µg/L | | | | | | | |
| Bromomethane | ND | 1.0 | µg/L | | | | | | | |
| Chloroethane | ND | 0.50 | µg/L | | | | | | | |
| 1,1-Dichloroethene | ND | 0.50 | µg/L | | | | | | | |
| Carbon disulfide | ND | 0.50 | µg/L | | | | | | | |
| Acrolein | ND | 10 | µg/L | | | | | | | |
| Methylene chloride | ND | 1.0 | µg/L | | | | | | | |
| trans-1,2-Dichloroethene | ND | 0.50 | µg/L | | | | | | | |
| Methyl tert-Butyl Ether (MTBE) | ND | 1.0 | µg/L | | | | | | | |
| 1,1-Dichloroethane | ND | 0.50 | µg/L | | | | | | | |
| Acrylonitrile | ND | 5.0 | µg/L | | | | | | | |
| cis-1,2-Dichloroethene | ND | 0.50 | µg/L | | | | | | | |
| 2,2-Dichloropropane | ND | 1.0 | µg/L | | | | | | | |
| Bromochloromethane | ND | 0.50 | µg/L | | | | | | | |
| Chloroform | ND | 0.50 | µg/L | | | | | | | |
| Carbon tetrachloride | ND | 0.50 | µg/L | | | | | | | |
| 1,1,1-Trichloroethane (TCA) | ND | 0.50 | µg/L | | | | | | | |
| 1,1-Dichloropropene | ND | 0.50 | µg/L | | | | | | | |
| Benzene | ND | 0.50 | µg/L | | | | | | | |
| 1,2-Dichloroethane (1,2-DCA) | ND | 0.50 | µg/L | | | | | | | |
| Trichloroethene (TCE) | ND | 0.50 | µg/L | | | | | | | |
| Dibromomethane | ND | 0.50 | µg/L | | | | | | | |
| 1,2-Dichloropropane | ND | 0.50 | µg/L | | | | | | | |
| Bromodichloromethane | ND | 0.50 | µg/L | | | | | | | |
| cis-1,3-Dichloropropene | ND | 0.50 | µg/L | | | | | | | |
| Toluene | ND | 0.50 | µg/L | | | | | | | |
| trans-1,3-Dichloropropene | ND | 0.50 | µg/L | | | | | | | |
| Tetrachloroethene (PCE) | ND | 0.50 | µg/L | | | | | | | |
| Dibromochloromethane | ND | 0.50 | µg/L | | | | | | | |

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Since 1898

California ELAP Certificate #1371

2527 Fresno Street
Fresno, CA 93721
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(559) 268-0740 Fax

| | | |
|---|---|---|
| RWQCB - Fresno | Project: 13-014-150 | |
| 1685 E Street | Project Number: River Ranch HOA Deep Well | Reported: |
| Fresno CA, 93706-2007 | Project Manager: Anthony Toto | 1/16/2015 |

## Volatile Organics - Quality Control

### Batch U4L2908 - EPA 8260B

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **Blank (U4L2908-BLK1)** | | | | Prepared & Analyzed: 12/29/14 | | | | | | |
| 1,3-Dichloropropane | ND | 0.50 | µg/L | | | | | | | |
| 1,2-Dibromoethane (EDB) | ND | 0.50 | µg/L | | | | | | | |
| Ethylbenzene | ND | 0.50 | µg/L | | | | | | | |
| Chlorobenzene | ND | 0.50 | µg/L | | | | | | | |
| 1,1,1,2-Tetrachloroethane | ND | 0.50 | µg/L | | | | | | | |
| m,p-Xylene | ND | 1.0 | µg/L | | | | | | | |
| o-Xylene | ND | 0.50 | µg/L | | | | | | | |
| Bromoform | ND | 1.0 | µg/L | | | | | | | |
| Isopropylbenzene | ND | 1.0 | µg/L | | | | | | | |
| Bromobenzene | ND | 0.50 | µg/L | | | | | | | |
| n-Propylbenzene | ND | 1.0 | µg/L | | | | | | | |
| 1,3,5-Trimethylbenzene | ND | 0.50 | µg/L | | | | | | | |
| 2-Chlorotoluene | ND | 0.50 | µg/L | | | | | | | |
| 1,2,3-Trichloropropane (123TCP) | ND | 0.50 | µg/L | | | | | | | |
| 4-Chlorotoluene | ND | 0.50 | µg/L | | | | | | | |
| tert-Butylbenzene | ND | 1.0 | µg/L | | | | | | | |
| 1,2,4-Trimethylbenzene | ND | 1.0 | µg/L | | | | | | | |
| sec-Butylbenzene | ND | 0.50 | µg/L | | | | | | | |
| p-Isopropyltoluene | ND | 1.0 | µg/L | | | | | | | |
| 1,3-Dichlorobenzene | ND | 0.50 | µg/L | | | | | | | |
| 1,4-Dichlorobenzene | ND | 0.50 | µg/L | | | | | | | |
| n-Butylbenzene | ND | 0.50 | µg/L | | | | | | | |
| 1,2-Dichlorobenzene | ND | 0.50 | µg/L | | | | | | | |
| 1,2-Dibromo-3-chloropropane (DBCP) | ND | 5.0 | µg/L | | | | | | | |
| 1,2,4-Trichlorobenzene | ND | 1.0 | µg/L | | | | | | | |
| Hexachlorobutadiene | ND | 1.0 | µg/L | | | | | | | |
| Naphthalene | ND | 0.50 | µg/L | | | | | | | |
| 1,2,3-Trichlorobenzene | ND | 0.50 | µg/L | | | | | | | |
| **LCS (U4L2908-BS1)** | | | | Prepared & Analyzed: 12/29/14 | | | | | | |
| *Surrogate: 4-Bromofluorobenzene* | *24.9* | | *µg/L* | *25.0* | | *99.6* | *70-130* | | | |
| *Surrogate: Dibromofluoromethane* | *26.6* | | *µg/L* | *25.0* | | *106* | *70-130* | | | |
| *Surrogate: Toluene-d8* | *25.7* | | *µg/L* | *25.0* | | *103* | *70-130* | | | |
| 1,1-Dichloroethene | 21.3 | 0.50 | µg/L | 19.8 | | 107 | 70-130 | | 20 | |
| Benzene | 20.1 | 0.50 | µg/L | 20.0 | | 100 | 70-130 | | 20 | |

MOORE TWINING ASSOCIATES, INC.

California ELAP Certificate #1371

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| | | |
|---|---|---|
| RWQCB - Fresno | Project: 13-014-150 | |
| 1685 E Street | Project Number: River Ranch HOA Deep Well | **Reported:** |
| Fresno CA, 93706-2007 | Project Manager: Anthony Toto | 1/16/2015 |

# Volatile Organics - Quality Control

## Batch U4L2908 - EPA 8260B

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **LCS (U4L2908-BS1)** | | | | Prepared & Analyzed: 12/29/14 | | | | | | |
| Trichloroethene (TCE) | 17.9 | 0.50 | µg/L | 20.0 | | 89.7 | 70-130 | | 20 | |
| Toluene | 19.0 | 0.50 | µg/L | 19.9 | | 95.5 | 70-130 | | 20 | |
| Chlorobenzene | 18.8 | 0.50 | µg/L | 20.0 | | 94.2 | 70-130 | | 20 | |
| **LCS Dup (U4L2908-BSD1)** | | | | Prepared & Analyzed: 12/29/14 | | | | | | |
| *Surrogate: 4-Bromofluorobenzene* | *24.3* | | *µg/L* | *25.0* | | *97.1* | *70-130* | | | |
| *Surrogate: Dibromofluoromethane* | *26.9* | | *µg/L* | *25.0* | | *108* | *70-130* | | | |
| *Surrogate: Toluene-d8* | *25.9* | | *µg/L* | *25.0* | | *104* | *70-130* | | | |
| 1,1-Dichloroethene | 20.3 | 0.50 | µg/L | 19.8 | | 103 | 70-130 | 4.62 | 20 | |
| Benzene | 19.1 | 0.50 | µg/L | 20.0 | | 95.6 | 70-130 | 4.95 | 20 | |
| Trichloroethene (TCE) | 17.0 | 0.50 | µg/L | 20.0 | | 85.1 | 70-130 | 5.26 | 20 | |
| Toluene | 18.1 | 0.50 | µg/L | 19.9 | | 90.9 | 70-130 | 4.96 | 20 | |
| Chlorobenzene | 17.9 | 0.50 | µg/L | 20.0 | | 89.7 | 70-130 | 4.95 | 20 | |

Date of Report: 01/13/2015

Julio Morales

Moore-Twining Associates
2527 Fresno Street
Fresno, CA 93720

| | |
|---|---|
| Client Project: | AL19034 |
| BCL Project: | Water Samples |
| BCL Work Order: | 1430788 |
| Invoice ID: | B193225 |

Enclosed are the results of analyses for samples received by the laboratory on 12/24/2014. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Contact Person: Misty Orton
Client Service Rep

Authorized Signature

# Table of Contents

MOORE TWINING ASSOCIATES, INC.

# SUBCONTRACT ORDER - Purchase Order # 22571

## MTA Project # AL19034

*California ELAP Certification # 1371*

14-30788

**Please reference these numbers on all reports and invoices:**
**We also request QC data be provided with final report.**

| **SENDING LABORATORY:** | **RECEIVING LABORATORY:** |
|---|---|
| Moore Twining Associates, Inc. | BC Laboratories, Inc. |
| 2527 Fresno Street | 4100 Atlas Court |
| Fresno, CA 93721 | Bakersfield, CA 93308 |
| Phone: (559) 268-7021 | Phone :(800) 878-4911 |
| Fax: (559) 268-0740 | Fax: (661) 327-1918 |
| Project Manager: Julio Morales | |

**Sample Comments**

**Client Sample ID#: DLW-121914-1** 1

**MTA Sample ID: AL19034-01 Matrix: Water** **Sampled: 12/19/14 10:54** **Report Due to Client: 01/06/15**

Requested Analysis: Chromium, Hexavalent — Holding time expires: 01/16/15 10:54

*Containers Supplied:*
125mL Plastic w/borate carbonate buffer (J)

SHORT HOLDING TIME
Cr+6 NO2 NO3 OP SS
DO Cl2 BOD MBAS COT

CHK BY DISTRIBUTION
SUB-OUT

| Released By | Date | Received By | Date |
|---|---|---|---|
| [signature] | 12/23/14 | [signature] | 122414 1025 |
| Released By | Date | Received By | Date |

**Please fax copy of receipt with your assigned sample ID number to (559) 268-0740** Page 1 of 1

**Chain of Custody and Cooler Receipt Form for 1430788 Page 2 of 2**

BC LABORATORIES INC. **COOLER RECEIPT FORM** Rev. No. 18 09/04/14 Page 1 Of 1

Submission #: 14-30788

| SHIPPING INFORMATION | SHIPPING CONTAINER | FREE LIQUID |
|---|---|---|
| Federal Express ☐ UPS ☐ Hand Delivery ☐ BC Lab Field Service ☐ Other ☑ (Specify) Golden | Ice Chest ☑ None ☐ Box ☐ Other ☐ (Specify)____ | YES ☐ NO ☐ |

Refrigerant: Ice ☐ Blue Ice ☑ None ☐ Other ☐ Comments:

Custody Seals: Ice Chest ☐ Intact? Yes ☐ No ☐ Containers ☐ Intact? Yes ☐ No ☐ None ☑ Comments:

All samples received? Yes ☑ No ☐ All samples containers intact? Yes ☑ No ☐ Description(s) match COC? Yes ☑ No ☐

COC Received ☐ YES ☐ NO

Emissivity: 0.98 Container: PE Thermometer ID: 208

Temperature: (A) 2.7 °C / (C) 2.3 °C

Date/Time 12 Dec 14 Analyst Init ML 1025

| SAMPLE CONTAINERS | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| QT GENERAL MINERAL/ GENERAL | | | | | | | | | | |
| PT PE UNPRESERVED | | | | | | | | | | |
| QT INORGANIC CHEMICAL METALS | | | | | | | | | | |
| PT INORGANIC CHEMICAL METALS | | | | | | | | | | |
| PT CYANIDE | | | | | | | | | | |
| PT NITROGEN FORMS | | | | | | | | | | |
| PT TOTAL SULFIDE | | | | | | | | | | |
| 2oz. ~~NITRATE / NITRITE~~ cr6 | A | | | | | | | | | |
| PT TOTAL ORGANIC CARBON | | | | | | | | | | |
| PT TOX | | | | | | | | | | |
| PT CHEMICAL OXYGEN DEMAND | | | | | | | | | | |
| PtA PHENOLICS | | | | | | | | | | |
| 40ml VOA VIAL TRAVEL BLANK | | | | | | | | | | |
| 40ml VOA VIAL | | | | | | | | | | |
| QT EPA 413.1, 413.2, 418.1 | | | | | | | | | | |
| PT ODOR | | | | | | | | | | |
| RADIOLOGICAL | | | | | | | | | | |
| BACTERIOLOGICAL | | | | | | | | | | |
| 40 ml VOA VIAL- 504 | | | | | | | | | | |
| QT EPA 508/608/8080 | | | | | | | | | | |
| QT EPA 515.1/8150 | | | | | | | | | | |
| QT EPA 525 | | | | | | | | | | |
| QT EPA 525 TRAVEL BLANK | | | | | | | | | | |
| 40ml EPA 547 | | | | | | | | | | |
| 40ml EPA 531.1 | | | | | | | | | | |
| 8oz Amber EPA 548 | | | | | | | | | | |
| QT EPA 549 | | | | | | | | | | |
| QT EPA 632 | | | | | | | | | | |
| QT EPA 8015M | | | | | | | | | | |
| QT AMBER | | | | | | | | | | |
| 8 OZ. JAR | | | | | | | | | | |
| 32 OZ. JAR | | | | | | | | | | |
| SOIL SLEEVE | | | | | | | | | | |
| PCB VIAL | | | | | | | | | | |
| PLASTIC BAG | | | | | | | | | | |
| FERROUS IRON | | | | | | | | | | |
| ENCORE | | | | | | | | | | |
| SMART KIT | | | | | | | | | | |
| Summa Canister | | | | | | | | | | |

Comments:____

Sample Numbering Completed By: JL Date/Time: 12-12-14 1208 [S:\WPDoc\WordPerfect\LAB_DOCS\FORMS\SAMREC]

A = Actual / C = Corrected

| | | | |
|---|---|---|---|
| Moore-Twining Associates | | **Reported:** | 01/13/2015 12:40 |
| 2527 Fresno Street | | Project: | Water Samples |
| Fresno, CA 93720 | | Project Number: | AL19034 |
| | | Project Manager: | Julio Morales |

# Laboratory / Client Sample Cross Reference

| Laboratory | Client Sample Information | | | |
|---|---|---|---|---|
| **1430788-01** | **COC Number:** | --- | **Receive Date:** | 12/24/2014 10:25 |
| | **Project Number:** | --- | **Sampling Date:** | 12/19/2014 10:54 |
| | **Sampling Location:** | --- | **Sample Depth:** | --- |
| | **Sampling Point:** | DLW-121914-1 AL19034-01 | **Lab Matrix:** | Water |
| | **Sampled By:** | --- | **Sample Type:** | Water |

| | |
|---|---|
| Moore-Twining Associates | **Reported:** 01/13/2015 12:40 |
| 2527 Fresno Street | Project: Water Samples |
| Fresno, CA 93720 | Project Number: AL19034 |
| | Project Manager: Julio Morales |

# Metals Analysis

**BCL Sample ID:** 1430788-01 **Client Sample Name:** DLW-121914-1 AL19034-01, 12/19/2014 10:54:00AM

| Constituent | Result | Units | PQL | MDL | Method | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Hexavalent Chromium | ND | ug/L | 0.20 | 0.055 | EPA-218.6 | 0.067 | | 1 |

| Run # | Method | Prep Date | Run Date/Time | Analyst | Instrument | Dilution | QC Batch ID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-218.6 | 12/26/14 | 12/26/14 19:57 | OLH | IC-4 | 1 | BXL2699 |

Moore-Twining Associates
2527 Fresno Street
Fresno, CA 93720

**Reported:** 01/13/2015 12:40
Project: Water Samples
Project Number: AL19034
Project Manager: Julio Morales

# Metals Analysis

## Quality Control Report - Method Blank Analysis

| Constituent | QC Sample ID | MB Result | Units | PQL | MDL | Lab Quals |
|---|---|---|---|---|---|---|
| **QC Batch ID: BXL2699** | | | | | | |
| Hexavalent Chromium | BXL2699-BLK1 | 0.067000 | ug/L | 0.20 | 0.055 | J |

| | |
|---|---|
| Moore-Twining Associates | **Reported:** 01/13/2015 12:40 |
| 2527 Fresno Street | Project: Water Samples |
| Fresno, CA 93720 | Project Number: AL19034 |
| | Project Manager: Julio Morales |

# Metals Analysis

## Quality Control Report - Laboratory Control Sample

| Constituent | QC Sample ID | Type | Result | Spike Level | Units | Percent Recovery | RPD | Control Limits Percent Recovery | Control Limits RPD | Lab Quals |
|---|---|---|---|---|---|---|---|---|---|---|
| **QC Batch ID: BXL2699** | | | | | | | | | | |
| Hexavalent Chromium | BXL2699-BS1 | LCS | 21.005 | 20.000 | ug/L | 105 | | 90 - 110 | | |

| | |
|---|---|
| Moore-Twining Associates<br>2527 Fresno Street<br>Fresno, CA 93720 | **Reported:** 01/13/2015 12:40<br>Project: Water Samples<br>Project Number: AL19034<br>Project Manager: Julio Morales |

# Metals Analysis

## Quality Control Report - Precision & Accuracy

| | | | | | | | | | Control Limits | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Constituent** | **Type** | **Source Sample ID** | **Source Result** | **Result** | **Spike Added** | **Units** | **RPD** | **Percent Recovery** | **RPD** | **Percent Recovery** | **Lab Quals** |
| **QC Batch ID: BXL2699** | Used client sample: Y - Description: Conference Room AL19028-01, 12/19/2014 11:28 | | | | | | | | | | |
| Hexavalent Chromium | DUP | 1430785-01 | 0.59000 | 0.57400 | | ug/L | 2.7 | | 10 | | |
| | MS | 1430785-01 | 0.59000 | 21.674 | 20.202 | ug/L | | 104 | | 90 - 110 | |
| | MSD | 1430785-01 | 0.59000 | 21.667 | 20.202 | ug/L | 0.0 | 104 | 10 | 90 - 110 | |

| | | | |
|---|---|---|---|
| Moore-Twining Associates | | **Reported:** | 01/13/2015 12:40 |
| 2527 Fresno Street | | Project: | Water Samples |
| Fresno, CA 93720 | | Project Number: | AL19034 |
| | | Project Manager: | Julio Morales |

## Notes And Definitions

| | |
|---|---|
| J | Estimated Value (CLP Flag) |
| MDL | Method Detection Limit |
| ND | Analyte Not Detected at or above the reporting limit |
| PQL | Practical Quantitation Limit |
| RPD | Relative Percent Difference |

MOORE TWINING ASSOCIATES, INC.

EST. 1898

ANALYTICAL CHEMISTRY DIVISION
CALIFORNIA ELAP CERTIFICATION # 1371

# CHAIN OF CUSTODY/ANALYSIS REQUEST

2527 FRESNO STREET • FRESNO, CA 93721 • PHONE (559) 268-7021 • FAX: (559) 268-0740

**WORK ORDER #:** AL19034
PAGE 1 OF 3

| REPORT TO: | ■ INVOICE TO: ☐ REPORT COPY TO: |
|---|---|
| ATTENTION: Douglas Wachtell | ATTENTION: Anthony Toto |
| NAME: Regional Water Board | NAME: Regional Water Board |
| ADDRESS: 1685 E Street<br>Fresno, CA 93706 | ADDRESS: 1685 E Street<br>Fresno, CA 93706 |
| PHONE: 559-445-5114 | PHONE: 559-445-6278 |
| email: doug.wachtell@waterboards.ca.gov | FAX: 559-445-5910 |

REPORTING:

- ☐ STANDARD FORMAT
- ☐ WRITE-ON (STATE FORM)
- ☐ GEOTRACKER/COELT (LUFT)
- ☒ PDF ☐ SPREADSHEET
- ☐ County DHS :
- ☐ Environmental Health Agency :
- ☐ OTHER:

**SAMPLE INFORMATION**

SAMPLED BY (PRINT): Douglas Wachtell

SIGNATURE: Douglas Wachtell

☐ PUBLIC SYSTEM ☐ ROUTINE
☒ PRIVATE WELL ☐ REPEAT
☐ OTHER ☐ REPLACEMENT

TURN AROUND TIME: ☐ RUSH, DUE ON:
☒ STANDARD

**SAMPLE TYPES:**

SOLID:
BS – BIOSOLID
CR – CERAMIC
SL – SOIL/SOLID

LIQUID:
DW - DRINKING WATER
GW - GROUND WATER
OL - OIL
SF - SURFACE WATER
ST - STORM WATER
WW – WASTE WATER

**PROJECT INFORMATION**

CONTRACT/P.O. NO.: 13-014-150

PROJECT: River Ranch HOA Deep Well

PROJECT NUMBER:

PROJECT MANAGER: Wachtell

ANALYSIS REQUESTED

LAB USE — NOTES ON RECEIVED CONDITION:

☐ CUSTODY SEAL(S) BROKEN ☐ SAMPLE(S) DAMAGED
☐ ON ICE ☐ AMBIENT TEMP. ☐ INCORRECT PRESERVATION

| LAB USE | CLIENT SAMPLE ID | DATE | TIME | TYPE | T22 Metals (Dissolved) | TPH DE & MO | USEPA 8270 | USEWPA 8260B | Gen Min (RWQCB) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | DLW-121914-1 | 12/19 | 1054 | DW | X | X | X | X | X |

COMMENTS/ADDITIONAL INSTRUCTIONS:

All samples NOT field filtered

| RELINQUISHED BY | COMPANY | DATE | TIME | RECEIVED BY | COMPANY |
|---|---|---|---|---|---|
| Douglas Wachtell | RBSF | 12/19 | 1545 | [illegible] | [illegible] |

**Sample Integrity** Page 2 of 3 WO# AL19034 Date Received: 12/19/14

**Section 1-Sampled Same Day**

Sample Transport: Walk In MTA Courier Transported In: Ice Chest Box Hand

Has Chilling Begun? Yes No

**Section 2-Sampled Previously**

Sample Transport: Walk-in UPS GSO Fed Ex MTA Courier Other:________

No. Coolers/Ice Chests:________ Temperature(s):________

Was Temperature In Range: Y or N Received On Ice: Wet Blue

Describe type of packing materials: Bubble Wrap Foam Packing Peanuts Paper Other:________

Were ice chest custody seals present? Y or N Intact? Y or N

**Section 3-COC Info.**

| | Completed Yes | Completed No | | Completed Yes | Completed No |
|---|---|---|---|---|---|
| Was COC Received | ✓ | | Analysis Requested | ✓ | |
| Date Sampled | ✓ | | Any hold times less than 72hr | | ✓ |
| Time Sampled | ✓ | | Client Name | ✓ | |
| Sample ID | ✓ | | Address | ✓ | |
| Special Storage/Handling Ins. | | ✓ | Telephone # | ✓ | |

**Section 4-Bottles/Analysis**

| | Yes | No | N/A | Comment |
|---|---|---|---|---|
| Did all bottles arrive unbroken and intact? | ✓ | | | |
| Were bottle custody seals present? | | | ✓ | |
| Were bottle custody seals intact? | | | ✓ | |
| Did all bottle labels agree with COC? | ✓ | | | |
| Were correct containers used for the tests requested? | ✓ | | | |
| Was sufficient amount of sample sent for tests indicated? | ✓ | | | |
| Were bubbles present in VOA Vials? (Volatiles Methods Only) | | | ✓ | |
| Were Ascorbic Acid Bottles Received with VOAs? | | | ✓ | |

**Section 5-Comment/Discrepancies**

Sample(s) Split/Preserve: Yes or No Container:______ Preservation:______ Initials:______

Filtered: Yes No Container:______ Preservation:______ Initials:______

Was Client Service Supervisor notified of discrepancies: Yes or No N/A Notified by:______

Explanations/Comments:

Labeled by:______ Checked by: LB

Moore Twining Associates, Inc.

**Sample Integrity** Page 3 of 3 WO# AL19034 MTA Bottles: Yes or No

Plastic 125mL ( A ) Plastic 250mL ( B ) Plastic 1L ( C ) Amber Glass (AG)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample(s) Received | 1 | | | | | | | | | | |
| Bacti 100mL Thiosulfate | | | | | | | | | | | |
| None Preserved Plastic | 2C | | | | | | | | | | |
| HNO3 Plastic | 1A | | | | | | | | | | |
| H2SO4 Plastic | | | | | | | | | | | |
| NaOH Plastic | | | | | | | | | | | |
| 300mL DO Bottle | | | | | | | | | | | |
| Other | | | | | | | | | | | |
| Client Own | | | | | | | | | | | |
| 1L Plastic NaOH/ZnAc | | | | | | | | | | | |
| 250mL (AG) None | | | | | | | | | | | |
| 250mL (AG) H2SO4 | | | | | | | | | | | |
| 250mL (AG) Thio 547, 548 | | | | | | | | | | | |
| 250mL (AG) Other | | | | | | | | | | | |
| 500mL Clear Glass None | | | | | | | | | | | |
| 1L (AG) None | 2C | | | | | | | | | | |
| 1L (AG) HCl | | | | | | | | | | | |
| 1L (AG) Thio 525, 515 | | | | | | | | | | | |
| 40mL (AG VOA) Thio + K Citrate 531.2 | | | | | | | | | | | |
| 40mL VOA Vial - HCl | 3 | | | | | | | | | | |
| 40mL VOA Vial - None | | | | | | | | | | | |
| 40mL VOA Vial - H3PO4 | | | | | | | | | | | |
| 40mL VOA Vial (AG) - thio (THM) | | | | | | | | | | | |
| 40mL VOA Vial - Na2SO3 (thio) | | | | | | | | | | | |
| Borate/Carbonate Buffer | | | | | | | | | | | |
| Soil Jar Clear Glass 125mL 250mL 500mL | | | | | | | | | | | |
| THM 40mL VOA None | | | | | | | | | | | |
| Plastic Bag | | | | | | | | | | | |
| Soil Tube | | | | | | | | | | | |
| Tedlar Bags | | | | | | | | | | | |
| | | | | | | | | | | | |
| Asbestos 1L Plastic | | | | | | | | | | | |
| Gross Alpha/Beta 1L HNO3 each | | | | | | | | | | | |
| Radiological 226/228 1L HNO3 each | | | | | | | | | | | |
| Radon | | | | | | | | | | | |
| Low Level Hg/Metals Double Bag | | | | | | | | | | | |

FL-SC-0003-03 b

ZALCO LABORATORIES, INC.
Analytical & Consulting Services

4309-Armour Avenue
Bakersfield, California 93308

(661) 395-0539
FAX (661) 395-3069

November 12, 2013

Janelle Dockham
River Ranch HOA
2131 G Street
Bakersfield, CA 93301

TEL: (661) 327-0440
FAX: -

RE: 1310303

Dear Janelle Dockham:

Zalco Laboratories, Inc. received 1 samples on 10/28/2013 for the analyses presented in the following report.

We appreciate your business and look forward to serving you in the future. Please feel free to call our office if you have any questions regarding these test results.

Sincerely,

Juan Manuel Magaña J.

Juan Magaña
Project Manager
CC: Colleen Bellue

+ 250-500-600 ++ 0.6-1.7 +++ 900-1600-2200 ++++ 500-1000-1500 P:Primary Standard S: Secondary Standard

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.
NSS: non-sufficient sample; MCL: maximum contaminant level; RL: reporting limit; #: above MCL

Note: Samples analyzed for regulatory purposes should be put on ice immediately after sampling and received by the laboratory at temperatures between 0-6°C. Microbiological analysis requires samples to be at least 4-10°C when received at the laboratory. For additional information regarding the limitations of the method(s) referred to, please call us at 661-395-0539.

ZALCO LABORATORIES, INC.
Analytical & Consulting Services

4309 Armour Avenue
Bakersfield, California 93308

(661) 395-0539
FAX (661) 395-3069

| | | | |
|---|---|---|---|
| River Ranch HOA | Project: Master | Work Order No.: | 1310303 |
| 2131 G Street | Project Number: | Reported: | 11/12/2013 |
| Bakersfield, CA 93301 | Attention: Janelle Dockham | | |

**Lab ID: 1310303-01**
**Client ID: Well-River Ranch HOA**
**Field Conditions:**
**Temp. Received, Celsius: 21.00**

| Date/Time | Collected By | Sampler's Employer | Fld. Res. Cl. | Fld. pH | Fld. Temp. C | User ID: | PS Code | Lab # |
|---|---|---|---|---|---|---|---|---|
| 10/28/2013 11:15:00AM | Colleen Bellue | | | | | | | 7625 |

| | MCL | Analyte | Results | RL | Units | Flag | Method | Prepared | Analyzed | Int. |
|---|---|---|---|---|---|---|---|---|---|---|
| **Alkalinity** | | | | | | | | | | |
| | | Total Alkalinity | 77 | 10 | mg/L | | SM 2320B | 10/28/13 | 10/28/13 | MSS |
| | | Bicarbonate (HCO3) | 77 | 10 | mg/L | | SM 2320B | 10/28/13 | 10/28/13 | MSS |
| | | Carbonate (CO3) | <10 | 10 | mg/L | | SM 2320B | 10/28/13 | 10/28/13 | MSS |
| | | Hydroxide (OH) | <10 | 10 | mg/L | | SM 2320B | 10/28/13 | 10/28/13 | MSS |
| **General Chemistry** | | | | | | | | | | |
| S | 15 | Color | <3.0 | 3.0 | Color Units | | SM 2120B | 10/28/13 | 10/28/13 | MSS |
| P | 2 | Fluoride | 0.37 | 0.10 | mg/L | | EPA 300.0 | 10/28/13 | 10/28/13 | LME |
| P | 45 | Nitrate as NO3 | 6.1 | 2.0 | mg/L | | EPA 300.0 | 10/28/13 | 10/28/13 | LME |
| S | 3 | Threshold Odor Number | <1.0 | 1.0 | T.O.N. | | SM 2150B | 10/28/13 | 10/28/13 | MSS |
| S | 5 | Turbidity | <0.10 | 0.10 | NTU | | SM 2130 B | 10/28/13 | 10/28/13 | MSS |
| P | 150 | Cyanide | <100 | 100 | ug/L | | SM 4500-CN-CE | 10/29/13 | 10/29/13 | RAM |
| P | 10000 | Nitrate + Nitrite (as N) | 1400 | 400 | ug/L | | EPA 300.0 | 10/28/13 | 10/28/13 | LME |
| | | Nitrite as NO2 | <1.0 | 1.0 | mg/L | | EPA 353.2 | 10/28/13 | 10/28/13 | LME |
| p | | Nitrite as Nitrogen (N) | <400 | 400 | ug/L | | EPA 300.0 | 10/28/13 | 10/28/13 | LME |
| | 600 | Chloride | 17 | 2.0 | mg/L | | EPA 300.0 | 10/28/13 | 10/28/13 | LME |
| S | 0.5 | MBAS (calculated as LAS, mol wt__.) | <0.050 | 0.050 | mg/L | | SM 5540C | 10/29/13 | 10/29/13 | CMM |
| S | | pH | 7.46 | | pH Units | | EPA 150.1 | 10/28/13 | 10/28/13 | MSS |
| S | +++ | Specific Conductance | 270 | 10 | umhos/cm | | SM 2510B | 10/28/13 | 10/28/13 | MSS |
| S | + | Sulfate as SO4 | 20 | 0.50 | mg/L | | EPA 300.0 | 10/28/13 | 10/28/13 | LME |
| S | ++++ | Total Dissolved Solids | 170 | 10 | mg/L | | SM 2540C | 10/29/13 | 10/29/13 | MSS |
| **Hardness** | | | | | | | | | | |
| S | | Hardness (as CaCO3) | 64 | 2.0 | mg/L | | SM 2340B | 10/30/13 | 10/31/13 | SS |
| **Inorganic Chemical** | | | | | | | | | | |
| P | 1000 | Aluminum | <50 | 50 | ug/L | | EPA 200.7 | 10/30/13 | 10/31/13 | SS |
| P | 6 | Antimony | <2.0 | 2.0 | ug/L | | EPA 200.8 | 10/29/13 | 10/29/13 | MSS |
| P | 1000 | Barium | <100 | 100 | ug/L | | EPA 200.7 | 10/30/13 | 10/31/13 | SS |
| P | 4 | Beryllium | <1.0 | 1.0 | ug/L | | EPA 200.8 | 10/29/13 | 10/29/13 | MSS |
| P | 5 | Cadmium | <1.0 | 1.0 | ug/L | | EPA 200.8 | 10/29/13 | 10/29/13 | MSS |
| P | 50 | Chromium | <10 | 10 | ug/L | | EPA 200.7 | 10/30/13 | 10/31/13 | SS |
| S | 1000 | Copper | <50 | 50 | ug/L | | EPA 200.7 | 10/30/13 | 10/31/13 | SS |
| S | 300 | Iron | <100 | 100 | ug/L | | EPA 200.7 | 10/30/13 | 10/31/13 | SS |
| P | 15 | Lead | <2.0 | 2.0 | ug/L | | EPA 200.8 | 10/29/13 | 10/29/13 | MSS |
| S | 50 | Manganese | <20 | 20 | ug/L | | EPA 200.7 | 10/30/13 | 10/31/13 | SS |
| P | 2 | Mercury | <0.20 | 0.20 | ug/L | | EPA 245.1 | 10/30/13 | 10/31/13 | LME |
| P | 100 | Nickel | <10 | 10 | ug/L | | EPA 200.7 | 10/30/13 | 10/31/13 | SS |
| P | 50 | Selenium | <2.0 | 2.0 | ug/L | | EPA 200.8 | 10/29/13 | 10/29/13 | MSS |

+ 250-500-600 ++ 0.6-1.7 +++ 900-1600-2200 ++++ 500-1000-1500 P:Primary Standard S: Secondary Standard


NSS: non-sufficient sample; MCL: maximum contaminant level; RL: reporting limit; #: above MCL

Note: Samples analyzed for regulatory purposes should be put on ice immediately after sampling and received by the laboratory at temperatures between 0-6°C. Microbiological analysis requires samples to be at least 4-10°C when received at the laboratory. For additional information regarding the limitations of the method(s) referred to, please call us at 661-395-0539.

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FAX (661) 395-3069

| | | |
|---|---|---|
| River Ranch HOA | Project: Master | Work Order No.: 1310303 |
| 2131 G Street | Project Number: | Reported: 11/12/2013 |
| Bakersfield, CA 93301 | Attention: Janelle Dockham | |

**Lab ID: 1310303-01**
**Client ID: Well-River Ranch HOA**
**Field Conditions:**
**Temp. Received, Celsius: 21.00**

| Date/Time | Collected By | Sampler's Employer | Fld. Res. Cl. | Fld. pH | Fld. Temp. C | User ID: | PS Code | Lab # |
|---|---|---|---|---|---|---|---|---|
| 10/28/2013 11:15:00AM | Colleen Bellue | | | | | | | 7625 |

| | MCL | Analyte | Results | RL | Units | Flag | Method | Prepared | Analyzed | Int. |
|---|---|---|---|---|---|---|---|---|---|---|
| **Inorganic Chemical** | | | | | | | | | | |
| S | 100 | Silver | <10 | 10 | ug/L | | EPA 200.7 | 10/30/13 | 10/31/13 | SS |
| P | 2 | Thallium | <1.0 | 1.0 | ug/L | | EPA 200.8 | 10/29/13 | 10/29/13 | MSS |
| S | 5000 | Zinc | 57 | 50 | ug/L | | EPA 200.7 | 10/30/13 | 10/31/13 | SS |
| P | 10 | Arsenic | <2.0 | 2.0 | ug/L | | EPA 200.8 | 10/29/13 | 10/29/13 | MSS |
| **Metals** | | | | | | | | | | |
| | | Calcium | 20 | 0.050 | mg/L | | EPA 200.7 | 10/30/13 | 10/31/13 | SS |
| | | Magnesium | 3.4 | 0.050 | mg/L | | EPA 200.7 | 10/30/13 | 10/31/13 | SS |
| | | Potassium | 1.5 | 0.50 | mg/L | | EPA 200.7 | 10/30/13 | 10/31/13 | SS |
| | | Sodium | 29 | 7.0 | mg/L | | EPA 200.7 | 10/30/13 | 11/12/13 | SS |

+ 250-500-600 ++ 0.6-1.7 +++ 900-1600-2200 ++++ 500-1000-1500 P:Primary Standard S: Secondary Standard


NSS: non-sufficient sample; MCL: maximum contaminant level; RL: reporting limit; #: above MCL

Note: Samples analyzed for regulatory purposes should be put on ice immediately after sampling and received by the laboratory at temperatures between 0-6°C. Microbiological analysis requires samples to be at least 4-10°C when received at the laboratory. For additional information regarding the limitations of the method(s) referred to, please call us at 661-395-0539.

ZALCO LABORATORIES, INC.

4309 Armour Avenue, Bakersfield, CA 93308 (661) 395-0539 FAX (661) 395-3069 www.zalcolabs.com
2186 Eastman Avenue, Suite103, Ventura, CA 93003 (805) 477-0114 Fax (805) 477-0125

**CHAIN OF CUSTODY, ID#** 1310 303

Page 1 of 1
Zalco Lab # ______
Client PO # ______
**PROJECT ID:** ______
**QUOTE ID:** ______

| REPORT INFO | INVOICE INFO |
|---|---|
| Client: RIVER RANCH HOA | Invoice To: Same as Client ☐ |
| Address: 2131 G. ST. | Address: |
| City, State, Zip: BKFLD, CA 93301 | City, State, Zip: |
| Attention: JANELLE | Attention: |
| Phone: Results ☐ 661-616-8267 | Phone: |
| Fax: Results ☐ | Fax: |
| Email: Results ☑ bellue@sbcglobal.net | Email: |

**SAMPLED BY:** **EMPLOYED BY:**

| Sample No.* | Sample Description | Sample Date | Sample Time | Type* | # OF CONTAINERS | ANALYSIS: 6MGPIOC | | | | | | | | | TEMPERATURE (C°) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Well - River Ranch HOA | 10-28-13 | 11:15am | DW | 4 | X | | | | | | | | | 21°C |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | |

**COMMENTS:**
Turnaround Time:
Routine ______ working days ☑
Rush By ______ working days
Send Copy to State of CA? Yes ☐ No ☑
Attention To: ______
Send Copy to County? Yes ☐ No ☑
County ______

SPLIT
INST
102813
1220

| RELINQUISHED By: Signature | PRINT | COMPANY | Date | Time | RECEIVED By: Signature | PRINT |
|---|---|---|---|---|---|---|
| Colleen C Bellue | Colleen C Bellue | River Ranch HOA | 10/28/13 | 1130 | Jaenly Bogie | J. Bogie |
| | | | | | | |
| | | | | | | |

NOTE: Samples are discarded 30 days after results unless other arrangements are made. Hazardous samples will be returned to client or disposed of at the client's expense.

*Sample Type Key: AQ-Aqueous; BS-Biosolid; DW-Drinking Water; GW-Ground Water; G-Gas; LPG-Liquid Petroleum Gas; OL-Oil; O-Other; P-Petroleum; S-Soil/Solid; ST-Storm Water; WW-Wastewater
*Sample No.: FOR OFFICE USE ONLY

# Appendix E

## Enhanced Oil Recovery Injection Information

E-1 Kern River Formation Active Steam Injection Well Summary

E-2 Station 36 Produced Water/Injectate Water Quality

# Exhbit E-1: Kern River Formation Active Steam Injection Well Summary

| API No. | Well ID | Section | Township | Range | Lease Name | Surface Coordinates[1] | | Elevation (feet, amsl)[2] | Directional Drilled | Well Depth[3] (feet) | Top of Perferation (TVDSS)[4] | Bottom of Perferation (TVDSS) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | X | Y | | | | | |
| 0403056342 | 19_0529R | 19 | S28 | E28 | SECTION 19 | 1699132.22 | 722000.22 | 941.9 | YES | 1681 | -291.99 | -301.98 |
| 0402957112 | 19_0555 | 19 | S28 | E28 | SECTION 19 | 1700452 | 720544 | 918 | NO | 1295 | 158 | -327 |
| 0403023606 | 19_0572R | 19 | S28 | E28 | SECTION 19 | 1700865.43 | 720269.36 | 995 | YES | 1509 | 165.02 | -324.96 |
| 0403031925 | 19_0588 | 19 | S28 | E28 | SECTION 19 | 1699134.12 | 720894.56 | 963 | YES | 1480 | 97.01 | -342.99 |
| 0403050610 | 19_0597 | 19 | S28 | E28 | SECTION 19 | 1701022.68 | 720478.79 | 1001.1 | YES | 1589 | -301.97 | -311.97 |
| 0403056343 | 19_0598 | 19 | S28 | E28 | SECTION 19 | 1699312.77 | 721644.85 | 944.2 | YES | 1746 | -185.16 | -315.16 |
| 0402963562 | 25_0509 | 25 | S28 | E27 | SECTION 25 | 1695927 | 715768 | 789 | NO | 1330 | -256 | -463 |
| 0402963563 | 25_0510 | 25 | S28 | E27 | SECTION 25 | 1696263 | 715752 | 809 | NO | 1351 | -236 | -467 |
| 0402963567 | 25_0514 | 25 | S28 | E27 | SECTION 25 | 1696264 | 715377 | 806 | NO | 1353 | -257 | -474 |
| 0402963570 | 25_0517 | 25 | S28 | E27 | SECTION 25 | 1695922 | 715052 | 822 | NO | 1368 | -296 | -468 |
| 0402963571 | 25_0518 | 25 | S28 | E27 | SECTION 25 | 1696302 | 715021 | 864 | NO | 1410 | -276 | -481 |
| 0402963572 | 25_0519 | 25 | S28 | E27 | SECTION 25 | 1696643 | 715015 | 885 | NO | 1426 | -245 | -439 |
| 0403046948 | 25_0549 | 25 | S28 | E27 | SECTION 25 | 1697240.4 | 713550.02 | 773.1 | YES | 1849 | -382.08 | -452.08 |
| 0403047809 | 25_0550 | 25 | S28 | E27 | SECTION 25 | 1696888.8 | 713657.5 | 796.6 | YES | 1845 | -401.36 | -468.36 |
| 0403047810 | 25_0551 | 25 | S28 | E27 | SECTION 25 | 1697470.78 | 713601.75 | 790.2 | YES | 1928 | -367.67 | -447.66 |
| 0403049017 | 25_0552 | 25 | S28 | E27 | SECTION 25 | 1695831.91 | 715478.78 | 800.9 | YES | 1907 | -282.08 | -369.03 |
| 0403049018 | 25_0553 | 25 | S28 | E27 | SECTION 25 | 1695922.35 | 714909.98 | 821.8 | YES | 1906 | -307.86 | -382.9 |
| 0403049019 | 25_0554 | 25 | S28 | E27 | SECTION 25 | 1696060.01 | 714469.61 | 831 | YES | 1925 | -299.87 | -376.97 |
| 0403049630 | 25_0555 | 25 | S28 | E27 | SECTION 25 | 1697498.47 | 714443.61 | 831.1 | YES | 1921 | -398.01 | -412.9 |
| 0403049860 | 25_0556 | 25 | S28 | E27 | SECTION 25 | 1697423.8 | 713956.41 | 798.8 | YES | 1890 | -396.66 | -416.59 |
| 0403050272 | 25_0557 | 25 | S28 | E27 | SECTION 25 | 1696571.24 | 714267.73 | 859.4 | YES | 1979 | -394.68 | -413.67 |
| 0403050306 | 25_0558 | 25 | S28 | E27 | SECTION 25 | 1696519.86 | 714074.02 | 859.2 | YES | 1944 | -414.17 | -429.13 |
| 0403053426 | 25_0561 | 25 | S28 | E27 | SECTION 25 | 1696989.78 | 713984.63 | 792.3 | YES | 1879 | -392.34 | -412.33 |
| 0403053427 | 25_0562 | 25 | S28 | E27 | SECTION 25 | 1696905.33 | 714257.77 | 818 | YES | 1842 | -281.24 | -430.96 |
| 0403049205 | 25_0578 | 25 | S28 | E27 | SECTION 25 | 1696860.4 | 718471.54 | 838.1 | YES | 1680 | -306.04 | -461.62 |
| 0403053851 | 3990214-9R | 9 | S29 | E28 | KCL-39 | 1710991.47 | 701675.8 | 453.8 | YES | 1028 | 149.4 | -317.78 |
| 0402950828 | 3990215 | 9 | S29 | E28 | KCL-39 | 1711141 | 701744 | 443 | NO | 832 | 166 | -244 |
| 0402956426 | 3990216 | 9 | S29 | E28 | KCL-39 | 1711436 | 701761 | 446 | NO | 777 | 271 | -310 |
| 0402971726 | 3990219A | 9 | S29 | E28 | KCL-39 | 1710170 | 701423 | 444 | NO | 775 | 94 | -396 |
| 0402950832 | 3990220 | 9 | S29 | E28 | KCL-39 | 1710507 | 701444 | 442 | NO | 855 | 104 | -351 |
| 0402950833 | 3990221 | 9 | S29 | E28 | KCL-39 | 1710835 | 701444 | 444 | NO | 827 | 131 | -316 |
| 0402950834 | 3990222 | 9 | S29 | E28 | KCL-39 | 1711156 | 701425 | 444 | NO | 804 | 146 | -273 |
| 0402956427 | 3990223 | 9 | S29 | E28 | KCL-39 | 1711448 | 701467 | 447.7 | NO | 808 | 253.7 | -282.3 |
| 0402950875 | 3990227 | 9 | S29 | E28 | KCL-39 | 1710176 | 701114 | 442 | NO | 891 | 78 | -392 |
| 0402950876 | 3990228 | 9 | S29 | E28 | KCL-39 | 1710531 | 701103 | 443 | NO | 871 | 103 | -367 |
| 0402950877 | 3990229 | 9 | S29 | E28 | KCL-39 | 1710897 | 701082 | 445 | NO | 811 | 121 | -318 |
| 0403053852 | 3990230-9R | 9 | S29 | E28 | KCL-39 | 1711208.76 | 701136.24 | 460.7 | YES | 1025 | -166.21 | -176.21 |
| 0402956428 | 3990231 | 9 | S29 | E28 | KCL-39 | 1711485 | 701136 | 456 | NO | 823 | 139 | -171 |
| 0402950882 | 3990234 | 9 | S29 | E28 | KCL-39 | 1709889 | 700754 | 441 | NO | 902 | 43 | -423 |
| 0403053853 | 3990235-9R | 9 | S29 | E28 | KCL-39 | 1710249.74 | 700778.29 | 453.8 | YES | 1050 | 50.14 | -425.95 |

# Exhbit E-1: Kern River Formation Active Steam Injection Well Summary

| API No. | Well ID | Section | Township | Range | Lease Name | Surface Coordinates[1] X | Surface Coordinates[1] Y | Elevation (feet, amsl)[2] | Directional Drilled | Well Depth[3] (feet) | Top of Perferation (TVDSS)[4] | Bottom of Perferation (TVDSS) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0402950885 | 3990237 | 9 | S29 | E28 | KCL-39 | 1710952 | 700723 | 459 | NO | 842 | 38 | -364 |
| 0402950886 | 3990238 | 9 | S29 | E28 | KCL-39 | 1711285 | 700738 | 452 | NO | 820 | 42 | -348 |
| 0402950887 | 3990239 | 9 | S29 | E28 | KCL-39 | 1711677 | 700747 | 454 | YES | 819 | 122.35 | -287.88 |
| 0403028734 | 3990500 | 9 | S29 | E28 | KCL-39 | 1708062.43 | 701222.89 | 469 | YES | 1277 | -38.98 | -438.96 |
| 0403028735 | 3990501 | 9 | S29 | E28 | KCL-39 | 1708038.44 | 700869.72 | 463 | YES | 1306 | -51 | -460.98 |
| 0403028736 | 3990502 | 9 | S29 | E28 | KCL-39 | 1708025.39 | 700533.27 | 461 | YES | 1301 | -79 | -468.98 |
| 0403028737 | 3990503 | 9 | S29 | E28 | KCL-39 | 1708325.67 | 700510.02 | 461 | YES | 1310 | -65 | -204 |
| 0403028738 | 3990504 | 9 | S29 | E28 | KCL-39 | 1708619.67 | 700519.94 | 454 | YES | 1267 | -41.92 | -193.93 |
| 0403028739 | 3990505 | 9 | S29 | E28 | KCL-39 | 1708015.7 | 700264.49 | 461 | YES | 1340 | -96.99 | -323.98 |
| 0403028740 | 3990506 | 9 | S29 | E28 | KCL-39 | 1708443.22 | 700309.81 | 452 | YES | 1349 | -77.78 | -238.52 |
| 0403028741 | 3990507 | 9 | S29 | E28 | KCL-39 | 1708724.33 | 700279.03 | 455 | YES | 1314 | -64.99 | -217.98 |
| 0403036407 | 3990514 | 9 | S29 | E28 | KCL-39 | 1708453 | 701239 | 462 | NO | 1000 | -14 | -410 |
| 0403036408 | 3990515 | 9 | S29 | E28 | KCL-39 | 1708411.2 | 701055.2 | 460 | NO | 1000 | -96 | -428 |
| 0403036409 | 3990516 | 9 | S29 | E28 | KCL-39 | 1708485.8 | 700849.4 | 459 | NO | 1000 | -111 | -439 |
| 0403050307 | 3990518 | 9 | S29 | E28 | KCL-39 | 1710824.16 | 700856.9 | 461.1 | YES | 1582 | -91.88 | -398.15 |
| 0402980579 | AL_0030 | 4 | S29 | E28 | ALMA | 1709883 | 704633 | 548 | NO | 961 | 393 | -352 |
| 0402953729 | AL_0503 | 4 | S29 | E28 | ALMA | 1709715 | 705331 | 587 | NO | 974 | 232 | -323 |
| 0402940703 | ALJ0501 | 4 | S29 | E28 | ALMA JR | 1710399 | 704608 | 547 | NO | 886 | 317 | -333 |
| 0402953761 | ALJ0502 | 4 | S29 | E28 | ALMA JR | 1710689 | 704635 | 512 | NO | 870 | 307 | -298 |
| 0402962728 | ALJ0507 | 4 | S29 | E28 | ALMA JR | 1710632 | 704007 | 482 | NO | 879 | 352 | -303 |
| 0402951611 | AMA0510 | 30 | S28 | E28 | AMAZON | 1701963 | 713629 | 808 | NO | 1488 | 83 | -577 |
| 0403055241 | AMA0514 | 30 | S28 | E28 | AMAZON | 1702271.6 | 713637.47 | 784.2 | YES | 1564 | -495.86 | -557.86 |
| 0403037420 | ANG0505 | 13 | S28 | E27 | ANGUS | 1696851.26 | 724907.16 | 974 | YES | 1720 | -196.91 | -279.91 |
| 0403042536 | ANG0507 | 13 | S28 | E27 | ANGUS | 1697279.37 | 724966.4 | 992.3 | YES | 1695 | -156.01 | -273.99 |
| 0403042538 | ANG0509 | 13 | S28 | E27 | ANGUS | 1697234.31 | 724541.62 | 973 | YES | 1664 | -183.61 | -291.59 |
| 0403042539 | ANG0510 | 13 | S28 | E27 | ANGUS | 1697532.16 | 724513.83 | 970.2 | YES | 1674 | -165.85 | -297.84 |
| 0403042540 | ANG0511 | 13 | S28 | E27 | ANGUS | 1697566.56 | 724334.6 | 968.9 | YES | 1677 | -190.07 | -308.06 |
| 0403042541 | ANG0512 | 13 | S28 | E27 | ANGUS | 1697501.7 | 723960.98 | 979.3 | YES | 1714 | -197.83 | -326.83 |
| 0403042542 | ANG0513 | 13 | S28 | E27 | ANGUS | 1697803.15 | 723957.77 | 971.4 | YES | 1672 | -177.33 | -300.33 |
| 0403042543 | ANG0514 | 13 | S28 | E27 | ANGUS | 1698132.02 | 723946.48 | 977.1 | YES | 1678 | -159.39 | -285.38 |
| 0402968795 | ANG0807 | 13 | S28 | E27 | ANGUS | 1698855 | 725771 | 1052 | NO | 1289 | -59 | -199 |
| 0402968796 | ANG0808 | 13 | S28 | E27 | ANGUS | 1698840 | 726131 | 1046 | NO | 1274 | -53 | -190 |
| 0402975059 | ANG0816 | 13 | S28 | E27 | ANGUS | 1698553 | 725778 | 1046 | NO | 1334 | -83 | -209 |
| 0402975060 | ANG0817 | 13 | S28 | E27 | ANGUS | 1698535 | 726169 | 1045 | NO | 1310 | -75 | -210 |
| 0402975061 | ANG0818 | 13 | S28 | E27 | ANGUS | 1698202 | 726178 | 1054 | NO | 1345 | -93 | -216 |
| 0402975062 | ANG0819 | 13 | S28 | E27 | ANGUS | 1698193 | 725792 | 1011 | NO | 1296 | -97 | -239 |
| 0402975066 | ANG0823 | 13 | S28 | E27 | ANGUS | 1697818 | 724253 | 989 | NO | 1350 | -98 | -282 |
| 0402975068 | ANG0825 | 13 | S28 | E27 | ANGUS | 1697832 | 725010 | 1026 | NO | 1359 | -84 | -271 |
| 0402948289 | ANO0002-6B | 31 | S28 | E28 | AMERICAN NAPHTHA | 1701947 | 709605 | 685 | NO | 1366 | 73 | -615 |
| 0402949438 | ANO0008-12B | 31 | S28 | E28 | AMERICAN NAPHTHA | 1703305 | 708223 | 635 | NO | 1336 | 95 | -605 |

## Exhbit E-1: Kern River Formation Active Steam Injection Well Summary

| API No. | Well ID | Section | Township | Range | Lease Name | Surface Coordinates[1] X | Surface Coordinates[1] Y | Elevation (feet, amsl)[2] | Directional Drilled | Well Depth[3] (feet) | Top of Perferation (TVDSS)[4] | Bottom of Perferation (TVDSS) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0402949440 | ANO0008-9B | 31 | S28 | E28 | AMERICAN NAPHTHA | 1703298 | 708919 | 657 | NO | 1332 | 187 | -578 |
| 0403050105 | ANO0010-11BR | 31 | S28 | E28 | AMERICAN NAPHTHA | 1703534.66 | 708381.12 | 682.1 | YES | 1568 | -458.48 | -558.15 |
| 0403050104 | ANO0010-8 | 31 | S28 | E28 | AMERICAN NAPHTHA | 1703494.18 | 709001.67 | 678.1 | YES | 1544 | -434.46 | -524.46 |
| 0402983427 | ANO0303 | 31 | S28 | E28 | AMERICAN NAPHTHA | 1701904 | 709964 | 707 | NO | 1386 | 71 | -572 |
| 0402983429 | ANO0305 | 31 | S28 | E28 | AMERICAN NAPHTHA | 1701915 | 709275 | 684 | NO | 1385 | 23 | -626 |
| 0402983434 | ANO0313 | 31 | S28 | E28 | AMERICAN NAPHTHA | 1702209 | 709976 | 680.72 | YES | 1350 | -469.63 | -490.62 |
| 0402972797 | ANO0315 | 31 | S28 | E28 | AMERICAN NAPHTHA | 1702252 | 709202 | 650 | YES | 1439 | -61.28 | -595.72 |
| 0402972802 | ANO0335 | 31 | S28 | E28 | AMERICAN NAPHTHA | 1702997 | 709210 | 700 | YES | 1480 | 101.88 | -562.95 |
| 0402970780 | ANO0347 | 31 | S28 | E28 | AMERICAN NAPHTHA | 1703269 | 708569 | 661 | NO | 1354 | 80 | -577 |
| 0402984357 | ANO0352 | 31 | S28 | E28 | AMERICAN NAPHTHA | 1703587 | 710310 | 724 | NO | 1385 | 48 | -545 |
| 0402972805 | ANO0353 | 31 | S28 | E28 | AMERICAN NAPHTHA | 1703559 | 709934 | 717 | NO | 1390 | 207 | -583 |
| 0403050106 | ANO0358A | 31 | S28 | E28 | AMERICAN NAPHTHA | 1703731.41 | 708186.97 | 687.5 | YES | 1584 | -461.03 | -574.02 |
| 0403001166 | ANO0363 | 31 | S28 | E28 | AMERICAN NAPHTHA | 1703942 | 709943 | 731 | YES | 1420 | -392.98 | -532.98 |
| 0402984360 | ANO0366 | 31 | S28 | E28 | AMERICAN NAPHTHA | 1704032 | 708974 | 709.46 | YES | 1423 | 221.18 | -517.56 |
| 0402984361 | ANO0367 | 31 | S28 | E28 | AMERICAN NAPHTHA | 1703984 | 708585 | 662 | NO | 1358 | 184 | -546 |
| 0403042935 | ANO0501 | 31 | S28 | E28 | AMERICAN NAPHTHA | 1703575.14 | 710533.01 | 740.4 | YES | 1544 | -508.79 | -574.45 |
| 0403043956 | ANO0503 | 31 | S28 | E28 | AMERICAN NAPHTHA | 1704057.84 | 710501.67 | 750.1 | YES | 1519 | -483.01 | -532.05 |
| 0403046374 | ANO0505 | 31 | S28 | E28 | AMERICAN NAPHTHA | 1702627.23 | 709634.96 | 666.7 | YES | 1531 | -457.5 | -565.43 |
| 0403046375 | ANO0506 | 31 | S28 | E28 | AMERICAN NAPHTHA | 1702742.26 | 709135.31 | 697.6 | YES | 1579 | -484.64 | -594.63 |
| 0403045303 | ANO0507 | 31 | S28 | E28 | AMERICAN NAPHTHA | 1701735.87 | 709966.73 | 714.9 | YES | 1662 | -424.68 | -623.67 |
| 0403045304 | ANO0508 | 31 | S28 | E28 | AMERICAN NAPHTHA | 1701740.59 | 709524.52 | 674.3 | YES | 1623 | -435.87 | -630.83 |
| 0403046376 | ANO0510 | 31 | S28 | E28 | AMERICAN NAPHTHA | 1701740.88 | 709421.23 | 673.5 | YES | 1615 | -446.35 | -649.32 |
| 0403050321 | ANO0511 | 31 | S28 | E28 | AMERICAN NAPHTHA | 1702876.29 | 709197.35 | 706.7 | YES | 1589 | -478.26 | -582.24 |
| 0403050973 | ANO0512 | 31 | S28 | E28 | AMERICAN NAPHTHA | 1704132.15 | 708158.45 | 646 | YES | 1560 | -452.72 | -560.71 |
| 0403050107 | ANO3683 | 31 | S28 | E28 | AMERICAN NAPHTHA | 1703951.4 | 708207.81 | 659.9 | YES | 1584 | -459.85 | -539.85 |
| 0403032424 | AZ_0505R | 4 | S29 | E28 | AZTEC | 1706929.76 | 707625.43 | 625 | YES | 1290 | -404.86 | -456.83 |
| 0402951588 | AZ_0506 | 4 | S29 | E28 | AZTEC | 1707326 | 707538 | 621 | NO | 1140 | 351 | -477 |
| 0403044321 | AZ_0514 | 4 | S29 | E28 | AZTEC | 1706890.63 | 707559.41 | 622.4 | YES | 1495 | -403.84 | -468.35 |
| 0402969639 | BF_0506 | 31 | S28 | E28 | BEAR FLAG | 1699841 | 710989 | 706 | NO | 1420 | 48 | -623 |
| 0403034580 | BF_0507 | 31 | S28 | E28 | BEAR FLAG | 1699808.31 | 711279.27 | 724 | YES | 1598 | -498.73 | -614.72 |
| 0403052395 | BF_0509 | 31 | S28 | E28 | BEAR FLAG | 1700124.19 | 710882.13 | 691.7 | YES | 1619 | -469.89 | -603.87 |
| 0402967278 | CAU0503 | 36 | S28 | E27 | CAULEY | 1696548 | 711373 | 723 | NO | 1321 | -351 | -492 |
| 0402967283 | CAU0508 | 36 | S28 | E27 | CAULEY | 1696888 | 711046 | 693 | NO | 1282 | -345 | -438 |
| 0402957888 | CEN0500 | 25 | S28 | E27 | 20TH CENTURY | 1698362 | 717909 | 930 | NO | 1468 | -22 | -423 |
| 0402959969 | CEN0505 | 25 | S28 | E27 | 20TH CENTURY | 1698056 | 717581 | 885 | NO | 1398 | -34 | -455 |
| 0402959970 | CEN0506 | 25 | S28 | E27 | 20TH CENTURY | 1698371 | 717609 | 902 | NO | 1435 | 5 | -472 |
| 0402959972 | CEN0508 | 25 | S28 | E27 | 20TH CENTURY | 1698698 | 717267 | 888 | NO | 1416 | 21 | -452 |
| 0403056344 | CH_0500R | 24 | S28 | E27 | CHANSLOR | 1698814.68 | 722021.5 | 937.1 | YES | 1726 | -316.43 | -326.43 |
| 0403056107 | CH_0501R | 24 | S28 | E27 | CHANSLOR | 1698500.57 | 721599.32 | 909.3 | YES | 1650 | -209.53 | -359.31 |
| 0403052156 | CH_0507R | 24 | S28 | E27 | CHANSLOR | 1698129.2 | 722745.61 | 910.5 | YES | 1442 | -208.77 | -309.76 |

# Exhbit E-1: Kern River Formation Active Steam Injection Well Summary

| API No. | Well ID | Section | Township | Range | Lease Name | Surface Coordinates[1] X | Surface Coordinates[1] Y | Elevation (feet, amsl)[2] | Directional Drilled | Well Depth[3] (feet) | Top of Perferation (TVDSS)[4] | Bottom of Perferation (TVDSS) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0403056345 | CH_0510R | 24 | S28 | E27 | CHANSLOR | 1698091.56 | 722362.07 | 909.4 | YES | 1656 | -225.32 | -370.24 |
| 0402962101 | CH_0511 | 24 | S28 | E27 | CHANSLOR | 1698414 | 722316 | 889 | NO | 1305 | 111 | -359 |
| 0403034713 | CH_0512R | 24 | S28 | E27 | CHANSLOR | 1698791.36 | 722260.64 | 917 | YES | 1416 | 97.03 | -327.96 |
| 0403056572 | CH_0513R | 24 | S28 | E27 | CHANSLOR | 1698127.03 | 722046.47 | 896 | YES | 1651 | -316.9 | -371.74 |
| 0403056571 | CH_0515R | 24 | S28 | E27 | CHANSLOR | 1698183.86 | 721594.89 | 902.77 | YES | 1653 | -231.34 | -382.23 |
| 0403056108 | CH_0517R | 24 | S28 | E27 | CHANSLOR | 1697708.88 | 722370.47 | 914 | YES | 1746 | -238.2 | -376.19 |
| 0402964071 | CH_0519 | 24 | S28 | E27 | CHANSLOR | 1697759 | 721587 | 870 | NO | 1342 | 62 | -404 |
| 0403052040 | CH_0527 | 24 | S28 | E27 | CHANSLOR | 1697488.39 | 723529.66 | 939.6 | YES | 1478 | -214.38 | -324.38 |
| 0403052041 | CH_0528 | 24 | S28 | E27 | CHANSLOR | 1697766.53 | 723531.96 | 937.9 | YES | 1473 | -198.07 | -307.06 |
| 0403052042 | CH_0529 | 24 | S28 | E27 | CHANSLOR | 1698080.64 | 723564.99 | 949 | YES | 1467 | -176.99 | -291.99 |
| 0403052043 | CH_0530 | 24 | S28 | E27 | CHANSLOR | 1697446.71 | 723105.65 | 953.2 | YES | 1500 | -208.71 | -338.71 |
| 0403052044 | CH_0531 | 24 | S28 | E27 | CHANSLOR | 1697783.25 | 723111.93 | 924.1 | YES | 1490 | -203.85 | -320.85 |
| 0403052045 | CH_0532 | 24 | S28 | E27 | CHANSLOR | 1698019.84 | 723132.19 | 926.5 | YES | 1490 | -190.25 | -301.25 |
| 0403052046 | CH_0533 | 24 | S28 | E27 | CHANSLOR | 1697447 | 722737.8 | 925.6 | YES | 1522 | -232.37 | -352.36 |
| 0403052047 | CH_0534 | 24 | S28 | E27 | CHANSLOR | 1697776.43 | 722696.56 | 906.4 | YES | 1512 | -206.52 | -331.5 |
| 0403051897 | CH_0535H | 24 | S28 | E27 | CHANSLOR | 1696923.65 | 721746.5 | 893.7 | YES | 2935 | -370.85 | -352.66 |
| 0403051898 | CH_0536H | 24 | S28 | E27 | CHANSLOR | 1696972.89 | 721745.94 | 893.6 | YES | 2915 | -359.08 | -318.94 |
| 0403056346 | CH_0537 | 24 | S28 | E27 | CHANSLOR | 1698421.69 | 722763.21 | 926.1 | YES | 1641 | -192.49 | -289.41 |
| 0403056347 | CH_0538 | 24 | S28 | E27 | CHANSLOR | 1698840.1 | 722776.09 | 913.8 | YES | 1622 | -172.13 | -257.1 |
| 0403056348 | CH_0540 | 24 | S28 | E27 | CHANSLOR | 1697750.39 | 722017.8 | 897 | YES | 1659 | -237.43 | -387.33 |
| 0403056350 | CH_0541 | 24 | S28 | E27 | CHANSLOR | 1698296.71 | 722005.26 | 900.8 | YES | 1790 | -297.09 | -376.09 |
| 0403056349 | CH_0543 | 24 | S28 | E27 | CHANSLOR | 1698867.93 | 721509.46 | 912.6 | YES | 1739 | -192.37 | -332.37 |
| 0403033995 | CLA0512 | 31 | S28 | E28 | CLARENCE | 1699550.63 | 712288.56 | 787 | YES | 1653 | -482.76 | -662.76 |
| 0403034582 | CLA0513 | 31 | S28 | E28 | CLARENCE | 1699803.11 | 712013.95 | 798 | NO | 1694 | -477 | -621 |
| 0402953645 | CLP0517 | 4 | S29 | E28 | CLAMPITT | 1710700 | 705318 | 549 | NO | 928 | 372 | -326 |
| 0402953475 | CLP0518 | 4 | S29 | E28 | CLAMPITT | 1710047 | 704984 | 556 | NO | 944 | 301 | -334 |
| 0402953476 | CLP0519 | 4 | S29 | E28 | CLAMPITT | 1710375 | 704973 | 560 | NO | 937 | 308 | -315 |
| 0402956414 | CTZ0036 | 5 | S29 | E28 | CORTEZ | 1702789 | 704175 | 523 | NO | 1442 | -55 | -225 |
| 0402956262 | CTZ0504 | 5 | S29 | E28 | CORTEZ | 1703321 | 704648 | 556 | NO | 1386 | 7 | -542 |
| 0402956264 | CTZ0506 | 5 | S29 | E28 | CORTEZ | 1703956 | 704563 | 555 | NO | 1342 | 75 | -511 |
| 0402956272 | CTZ0514 | 5 | S29 | E28 | CORTEZ | 1703915 | 704265 | 552 | NO | 1373 | 6 | -528 |
| 0403018451 | CTZ0517 | 5 | S29 | E28 | CORTEZ | 1703659.63 | 704266.49 | 543 | NO | 1473 | -23 | -727 |
| 0403048358 | CTZ0519 | 5 | S29 | E28 | CORTEZ | 1703316.22 | 704355.68 | 534.5 | YES | 1603 | -483.78 | -538.77 |
| 0403048359 | CTZ0520 | 5 | S29 | E28 | CORTEZ | 1703592.96 | 704552.65 | 553 | YES | 1609 | -451.52 | -525.5 |
| 0403048361 | CTZ0522 | 5 | S29 | E28 | CORTEZ | 1703674.9 | 704066.11 | 525.2 | YES | 1627 | -487.79 | -528.79 |
| 0402957116 | DDA0500 | 19 | S28 | E28 | D & D A | 1700411 | 719866 | 925 | NO | 1343 | 138 | -339 |
| 0402957122 | DDA0506 | 19 | S28 | E28 | D & D A | 1700827 | 719215 | 887 | NO | 1310 | 147 | -333 |
| 0402957124 | DDA0508 | 19 | S28 | E28 | D & D A | 1700421 | 718896 | 865 | NO | 1318 | 170 | -263 |
| 0403050310 | DDA0512 | 19 | S28 | E28 | D & D A | 1700845.17 | 719464.78 | 908.4 | YES | 1606 | -285.35 | -322.35 |
| 0403050311 | DDA0514 | 19 | S28 | E28 | D & D A | 1700957.18 | 719180.56 | 884.3 | YES | 1670 | -350.17 | -360.17 |

# Exhbit E-1: Kern River Formation Active Steam Injection Well Summary

| API No. | Well ID | Section | Township | Range | Lease Name | Surface Coordinates[1] X | Surface Coordinates[1] Y | Elevation (feet, amsl)[2] | Directional Drilled | Well Depth[3] (feet) | Top of Perferation (TVDSS)[4] | Bottom of Perferation (TVDSS) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0403050611 | DDA0515 | 19 | S28 | E28 | D & D A | 1700930.26 | 719769.11 | 932.1 | YES | 1467 | -297.15 | -307.15 |
| 0403050309 | DDB0504 | 19 | S28 | E28 | D & D B | 1700311.53 | 720128.56 | 946.4 | YES | 1637 | -314.63 | -324.63 |
| 0403022836 | DF_0501 | 8 | S29 | E28 | DAVIS FEE | 1703609.53 | 702635.24 | 502 | YES | 1565 | -273.68 | -609.59 |
| 0403022837 | DF_0502 | 8 | S29 | E28 | DAVIS FEE | 1703685.31 | 702384.13 | 492 | YES | 1551 | -298.85 | -635.76 |
| 0403022838 | DF_0503 | 8 | S29 | E28 | DAVIS FEE | 1703637.13 | 702029.32 | 493 | YES | 1582 | -306.96 | -470.94 |
| 0403022840 | DF_0505 | 8 | S29 | E28 | DAVIS FEE | 1703925.14 | 702633.33 | 505.51 | YES | 1551 | -253.16 | -516.13 |
| 0403022841 | DF_0506 | 8 | S29 | E28 | DAVIS FEE | 1703974.9 | 702385.64 | 498 | YES | 1551 | -251.97 | -601.94 |
| 0403022844 | DF_0509 | 8 | S29 | E28 | DAVIS FEE | 1704277.5 | 702382.38 | 499 | YES | 1556 | -68.99 | -605.97 |
| 0403051410 | DIC0574 | 34 | S28 | E28 | DICK | 1716314.34 | 709829.56 | 680.7 | YES | 727 | 292.7 | 196.7 |
| 0403057135 | DIC0593R | 34 | S28 | E28 | DICK | 1715841.78 | 709105.39 | 779.6 | YES | 917 | 424.6 | 404.6 |
| 0402978843 | DIC0594I | 34 | S28 | E28 | DICK | 1716343 | 709162 | 695 | NO | 688 | 460 | 153 |
| 0403057136 | DIC0603R | 34 | S28 | E28 | DICK | 1715834.88 | 708793.71 | 777.9 | YES | 916 | 417.91 | 147.91 |
| 0402978759 | DIC0604 | 34 | S28 | E28 | DICK | 1716289 | 708785 | 713 | NO | 711 | 425 | 95 |
| 0402978760 | DIC0613 | 34 | S28 | E28 | DICK | 1715906 | 708441 | 731 | NO | 784 | 314 | 38 |
| 0402978761 | DIC0614 | 34 | S28 | E28 | DICK | 1716270 | 708479 | 743 | NO | 805 | 343 | 55 |
| 0402956282 | DR_0510 | 5 | S29 | E28 | DEL REY | 1703358 | 704930 | 562 | NO | 1384 | 72 | -523 |
| 0402956283 | DR_0511 | 5 | S29 | E28 | DEL REY | 1703684 | 704899 | 563 | NO | 1363 | 83 | -493 |
| 0403048362 | DR_0516 | 5 | S29 | E28 | DEL REY | 1703498 | 705197.5 | 580.8 | YES | 1611 | -425.59 | -497.59 |
| 0403048363 | DR_0520 | 5 | S29 | E28 | DEL REY | 1703215.24 | 705144.14 | 576.1 | YES | 1596 | -446.61 | -522.59 |
| 0403051488 | DR_0521 | 5 | S29 | E28 | DEL REY | 1703102.26 | 705045.28 | 569.1 | YES | 1661 | -494.37 | -619.34 |
| 0403051489 | DR_0522 | 5 | S29 | E28 | DEL REY FEE | 1703817.2 | 705217.57 | 582 | YES | 1587 | -399.1 | -546.05 |
| 0402956372 | DRW0500 | 5 | S29 | E28 | DEL REY WEST | 1701937 | 705370 | 563 | NO | 1472 | -107 | -572 |
| 0402956379 | DRW0507 | 5 | S29 | E28 | DEL REY WEST | 1701625 | 704697 | 540 | NO | 1459 | -301 | -440 |
| 0403018452 | DRW0508 | 5 | S29 | E28 | DEL REY WEST | 1702222 | 705120 | 542 | NO | 1513 | -134 | -763 |
| 0403054903 | DRW0510 | 5 | S29 | E28 | DEL REY WEST | 1701525.77 | 705275.44 | 554 | YES | 1654 | -463.13 | -541.13 |
| 0403054904 | DRW0513 | 5 | S29 | E28 | DEL REY WEST | 1701576.92 | 705203.76 | 553.7 | YES | 1654 | -480.86 | -552.86 |
| 0403054905 | DRW0514 | 5 | S29 | E28 | DEL REY WEST | 1701909.86 | 705105.54 | 561.6 | YES | 1645 | -476.31 | -522.31 |
| 0403054906 | DRW0515 | 5 | S29 | E28 | DEL REY WEST | 1702423.93 | 705103.58 | 548.8 | YES | 1654 | -433.62 | -507.61 |
| 0403022619 | DVS0502R | 8 | S29 | E28 | DAVIS | 1706302 | 701983 | 475.01 | YES | 1286 | 48.2 | -581.6 |
| 0402956383 | DVS0503 | 8 | S29 | E28 | DAVIS | 1706306 | 701704 | 468 | NO | 1271 | -89 | -603 |
| 0403055190 | ELW0500 | 3 | S29 | E28 | ELWOOD | 1714978.77 | 703702.13 | 518.9 | YES | 805 | -92.46 | -102.07 |
| 0403055130 | ELW0502 | 3 | S29 | E28 | ELWOOD | 1715392.05 | 703465.07 | 508.3 | YES | 792 | -75.46 | -84.95 |
| 0403007000 | ELW0910 | 3 | S29 | E28 | ELWOOD | 1715024 | 703824 | 522.8 | NO | 700 | 421.8 | -97.2 |
| 0403007006 | ELW0930 | 3 | S29 | E28 | ELWOOD | 1714986 | 703307 | 489 | YES | 640 | 399.14 | -91.52 |
| 0402972788 | FEA0154 | 25 | S28 | E27 | FEE A | 1698473 | 716701 | 884 | YES | 1415 | -5 | -482.14 |
| 0402974589 | FEA0163 | 25 | S28 | E27 | FEE A | 1698641 | 715235 | 787 | YES | 1302 | -76.96 | -456.7 |
| 0403040776 | FEA0503 | 25 | S28 | E27 | FEE A | 1698716.75 | 716742.51 | 880.7 | YES | 1716 | -423.7 | -475.65 |
| 0403040777 | FEA0504 | 25 | S28 | E27 | FEE A | 1698906.77 | 716128.83 | 830 | YES | 1655 | -416.04 | -452.51 |
| 0403058115 | FEA0505 | 25 | S28 | E27 | FEE A | 1698613.2 | 716123.32 | 828.3 | YES | 1693 | -425.19 | -461.19 |
| 0403059129 | FEA0509 | 25 | S28 | E27 | FEE A | 1698653.44 | 716040.32 | 828.3 | YES | 1634 | -426.96 | -485.95 |

Exhbit E-1: Kern River Formation Active Steam Injection Well Summary

| API No. | Well ID | Section | Township | Range | Lease Name | Surface Coordinates[1] X | Surface Coordinates[1] Y | Elevation (feet, amsl)[2] | Directional Drilled | Well Depth[3] (feet) | Top of Perferation (TVDSS)[4] | Bottom of Perferation (TVDSS) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0402965911 | FEB0076 | 6 | S29 | E28 | FEE B | 1700585 | 707799 | 595 | NO | 1390 | -187 | -305 |
| 0402974721 | FEB0370 | 6 | S29 | E28 | FEE B | 1700270 | 707803 | 604 | NO | 1240 | -212 | -428 |
| 0403049021 | FEB0503 | 6 | S29 | E28 | FEE B | 1700606.93 | 707478.68 | 598.8 | YES | 1596 | -206.09 | -307.08 |
| 0402957393 | FR_0500 | 8 | S29 | E28 | FRANK | 1704958 | 701011 | 464 | NO | 1441 | -287 | -498 |
| 0402942714 | GW_0502 | 31 | S28 | E28 | GREEN & WHITTIER | 1699441 | 709308 | 672 | NO | 1163 | -202 | -431 |
| 0402944802 | GW_0515 | 31 | S28 | E28 | GREEN & WHITTIER | 1700484 | 710329 | 666 | NO | 1448 | -374 | -609 |
| 0402944762 | GW_0523 | 31 | S28 | E28 | GREEN & WHITTIER | 1700880 | 709719 | 659 | NO | 1460 | 21 | -601 |
| 0402956237 | GW_0531 | 31 | S28 | E28 | GREEN & WHITTIER | 1699457 | 708977 | 651 | NO | 1490 | -79 | -454 |
| 0402973301 | GW_0553 | 31 | S28 | E28 | GREEN & WHITTIER | 1701236 | 709335 | 675 | NO | 1458 | 25 | -585 |
| 0402973302 | GW_0554 | 31 | S28 | E28 | GREEN & WHITTIER | 1700846 | 710326 | 703 | NO | 1434 | -349 | -590 |
| 0402973304 | GW_0556 | 31 | S28 | E28 | GREEN & WHITTIER | 1700105 | 710260 | 690 | NO | 1462 | -7 | -525 |
| 0402973305 | GW_0557 | 31 | S28 | E28 | GREEN & WHITTIER | 1700190 | 710614 | 686 | NO | 1427 | -409 | -624 |
| 0402973321 | GW_0558 | 31 | S28 | E28 | GREEN & WHITTIER | 1699394 | 710338 | 677 | NO | 1491 | -140 | -523 |
| 0402973773 | GW_0560 | 31 | S28 | E28 | GREEN & WHITTIER | 1699737 | 710641 | 690 | NO | 1450 | -134 | -635 |
| 0403038085 | GW_0562 | 31 | S28 | E28 | GREEN & WHITTIER | 1699213.1 | 710488.17 | 678.7 | YES | 1611 | -358.93 | -547.85 |
| 0403038086 | GW_0563 | 31 | S28 | E28 | GREEN & WHITTIER | 1699100.15 | 710269.56 | 684.8 | YES | 1579 | -357.14 | -588.13 |
| 0403038087 | GW_0564 | 31 | S28 | E28 | GREEN & WHITTIER | 1699077.45 | 709968.46 | 675.8 | YES | 1549 | -376.15 | -579.14 |
| 0403038088 | GW_0565 | 31 | S28 | E28 | GREEN & WHITTIER | 1699085.69 | 709642.82 | 673 | YES | 1583 | -386.92 | -570.91 |
| 0403038089 | GW_0566 | 31 | S28 | E28 | GREEN & WHITTIER | 1699037.92 | 709319.9 | 669.3 | YES | 1576 | -411.66 | -456.66 |
| 0403038090 | GW_0567 | 31 | S28 | E28 | GREEN & WHITTIER | 1698977.57 | 710361.93 | 679.5 | YES | 1660 | -363.64 | -432.48 |
| 0403040248 | GW_0569 | 31 | S28 | E28 | GREEN & WHITTIER | 1699609.65 | 709640.71 | 657.9 | YES | 1658 | -182.92 | -557.88 |
| 0403046377 | GW_0571 | 31 | S28 | E28 | GREEN & WHITTIER | 1701345.09 | 710020.61 | 665.7 | YES | 1635 | -439.2 | -634.19 |
| 0403046378 | GW_0572 | 31 | S28 | E28 | GREEN & WHITTIER | 1701392.04 | 709772.78 | 688.2 | YES | 1675 | -443.05 | -653.05 |
| 0403052048 | GW_0574 | 31 | S28 | E28 | GREEN & WHITTIER | 1700452.84 | 710081.66 | 662.5 | YES | 1645 | -437.5 | -592.5 |
| 0403052049 | GW_0575 | 31 | S28 | E28 | GREEN & WHITTIER | 1700822.11 | 709940.66 | 682.1 | YES | 1645 | -443.03 | -575.02 |
| 0403052050 | GW_0576 | 31 | S28 | E28 | GREEN & WHITTIER | 1700787.03 | 709366.01 | 642.3 | YES | 1630 | -472.82 | -594.81 |
| 0403053611 | GW_0578 | 31 | S28 | E28 | GREEN & WHITTIER | 1699631.59 | 709567.27 | 658.2 | YES | 1665 | -451.13 | -540.12 |
| 0403053612 | GW_0579 | 31 | S28 | E28 | GREEN & WHITTIER | 1699656.05 | 709590.49 | 658.7 | YES | 1725 | -427.53 | -529.52 |
| 0403053613 | GW_0580 | 31 | S28 | E28 | GREEN & WHITTIER | 1700254.23 | 709870.06 | 658.7 | YES | 1641 | -420.2 | -529.19 |
| 0403053646 | GW_0581 | 31 | S28 | E28 | GREEN & WHITTIER | 1700149.16 | 709622.01 | 642.8 | YES | 1609 | -426.1 | -528.08 |
| 0403053614 | GW_0582 | 31 | S28 | E28 | GREEN & WHITTIER | 1700443.22 | 709713.95 | 664 | YES | 1630 | -399.93 | -511.92 |
| 0403053616 | GW_0584 | 31 | S28 | E28 | GREEN & WHITTIER | 1699427.94 | 710546.95 | 679.6 | YES | 1621 | -451.13 | -528.12 |
| 0402946178 | GWA0516 | 30 | S28 | E28 | GREEN & WHITTIER A | 1699957 | 715327 | 769 | NO | 1358 | 12 | -72 |
| 0403028606 | GWA0533R | 30 | S28 | E28 | GREEN & WHITTIER A | 1699563.67 | 714006.23 | 755 | YES | 1574 | -84.53 | -504.44 |
| 0402951626 | GWA0552 | 30 | S28 | E28 | GREEN & WHITTIER A | 1701640 | 713635 | 812 | NO | 1482 | 142 | -580 |
| 0403037018 | GWA0567 | 30 | S28 | E28 | GREEN & WHITTIER A | 1699944.5 | 714311.95 | 743 | YES | 1529 | -454.99 | -586.99 |
| 0402988866 | GWA0570 | 30 | S28 | E28 | GREEN & WHITTIER A | 1699967 | 713993 | 729 | NO | 1435 | -29 | -593 |
| 0402988867 | GWA0571 | 30 | S28 | E28 | GREEN & WHITTIER A | 1699888 | 713654 | 724 | NO | 1476 | -47 | -616 |
| 0402989572 | GWA0573 | 30 | S28 | E28 | GREEN & WHITTIER A | 1700011 | 714561 | 760 | NO | 1434 | -10 | -559 |
| 0403033993 | GWA0579 | 30 | S28 | E28 | GREEN & WHITTIER A | 1699412.54 | 713430.44 | 722 | YES | 1590 | -489.35 | -644.33 |

# Exhbit E-1: Kern River Formation Active Steam Injection Well Summary

| API No. | Well ID | Section | Township | Range | Lease Name | Surface Coordinates[1] X | Surface Coordinates[1] Y | Elevation (feet, amsl)[2] | Directional Drilled | Well Depth[3] (feet) | Top of Perferation (TVDSS)[4] | Bottom of Perferation (TVDSS) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0403035128 | GWA0580 | 30 | S28 | E28 | GREEN & WHITTIER A | 1699542.88 | 715331.02 | 774 | YES | 1559 | -450.32 | -475.32 |
| 0403035129 | GWA0581 | 30 | S28 | E28 | GREEN & WHITTIER A | 1699621.3 | 715066.43 | 776 | YES | 1579 | -462.19 | -487.18 |
| 0403034990 | GWA0582 | 30 | S28 | E28 | GREEN & WHITTIER A | 1699662.17 | 714338.63 | 751 | YES | 1591 | -433.42 | -512.41 |
| 0403035130 | GWA0583 | 30 | S28 | E28 | GREEN & WHITTIER A | 1699304.66 | 715077.69 | 791 | YES | 1591 | -432.27 | -492.26 |
| 0403035131 | GWA0584 | 30 | S28 | E28 | GREEN & WHITTIER A | 1699319.01 | 714753.6 | 773 | YES | 1587 | -444.48 | -496.47 |
| 0403035132 | GWA0585 | 30 | S28 | E28 | GREEN & WHITTIER A | 1699579.8 | 714662.45 | 772 | YES | 1603 | -442.38 | -510.38 |
| 0403035133 | GWA0587 | 30 | S28 | E28 | GREEN & WHITTIER A | 1699456.1 | 713696.1 | 731 | YES | 1565 | -449.41 | -516.41 |
| 0403055242 | GWA0588 | 30 | S28 | E28 | GREEN & WHITTIER A | 1701411.66 | 713336.61 | 807.1 | YES | 1667 | -554.54 | -594.54 |
| 0402969741 | HF_0510 | 31 | S28 | E28 | HANFORD & FRESNO | 1699575 | 712673 | 714 | NO | 1401 | -78 | -636 |
| 0403015226 | HF_0514 | 31 | S28 | E28 | HANFORD & FRESNO | 1699509 | 713023 | 709 | YES | 1536 | -449.28 | -653.28 |
| 0403033996 | HF_0515 | 31 | S28 | E28 | HANFORD & FRESNO | 1699854.33 | 712714.4 | 741 | YES | 1592 | -623.83 | -668.83 |
| 0402961586 | HF80003-1B | 8 | S29 | E28 | H H & F SEC 8 | 1705014 | 702624 | 499 | YES | 1366 | 1.96 | -634 |
| 0402961587 | HF80003-2B | 8 | S29 | E28 | H H & F SEC 8 | 1704844 | 702382 | 495 | YES | 1384 | -22.37 | -537.62 |
| 0402961590 | HF80005-2B | 8 | S29 | E28 | H H & F SEC 8 | 1705283 | 702360 | 488 | YES | 1355 | 0 | -625.98 |
| 0403041156 | HOT0500 | 10 | S29 | E28 | HOTCHKISS | 1712200.01 | 701119.85 | 452.9 | YES | 1183 | -55.73 | -231.31 |
| 0403037343 | JUN0050R | 9 | S29 | E28 | JUNCTION | 1707418.69 | 701230.83 | 460 | YES | 1310 | 24.14 | -581.48 |
| 0402956353 | JUN0512 | 9 | S29 | E28 | JUNCTION | 1707011 | 701439 | 465 | NO | 1243 | -72 | -589 |
| 0402956355 | JUN0514 | 9 | S29 | E28 | JUNCTION | 1707629 | 701562 | 470 | NO | 1208 | -30 | -80 |
| 0402956405 | JUN0515 | 9 | S29 | E28 | JUNCTION | 1707006 | 701139 | 459 | NO | 1245 | -103 | -504 |
| 0402956362 | JUN0522 | 9 | S29 | E28 | JUNCTION | 1706705 | 701498 | 465 | NO | 1263 | -85 | -408 |
| 0402956363 | JUN0523 | 9 | S29 | E28 | JUNCTION | 1706704 | 701138 | 457 | NO | 1254 | -59 | -591 |
| 0403028805 | JUN0527 | 9 | S29 | E28 | JUNCTION | 1706779.01 | 700871.96 | 455 | YES | 1390 | -138.51 | -523.32 |
| 0403028806 | JUN0528 | 9 | S29 | E28 | JUNCTION | 1707068.14 | 700808.31 | 442 | YES | 1354 | -122.99 | -508.98 |
| 0403028807 | JUN0529 | 9 | S29 | E28 | JUNCTION | 1707340.38 | 700808.06 | 443 | YES | 1333 | -83.91 | -502.12 |
| 0403028808 | JUN0530 | 9 | S29 | E28 | JUNCTION | 1707580.06 | 700882.47 | 447 | YES | 1386 | -73.58 | -509.7 |
| 0403028809 | JUN0531 | 9 | S29 | E28 | JUNCTION | 1706717.88 | 700584.62 | 451 | YES | 1401 | -127.99 | -368.98 |
| 0403028810 | JUN0532 | 9 | S29 | E28 | JUNCTION | 1707000.21 | 700554.2 | 443 | YES | 1392 | -126.99 | -531.98 |
| 0403028811 | JUN0533 | 9 | S29 | E28 | JUNCTION | 1707333.82 | 700576.16 | 442 | YES | 1345 | -101.99 | -508.98 |
| 0403028812 | JUN0534 | 9 | S29 | E28 | JUNCTION | 1707614.22 | 700535.88 | 443 | YES | 1343 | -91.71 | -505.13 |
| 0403028813 | JUN0535 | 9 | S29 | E28 | JUNCTION | 1706714.46 | 700340.24 | 448 | YES | 1445 | -149.41 | -397.09 |
| 0403028814 | JUN0536 | 9 | S29 | E28 | JUNCTION | 1707010.36 | 700290.03 | 445 | YES | 1390 | -149.98 | -384.96 |
| 0403028815 | JUN0537 | 9 | S29 | E28 | JUNCTION | 1707368.17 | 700287.18 | 442 | YES | 1354 | -131 | -539.98 |
| 0403028816 | JUN0538 | 9 | S29 | E28 | JUNCTION | 1707610.54 | 700287.5 | 440 | YES | 1353 | -113.5 | -522.27 |
| 0403058329 | JUN0545 | 9 | S29 | E28 | JUNCTION | 1707005.76 | 701085.68 | 471.5 | YES | 1454 | -385.74 | -495.73 |
| 0403014180 | K100077 | 10 | S29 | E28 | KCL-10 | 1713150 | 701465 | 454.81 | NO | 802 | 180.81 | -179.19 |
| 0403041157 | K100500 | 10 | S29 | E28 | KCL-10 | 1712320.05 | 701748.95 | 455.8 | YES | 1147 | -19.32 | -212.13 |
| 0403041158 | K100501 | 10 | S29 | E28 | KCL-10 | 1712860.02 | 701707.27 | 448.2 | YES | 911 | 4.39 | -185.33 |
| 0403041159 | K100502 | 10 | S29 | E28 | KCL-10 | 1713269.83 | 701684.44 | 448.2 | YES | 920 | 24.46 | -156.11 |
| 0403041160 | K100503 | 10 | S29 | E28 | KCL-10 | 1712260.83 | 701508.23 | 453.3 | YES | 1146 | -51.69 | -246.68 |
| 0403041161 | K100504 | 10 | S29 | E28 | KCL-10 | 1712634.75 | 701499.2 | 455.8 | YES | 1112 | -15.25 | -206.31 |

Exhbit E-1: Kern River Formation Active Steam Injection Well Summary

| API No. | Well ID | Section | Township | Range | Lease Name | Surface Coordinates[1] X | Surface Coordinates[1] Y | Elevation (feet, amsl)[2] | Directional Drilled | Well Depth[3] (feet) | Top of Perferation (TVDSS)[4] | Bottom of Perferation (TVDSS) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0403041228 | K100505 | 10 | S29 | E28 | KCL-10 | 1713390.42 | 701646.3 | 447.6 | YES | 925 | 38.36 | -169.4 |
| 0403014819 | K100603 | 10 | S29 | E28 | KCL-10 | 1712776 | 702184 | 445 | NO | 897 | 237 | -415 |
| 0403021444 | K100605 | 10 | S29 | E28 | KCL-10 | 1713146 | 702110 | 446 | YES | 815 | 52.96 | -180.3 |
| 0403015443 | K100606 | 10 | S29 | E28 | KCL-10 | 1712278 | 702309 | 443 | YES | 976 | 255.19 | -204.55 |
| 0403015427 | K100615 | 10 | S29 | E28 | KCL-10 | 1713520 | 701551 | 448 | NO | 883 | 238 | -196 |
| 0403015428 | K100617 | 10 | S29 | E28 | KCL-10 | 1713846 | 701511 | 448 | NO | 838 | 244 | -170 |
| 0402987832 | KC20211 | 2 | S29 | E28 | KCL-2 | 1718111 | 704147 | 468 | NO | 466 | 298 | 178 |
| 0402987833 | KC20213 | 2 | S29 | E28 | KCL-2 | 1718112 | 703872 | 474 | NO | 451 | 292 | 165 |
| 0402962360 | KC20215 | 2 | S29 | E28 | KCL-2 | 1717492 | 703522 | 469 | NO | 400 | 336 | 162 |
| 0402987834 | KC20217 | 2 | S29 | E28 | KCL-2 | 1718158 | 703516 | 488 | NO | 432 | 300 | 169 |
| 0403050085 | KC20219R | 2 | S29 | E28 | KCL-2 | 1717519.97 | 703161.27 | 475.5 | YES | 510 | 305.5 | 89.5 |
| 0402987836 | KC20223 | 2 | S29 | E28 | KCL-2 | 1718142 | 703182 | 498 | NO | 465 | 282 | 166 |
| 0402958665 | KC30601 | 3 | S29 | E28 | KCL-3 | 1712273 | 703664 | 462 | NO | 745 | 316 | -174 |
| 0402958275 | KC30612 | 3 | S29 | E28 | KCL-3 | 1712609 | 703325 | 456 | NO | 730 | 335 | -179 |
| 0403007012 | KC30618 | 3 | S29 | E28 | KCL-3 | 1714610 | 703326 | 472.04 | NO | 625 | 382.04 | -77.96 |
| 0402958561 | KC30622 | 3 | S29 | E28 | KCL-3 | 1712619 | 703021 | 451 | NO | 705 | 319 | -196 |
| 0402958354 | KC30624 | 3 | S29 | E28 | KCL-3 | 1713279 | 702997 | 454 | NO | 650 | 301 | -156 |
| 0403007013 | KC30628 | 3 | S29 | E28 | KCL-3 | 1714603 | 703053 | 461.41 | NO | 615 | 371.41 | -101.59 |
| 0403027982 | KC30637R | 3 | S29 | E28 | KCL-3 | 1714427.5 | 702739.81 | 460 | YES | 818 | 247.65 | -118.74 |
| 0403055131 | KC30639 | 3 | S29 | E28 | KCL-3 | 1714399.98 | 702962.96 | 475.8 | YES | 735 | -57.13 | -107.01 |
| 0402928488 | KER0116 | 32 | S28 | E28 | KERN | 1705331 | 709331 | 638 | NO | 1210 | 298 | -472 |
| 0403031223 | KER0140R | 32 | S28 | E28 | KERN | 1706750.88 | 708353.54 | 663 | YES | 1243 | -452.93 | -492.93 |
| 0403037556 | KER0504R | 32 | S28 | E28 | KERN | 1704592.75 | 710308.11 | 694 | YES | 1435 | -489.47 | -515.37 |
| 0402952490 | KER0516 | 32 | S28 | E28 | KERN | 1705622 | 708481 | 637 | NO | 1216 | 294 | -473 |
| 0403032425 | KER0530 | 32 | S28 | E28 | KERN | 1705024.05 | 708334.9 | 628 | YES | 1390 | -406.78 | -453.62 |
| 0403036797 | KER0539 | 32 | S28 | E28 | KERN | 1704596.68 | 709827.99 | 689 | YES | 1438 | -471.97 | -517.87 |
| 0403036742 | KER0540 | 32 | S28 | E28 | KERN | 1704975.46 | 709696.42 | 660 | YES | 1412 | -471.25 | -510.67 |
| 0403043957 | KER0542 | 32 | S28 | E28 | KERN | 1705469.12 | 708835.25 | 645.7 | YES | 1425 | -422.98 | -479.9 |
| 0403046367 | KER0543 | 32 | S28 | E28 | KERN | 1705530.11 | 708356.97 | 632.5 | YES | 1539 | -439.61 | -480.54 |
| 0403051406 | KNV0504 | 34 | S28 | E28 | KERNVIEW | 1716717.99 | 709883.27 | 643.2 | YES | 681 | 350.21 | 213.21 |
| 0403051407 | KNV0505 | 34 | S28 | E28 | KERNVIEW | 1717100.52 | 709884.62 | 625.8 | YES | 645 | 372.8 | 249.81 |
| 0403051408 | KNV0506 | 34 | S28 | E28 | KERNVIEW | 1716694.58 | 709559.54 | 641.3 | YES | 681 | 345.3 | 215.3 |
| 0403051409 | KNV0507 | 34 | S28 | E28 | KERNVIEW | 1717114 | 709489.82 | 598.7 | YES | 641 | 365.7 | 238.71 |
| 0403014352 | KRD0101 | 36 | S28 | E27 | KERN RIVER DRILLERS | 1697440 | 713191 | 792.92 | NO | 1761 | -267.08 | -491.08 |
| 0403046949 | KRD0528 | 36 | S28 | E27 | KERN RIVER DRILLERS | 1697050.71 | 713045.34 | 754.8 | YES | 1940 | -405.49 | -467.47 |
| 0403047811 | KRD0529 | 36 | S28 | E27 | KERN RIVER DRILLERS | 1697126.74 | 713214.9 | 759.6 | YES | 1733 | -296.4 | -476.4 |
| 0403047812 | KRD0530 | 36 | S28 | E27 | KERN RIVER DRILLERS | 1697267.27 | 712933.52 | 773.6 | YES | 1768 | -389.27 | -473.26 |
| 0403047813 | KRD0531 | 36 | S28 | E27 | KERN RIVER DRILLERS | 1697123.27 | 712551.33 | 733.8 | YES | 1748 | -329.33 | -464.26 |
| 0403051404 | KRN0503 | 34 | S28 | E28 | KERN | 1716702.62 | 708069.01 | 627.4 | YES | 760 | 287.4 | 147.4 |
| 0403051405 | KRN0504 | 34 | S28 | E28 | KERN | 1717100.53 | 708078.55 | 598 | YES | 688 | 322 | 193.01 |

Exhbit E-1: Kern River Formation Active Steam Injection Well Summary

| API No. | Well ID | Section | Township | Range | Lease Name | Surface Coordinates[1] X | Surface Coordinates[1] Y | Elevation (feet, amsl)[2] | Directional Drilled | Well Depth[3] (feet) | Top of Perferation (TVDSS)[4] | Bottom of Perferation (TVDSS) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0403051415 | KRN0505 | 34 | S28 | E28 | KERN | 1716701.15 | 708416.33 | 654.5 | YES | 732 | 303.51 | 154.51 |
| 0403055276 | LH_0505 | 30 | S28 | E28 | LAWTON & HANNAMAN | 1701981.31 | 713449.23 | 808.8 | YES | 1631 | -524.89 | -567.86 |
| 0403055245 | LH_0506 | 30 | S28 | E28 | LAWTON & HANNAMAN | 1702751.38 | 713330.54 | 747.6 | YES | 1553 | -481.97 | -546.97 |
| 0403055246 | LH_0507 | 30 | S28 | E28 | LAWTON & HANNAMAN | 1702327.45 | 713353.57 | 768 | YES | 1563 | -499.28 | -558.27 |
| 0402957396 | MAY0502 | 8 | S29 | E28 | MAY | 1705950 | 700986 | 460 | NO | 1357 | -160 | -510 |
| 0402957441 | MAY0505 | 8 | S29 | E28 | MAY | 1705633 | 701360 | 468 | NO | 1360 | -152 | -372 |
| 0402969463 | MAY0508 | 8 | S29 | E28 | MAY | 1706346 | 700861 | 454 | NO | 1321 | -142 | -496 |
| 0403030659 | MC10002-2BR | 5 | S29 | E28 | MONTE CRISTO 1 | 1701659.23 | 707784.79 | 620 | YES | 1583 | -396.91 | -484.9 |
| 0403030660 | MC10002-4BR | 5 | S29 | E28 | MONTE CRISTO 1 | 1701579.46 | 707233.97 | 611 | YES | 1580 | -414.86 | -492.85 |
| 0403030661 | MC10002-6BR | 5 | S29 | E28 | MONTE CRISTO 1 | 1701620.15 | 706943.49 | 598 | YES | 1590 | -425.99 | -491.99 |
| 0402951162 | MC10004-14B | 5 | S29 | E28 | MONTE CRISTO 1 | 1701986 | 705685 | 568 | NO | 1212 | -129 | -558 |
| 0403030662 | MC10004-4BR | 5 | S29 | E28 | MONTE CRISTO 1 | 1701941.75 | 707247.57 | 599 | YES | 1554 | -391.03 | -447.02 |
| 0403030663 | MC10004-6BR | 5 | S29 | E28 | MONTE CRISTO 1 | 1702002.09 | 706999.98 | 592 | YES | 1547 | -403.93 | -473.93 |
| 0403030664 | MC10004-8BR | 5 | S29 | E28 | MONTE CRISTO 1 | 1702057.23 | 706769.48 | 589 | YES | 1540 | -405.99 | -478.99 |
| 0402951168 | MC10006-12B | 5 | S29 | E28 | MONTE CRISTO 1 | 1702430 | 705976 | 556 | NO | 1161 | -102 | -547 |
| 0402951174 | MC10008-10B | 5 | S29 | E28 | MONTE CRISTO 1 | 1702534 | 706282 | 565 | YES | 1158 | -34 | -540.85 |
| 0402951173 | MC10008-8B | 5 | S29 | E28 | MONTE CRISTO 1 | 1702534 | 706578 | 572 | NO | 1177 | 92 | -510 |
| 0402951178 | MC10010-10B | 5 | S29 | E28 | MONTE CRISTO 1 | 1702877 | 706170 | 571 | NO | 1178 | 59 | -528 |
| 0402955911 | MC10010-16B | 5 | S29 | E28 | MONTE CRISTO 1 | 1702909 | 705376 | 561 | NO | 1138 | 64 | -557 |
| 0402951177 | MC10010-8B | 5 | S29 | E28 | MONTE CRISTO 1 | 1702902 | 706548 | 584 | YES | 1143 | 84 | -476.39 |
| 0402951185 | MC10012-10B | 5 | S29 | E28 | MONTE CRISTO 1 | 1703297 | 706173 | 590 | NO | 1180 | 84 | -514 |
| 0402951186 | MC10012-12B | 5 | S29 | E28 | MONTE CRISTO 1 | 1703341 | 705834 | 572 | NO | 1182 | 103 | -505 |
| 0402952120 | MC10012-1B | 5 | S29 | E28 | MONTE CRISTO 1 | 1703348 | 707909 | 622 | YES | 1306 | 86.73 | -586.23 |
| 0402951184 | MC10012-8B | 5 | S29 | E28 | MONTE CRISTO 1 | 1703292 | 706524 | 599 | NO | 1174 | 99 | -498 |
| 0402951192 | MC10014-10B | 5 | S29 | E28 | MONTE CRISTO 1 | 1703709 | 706197 | 599 | NO | 1160 | 121 | -518 |
| 0402951193 | MC10014-12B | 5 | S29 | E28 | MONTE CRISTO 1 | 1703717 | 705869 | 579 | NO | 1171 | 69 | -545 |
| 0402951189 | MC10014-4B | 5 | S29 | E28 | MONTE CRISTO 1 | 1703714 | 707274 | 627 | NO | 1107 | 141 | -454 |
| 0402951190 | MC10014-6B | 5 | S29 | E28 | MONTE CRISTO 1 | 1703702 | 706927 | 613 | NO | 1139 | 131 | -481 |
| 0402955915 | MC10016-10B | 5 | S29 | E28 | MONTE CRISTO 1 | 1704003 | 706238 | 600 | NO | 1171 | 124 | -498 |
| 0402955916 | MC10016-14B | 5 | S29 | E28 | MONTE CRISTO 1 | 1703991 | 705597 | 597 | NO | 1162 | 77 | -509 |
| 0403030665 | MC10176R | 5 | S29 | E28 | MONTE CRISTO 1 | 1701605.55 | 706704.65 | 586 | YES | 1582 | -439.89 | -504.89 |
| 0402970625 | MC10344 | 5 | S29 | E28 | MONTE CRISTO 1 | 1702915 | 706915 | 583 | NO | 1240 | -190 | -567 |
| 0402970628 | MC10353 | 5 | S29 | E28 | MONTE CRISTO 1 | 1703285 | 707298 | 597 | NO | 1216 | 119 | -523 |
| 0403043949 | MC10501 | 5 | S29 | E28 | MONTE CRISTO 1 | 1703624.82 | 706479.97 | 612.9 | YES | 1547 | -372.48 | -516.45 |
| 0403043950 | MC10502 | 5 | S29 | E28 | MONTE CRISTO 1 | 1703257.81 | 707125.05 | 607 | YES | 1572 | -427.25 | -516.24 |
| 0403043951 | MC10503 | 5 | S29 | E28 | MONTE CRISTO 1 | 1703878.45 | 707240.49 | 639.7 | YES | 1551 | -418.47 | -468.47 |
| 0403043952 | MC10504 | 5 | S29 | E28 | MONTE CRISTO 1 | 1703660.89 | 707420.81 | 620.4 | YES | 1549 | -367.82 | -471.79 |
| 0403051490 | MC10505 | 5 | S29 | E28 | MONTE CRISTO 1 | 1702733.03 | 705923.77 | 571.2 | YES | 1597 | -467.33 | -572.33 |
| 0403051491 | MC10507 | 5 | S29 | E28 | MONTE CRISTO 1 | 1703520.42 | 705569.92 | 578.7 | YES | 1554 | -447.26 | -567.25 |
| 0403051492 | MC10508 | 5 | S29 | E28 | MONTE CRISTO 1 | 1703459.9 | 705502.12 | 577.8 | YES | 1603 | -418.28 | -578.15 |

## Exhbit E-1: Kern River Formation Active Steam Injection Well Summary

| API No. | Well ID | Section | Township | Range | Lease Name | Surface Coordinates[1] X | Surface Coordinates[1] Y | Elevation (feet, amsl)[2] | Directional Drilled | Well Depth[3] (feet) | Top of Perferation (TVDSS)[4] | Bottom of Perferation (TVDSS) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0403043953 | MC10509 | 5 | S29 | E28 | MONTE CRISTO 1 | 1703891.96 | 707418.63 | 632.8 | YES | 1550 | -463.78 | -487.78 |
| 0403051493 | MC10510 | 5 | S29 | E28 | MONTE CRISTO 1 | 1703267.18 | 705493.56 | 576 | YES | 1594 | -440.91 | -567.87 |
| 0403051494 | MC10511 | 5 | S29 | E28 | MONTE CRISTO 1 | 1703252.62 | 705563.49 | 577.3 | YES | 1595 | -425.59 | -580.59 |
| 0403051495 | MC10512 | 5 | S29 | E28 | MONTE CRISTO 1 | 1703087.08 | 705599.74 | 578 | YES | 1601 | -438.33 | -567.32 |
| 0403051496 | MC10513 | 5 | S29 | E28 | MONTE CRISTO 1 | 1702593.57 | 705694.75 | 566.2 | YES | 1588 | -455.5 | -582.5 |
| 0403050974 | MC10514 | 5 | S29 | E28 | MONTE CRISTO 1 | 1703522.81 | 707703.21 | 616.4 | YES | 1550 | -472.73 | -551.73 |
| 0403054833 | MC10515 | 5 | S29 | E28 | MONTE CRISTO 1 | 1701612.71 | 706318.59 | 580.7 | YES | 1627 | -444.49 | -544.48 |
| 0403054899 | MC10516 | 5 | S29 | E28 | MONTE CRISTO 1 | 1702052.81 | 706291.46 | 589.3 | YES | 1660 | -431.12 | -522.08 |
| 0403054900 | MC10517 | 5 | S29 | E28 | MONTE CRISTO 1 | 1702374.85 | 706190.1 | 571 | YES | 1596 | -402.56 | -505.55 |
| 0403054901 | MC10518 | 5 | S29 | E28 | MONTE CRISTO 1 | 1701622.33 | 705986.68 | 574.4 | YES | 1630 | -453.55 | -564.55 |
| 0403054834 | MC10519 | 5 | S29 | E28 | MONTE CRISTO 1 | 1702000.68 | 705857.41 | 579.9 | YES | 1629 | -445.05 | -515.04 |
| 0403054902 | MC10520 | 5 | S29 | E28 | MONTE CRISTO 1 | 1701628.32 | 705537.4 | 559.5 | YES | 1667 | -454.02 | -518.01 |
| 0403054835 | MC10521 | 5 | S29 | E28 | MONTE CRISTO 1 | 1702358.54 | 705659.9 | 562.9 | YES | 1596 | -436.03 | -509.02 |
| 0403054836 | MC10522 | 5 | S29 | E28 | MONTE CRISTO 1 | 1702372.92 | 706984.99 | 594.5 | YES | 1627 | -439.53 | -478.02 |
| 0403054837 | MC10523 | 5 | S29 | E28 | MONTE CRISTO 1 | 1702252.92 | 705441.88 | 562.1 | YES | 1636 | -455 | -510 |
| 0403054838 | MC10524 | 5 | S29 | E28 | MONTE CRISTO 1 | 1702506.86 | 705416.61 | 556.2 | YES | 1604 | -432.84 | -502.84 |
| 0402973165 | MIT0024 | 18 | S28 | E28 | MITCHELL | 1700367 | 725235 | 1008 | NO | 1244 | -2 | -132 |
| 0403011110 | MIT0501 | 18 | S28 | E28 | MITCHELL | 1700325 | 725657 | 1023 | NO | 1282 | -67 | -107 |
| 0403011111 | MIT0502 | 18 | S28 | E28 | MITCHELL | 1700337 | 724886 | 989 | NO | 1272 | -12 | -133 |
| 0403011113 | MIT0504 | 18 | S28 | E28 | MITCHELL | 1700320 | 724153 | 944 | NO | 1243 | -31 | -155 |
| 0403011114 | MIT0505 | 18 | S28 | E28 | MITCHELL | 1700796 | 726088 | 1038 | NO | 1262 | -40 | -55 |
| 0403011115 | MIT0506 | 18 | S28 | E28 | MITCHELL | 1700849 | 725817 | 1044 | YES | 1263 | -49.45 | -69.44 |
| 0403011116 | MIT0507 | 18 | S28 | E28 | MITCHELL | 1700791 | 724146 | 980 | NO | 1277 | 3 | -129 |
| 0403011119 | MIT0510 | 18 | S28 | E28 | MITCHELL | 1701328 | 724838 | 966 | NO | 1207 | 48 | -69 |
| 0403037912 | MIT0516 | 18 | S28 | E28 | MITCHELL | 1700834.35 | 724962.33 | 984 | YES | 1506 | 13.22 | -114.77 |
| 0403015665 | MTD0023 | 30 | S28 | E28 | MT DIABLO | 1699011 | 714837 | 766 | YES | 1620 | -60.23 | -578.12 |
| 0402946794 | OAK0047 | 24 | S28 | E27 | OAKLAND | 1698050 | 718911 | 889 | NO | 1320 | 4 | -421 |
| 0403010555 | OAK0501 | 24 | S28 | E27 | OAKLAND | 1697689 | 719245 | 868 | YES | 1506 | -4.13 | -449.12 |
| 0403010557 | OAK0503 | 24 | S28 | E27 | OAKLAND | 1698056 | 718633 | 889 | NO | 1536 | 9 | -443 |
| 0403010560 | OAK0506 | 24 | S28 | E27 | OAKLAND | 1698786 | 719257 | 903 | NO | 1452 | 93 | -402 |
| 0403038446 | OAK0513 | 24 | S28 | E27 | OAKLAND | 1698111.2 | 719587.15 | 888 | YES | 1489 | 20.03 | -443.96 |
| 0402957400 | PIE0502 | 8 | S29 | E28 | PIERCE | 1705296 | 702016 | 483 | NO | 1365 | -12 | -555 |
| 0402957407 | PIE0509 | 8 | S29 | E28 | PIERCE | 1705952 | 702031 | 476 | NO | 1309 | 28 | -603 |
| 0403047221 | PIE0511 | 8 | S29 | E28 | PIERCE | 1705640.41 | 702439.13 | 479.8 | YES | 1513 | -528.57 | -643.57 |
| 0403047367 | PIE0512 | 8 | S29 | E28 | PIERCE | 1705534.39 | 701812.98 | 474.8 | YES | 1533 | -533.83 | -622.8 |
| 0402966655 | QE_0511 | 31 | S28 | E28 | QUEEN ESTHER | 1699149 | 711269 | 725 | NO | 1487 | -141 | -484 |
| 0402969199 | QE_0513 | 31 | S28 | E28 | QUEEN ESTHER | 1699475 | 711930 | 786 | NO | 1538 | -87 | -669 |
| 0402969585 | QE_0515 | 31 | S28 | E28 | QUEEN ESTHER | 1699453 | 711298 | 752 | NO | 1493 | 1 | -538 |
| 0403033997 | QE_0519 | 31 | S28 | E28 | QUEEN ESTHER | 1699531.3 | 711545.92 | 732 | YES | 1623 | -511.92 | -679.92 |
| 0403049697 | QE_0520 | 31 | S28 | E28 | QUEEN ESTHER | 1699294.81 | 711641.68 | 755 | YES | 1703 | -418.96 | -466.95 |

# Exhbit E-1: Kern River Formation Active Steam Injection Well Summary

| API No. | Well ID | Section | Township | Range | Lease Name | Surface Coordinates[1] X | Surface Coordinates[1] Y | Elevation (feet, amsl)[2] | Directional Drilled | Well Depth[3] (feet) | Top of Perferation (TVDSS)[4] | Bottom of Perferation (TVDSS) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0403050087 | QE_0522 | 31 | S28 | E28 | QUEEN ESTHER | 1698918.64 | 711283.64 | 724.4 | YES | 1680 | -456.78 | -501.78 |
| 0403053617 | QE_0524 | 31 | S28 | E28 | QUEEN ESTHER | 1699362.33 | 710900.82 | 693.8 | YES | 1654 | -453.7 | -547.69 |
| 0402958409 | RAS0227 | 4 | S29 | E28 | RASMUSSEN | 1711784 | 703445 | 461 | NO | 790 | 290 | -211 |
| 0402958684 | RAS0503 | 4 | S29 | E28 | RASMUSSEN | 1710312 | 703690 | 483 | NO | 870 | 318 | -331 |
| 0402960654 | RAS0512 | 4 | S29 | E28 | RASMUSSEN | 1709952 | 703331 | 469 | NO | 950 | 281 | -384 |
| 0402958693 | RAS0518 | 4 | S29 | E28 | RASMUSSEN | 1711952 | 703336 | 454 | NO | 775 | 312 | -212 |
| 0402958558 | RAS0522 | 4 | S29 | E28 | RASMUSSEN | 1709947 | 702967 | 468 | NO | 930 | 258 | -407 |
| 0402958433 | RAS0523 | 4 | S29 | E28 | RASMUSSEN | 1710286 | 702959 | 458 | NO | 905 | 282 | -382 |
| 0402958690 | RAS0524 | 4 | S29 | E28 | RASMUSSEN | 1710611 | 703070 | 457 | NO | 890 | 197 | -365 |
| 0402940384 | RAS0525 | 4 | S29 | E28 | RASMUSSEN | 1710920 | 703069 | 454 | NO | 825 | 214 | -338 |
| 0402940386 | RAS0527 | 4 | S29 | E28 | RASMUSSEN | 1711616 | 703046 | 452 | NO | 785 | 264 | -234 |
| 0403052052 | RAS0535 | 4 | S29 | E28 | RASMUSSEN | 1710755.13 | 703687.09 | 467.8 | YES | 1115 | -290.87 | -300.7 |
| 0403052051 | RAS0536 | 4 | S29 | E28 | RASMUSSEN | 1710369.09 | 703380.27 | 474.8 | YES | 1118 | -333.58 | -353.51 |
| 0403052053 | RAS0537 | 4 | S29 | E28 | RASMUSSEN | 1710607.33 | 703370.82 | 462.3 | YES | 1127 | -267.68 | -337.68 |
| 0402962066 | RAS0703 | 4 | S29 | E28 | RASMUSSEN | 1710288 | 704000 | 494 | NO | 940 | 370 | -317 |
| 0402966589 | RAS0708 | 4 | S29 | E28 | RASMUSSEN | 1711931 | 703985 | 477 | YES | 835 | 327 | -201.47 |
| 0403017545 | REA0504 | 25 | S28 | E27 | REARDON | 1698273 | 716961 | 904 | YES | 1686 | -10.77 | -485.75 |
| 0402957225 | RED0507 | 4 | S29 | E28 | RED BANK | 1711021 | 704640 | 534 | NO | 872 | 340 | -209 |
| 0402953670 | REV0506 | 4 | S29 | E28 | REVENUE | 1711363 | 705622 | 544 | NO | 902 | 382 | -266 |
| 0402953101 | S3_0002-19 | 3 | S29 | E28 | SECTION 3 | 1712310 | 704555 | 497 | NO | 795 | 345 | 320 |
| 0402953102 | S3_0002-20 | 3 | S29 | E28 | SECTION 3 | 1712266 | 704294 | 491.63 | YES | 804 | 340.62 | 317.62 |
| 0402940742 | S3_0005-6 | 3 | S29 | E28 | SECTION 3 | 1713015 | 706824 | 583 | NO | 800 | 383 | 251 |
| 0403055129 | S3_0017-21 | 3 | S29 | E28 | SECTION 3 | 1715276.39 | 704000.37 | 546.2 | YES | 848 | -74.38 | -83.23 |
| 0402944880 | SEN0501 | 31 | S28 | E28 | SENATOR | 1701350 | 711945 | 738 | NO | 1449 | -3 | -607 |
| 0403052054 | SEN0523 | 31 | S28 | E28 | SENATOR | 1700476.15 | 710807.68 | 684 | YES | 1628 | -447.33 | -602.3 |
| 0403052055 | SEN0524 | 31 | S28 | E28 | SENATOR | 1700489.4 | 710846.53 | 684.6 | YES | 1589 | -460.23 | -579.22 |
| 0403041229 | SFK0506 | 10 | S29 | E28 | SANTA FE ENERGY KCL-10 | 1713769.91 | 702111.59 | 450.3 | YES | 886 | 1.72 | -138.87 |
| 0402944241 | SJ_0545 | 5 | S29 | E28 | SAN JOAQUIN | 1704621 | 704141 | 538 | NO | 1139 | 96 | -587 |
| 0402944255 | SJ_0546 | 5 | S29 | E28 | SAN JOAQUIN | 1705007 | 704106 | 530 | NO | 1129 | 130 | -561 |
| 0402952049 | SJ_0557 | 5 | S29 | E28 | SAN JOAQUIN | 1706155 | 707875 | 632 | NO | 1191 | 304 | -473 |
| 0402952077 | SJ_0565 | 5 | S29 | E28 | SAN JOAQUIN | 1705751 | 707551 | 619 | YES | 1219 | 286.83 | -505.92 |
| 0402956371 | SJ_0586 | 5 | S29 | E28 | SAN JOAQUIN | 1704009 | 705981 | 586 | NO | 1272 | 134 | -479 |
| 0402956295 | SJ_0593 | 5 | S29 | E28 | SAN JOAQUIN | 1704270 | 704164 | 543 | NO | 1353 | 70 | -563 |
| 0403048360 | SJ_0597R | 5 | S29 | E28 | SAN JOAQUIN | 1703405.21 | 704042.48 | 521.2 | YES | 1580 | -439.14 | -555.11 |
| 0402956301 | SJ_0599 | 5 | S29 | E28 | SAN JOAQUIN | 1703876 | 703991 | 530 | NO | 1389 | -5 | -542 |
| 0402956302 | SJ_0600 | 5 | S29 | E28 | SAN JOAQUIN | 1704187 | 703971 | 531 | NO | 1362 | 26 | -537 |
| 0402956303 | SJ_0601 | 5 | S29 | E28 | SAN JOAQUIN | 1704533 | 703930 | 535 | NO | 1354 | 248 | -543 |
| 0402956311 | SJ_0609 | 5 | S29 | E28 | SAN JOAQUIN | 1703880 | 703626 | 531 | NO | 1400 | -10 | -525 |
| 0402956320 | SJ_0618 | 5 | S29 | E28 | SAN JOAQUIN | 1702283 | 703391 | 498 | NO | 1457 | -318 | -471 |
| 0402956321 | SJ_0619 | 5 | S29 | E28 | SAN JOAQUIN | 1702592 | 703398 | 511 | NO | 1470 | -292 | -453 |

# Exhbit E-1: Kern River Formation Active Steam Injection Well Summary

| API No. | Well ID | Section | Township | Range | Lease Name | Surface Coordinates[1] X | Surface Coordinates[1] Y | Elevation (feet, amsl)[2] | Directional Drilled | Well Depth[3] (feet) | Top of Perferation (TVDSS)[4] | Bottom of Perferation (TVDSS) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0402956324 | SJ_0622 | 5 | S29 | E28 | SAN JOAQUIN | 1703564 | 703356 | 514 | NO | 1393 | -46 | -597 |
| 0403030935 | SJ_0623R | 5 | S29 | E28 | SAN JOAQUIN | 1703861.87 | 703326.58 | 516 | YES | 1495 | -500.94 | -515.94 |
| 0402956329 | SJ_0627 | 5 | S29 | E28 | SAN JOAQUIN | 1705353 | 703233 | 517 | NO | 1302 | 25 | -582 |
| 0402956330 | SJ_0628 | 5 | S29 | E28 | SAN JOAQUIN | 1705715 | 703322 | 536 | NO | 1295 | 68 | -600 |
| 0402956333 | SJ_0631 | 5 | S29 | E28 | SAN JOAQUIN | 1702266 | 703067 | 494 | NO | 1463 | -356 | -491 |
| 0402956334 | SJ_0632 | 5 | S29 | E28 | SAN JOAQUIN | 1702630 | 703035 | 498 | NO | 1462 | -333 | -477 |
| 0402956335 | SJ_0633 | 5 | S29 | E28 | SAN JOAQUIN | 1702962 | 703054 | 498 | NO | 1447 | -296 | -462 |
| 0402956336 | SJ_0634 | 5 | S29 | E28 | SAN JOAQUIN | 1703261 | 703061 | 492 | NO | 1421 | -82 | -637 |
| 0402956337 | SJ_0635 | 5 | S29 | E28 | SAN JOAQUIN | 1703566 | 703041 | 502 | NO | 1401 | -60 | -618 |
| 0402956338 | SJ_0636 | 5 | S29 | E28 | SAN JOAQUIN | 1703918 | 703006 | 507 | NO | 1387 | -30 | -569 |
| 0403030937 | SJ_0637R | 5 | S29 | E28 | SAN JOAQUIN | 1704312.93 | 703018.61 | 507 | YES | 1527 | -456.99 | -506.99 |
| 0403030939 | SJ_0639R | 5 | S29 | E28 | SAN JOAQUIN | 1705009.13 | 703065.37 | 511 | YES | 1435 | -486.98 | -595.98 |
| 0402956342 | SJ_0640 | 5 | S29 | E28 | SAN JOAQUIN | 1705301 | 703003 | 520 | NO | 1329 | 35 | -632 |
| 0402956343 | SJ_0641 | 5 | S29 | E28 | SAN JOAQUIN | 1705666 | 702979 | 525 | NO | 1294 | 87 | -575 |
| 0402961749 | SJ_0646 | 5 | S29 | E28 | SAN JOAQUIN | 1705266 | 702802 | 507 | YES | 1354 | 19.78 | -611.16 |
| 0402969948 | SJ_0651 | 5 | S29 | E28 | SAN JOAQUIN | 1705255 | 703607 | 526.72 | NO | 1286 | 92.72 | -553.28 |
| 0403017576 | SJ_0657 | 5 | S29 | E28 | SAN JOAQUIN | 1702224 | 703994 | 512 | YES | 1517 | -297.98 | -441.98 |
| 0403018631 | SJ_0658 | 5 | S29 | E28 | SAN JOAQUIN | 1702915 | 704003 | 526.33 | NO | 1524 | -63.67 | -389.67 |
| 0403041672 | SJ_0662 | 5 | S29 | E28 | SAN JOAQUIN | 1703334.18 | 703976.89 | 519.7 | YES | 1822 | -46.54 | -212.81 |
| 0403041673 | SJ_0663 | 5 | S29 | E28 | SAN JOAQUIN | 1703078.91 | 703651.93 | 506.1 | YES | 1647 | -140.23 | -240.44 |
| 0403043954 | SJ_0664 | 5 | S29 | E28 | SAN JOAQUIN | 1704356.47 | 705467.51 | 579.6 | YES | 1573 | -440.49 | -512.47 |
| 0403043955 | SJ_0665 | 5 | S29 | E28 | SAN JOAQUIN | 1704319.24 | 705210.04 | 581.3 | YES | 1541 | -412.18 | -515.17 |
| 0403044323 | SJ_0667 | 5 | S29 | E28 | SAN JOAQUIN | 1706346.07 | 707692.45 | 630.6 | YES | 1459 | -442.79 | -495.37 |
| 0403048364 | SJ_0668 | 5 | S29 | E28 | SAN JOAQUIN | 1704088.66 | 704906.2 | 556.6 | YES | 1574 | -448.64 | -486.62 |
| 0403049070 | SJ_0670 | 5 | S29 | E28 | SAN JOAQUIN | 1702904.53 | 703043.89 | 497.5 | YES | 1624 | -433.21 | -644.18 |
| 0403049071 | SJ_0671 | 5 | S29 | E28 | SAN JOAQUIN | 1702870.81 | 703437.62 | 512.7 | YES | 1665 | -511.57 | -640.56 |
| 0403049324 | SJ_0673 | 5 | S29 | E28 | SAN JOAQUIN | 1702656.44 | 703710.64 | 516.9 | YES | 1662 | -522.4 | -635.39 |
| 0403042937 | SOV0505 | 31 | S28 | E28 | SOVEREIGN | 1704257.57 | 711072.54 | 718.3 | YES | 1506 | -449.96 | -513.52 |
| 0403042939 | SOV0507 | 31 | S28 | E28 | SOVEREIGN | 1704032.54 | 711036.39 | 724.1 | YES | 1505 | -466.64 | -555.57 |
| 0403042940 | SOV0508 | 31 | S28 | E28 | SOVEREIGN | 1703712.71 | 710927.53 | 732.3 | YES | 1548 | -487.69 | -608.34 |
| 0402942593 | ST_0505 | 31 | S28 | E28 | STERLING | 1703576 | 711312 | 761 | NO | 1362 | 213 | -549 |
| 0402944834 | ST_0508 | 31 | S28 | E28 | STERLING | 1703319 | 712980 | 761 | NO | 1362 | 213 | -517 |
| 0402944836 | ST_0514 | 31 | S28 | E28 | STERLING | 1703288 | 712239 | 779 | NO | 1391 | 192 | -503 |
| 0402944808 | ST_0517 | 31 | S28 | E28 | STERLING | 1701658 | 711945 | 750 | NO | 1431 | 14 | -590 |
| 0402944823 | ST_0519 | 31 | S28 | E28 | STERLING | 1702372 | 711913 | 754 | NO | 1416 | 168 | -566 |
| 0402944813 | ST_0526 | 31 | S28 | E28 | STERLING | 1701978 | 711297 | 720 | NO | 1442 | 145 | -586 |
| 0403000413 | ST_0544 | 31 | S28 | E28 | STERLING | 1702299 | 711292 | 746 | NO | 1445 | 168 | -609 |
| 0403054839 | ST_0551 | 31 | S28 | E28 | STERLING | 1702520.01 | 711671.01 | 733.8 | YES | 1659 | -537.46 | -572.46 |
| 0403054840 | ST_0552 | 31 | S28 | E28 | STERLING | 1702538.94 | 711647.52 | 733.7 | YES | 1604 | -517.71 | -587.7 |
| 0403054841 | ST_0553 | 31 | S28 | E28 | STERLING | 1701975.79 | 711694.7 | 756.7 | YES | 1646 | -551.1 | -591.1 |

Exhbit E-1: Kern River Formation Active Steam Injection Well Summary

| API No. | Well ID | Section | Township | Range | Lease Name | Surface Coordinates[1] X | Surface Coordinates[1] Y | Elevation (feet, amsl)[2] | Directional Drilled | Well Depth[3] (feet) | Top of Perferation (TVDSS)[4] | Bottom of Perferation (TVDSS) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0403054842 | ST_0554 | 31 | S28 | E28 | STERLING | 1702448.44 | 711262.35 | 751.1 | YES | 1651 | -527.21 | -597.2 |
| 0403054843 | ST_0555 | 31 | S28 | E28 | STERLING | 1701738.45 | 711565.95 | 753.8 | YES | 1676 | -574.31 | -594.31 |
| 0403054844 | ST_0556 | 31 | S28 | E28 | STERLING | 1701999.31 | 711933.25 | 802.8 | YES | 1659 | -532.17 | -592.17 |
| 0403051411 | STP0502 | 34 | S28 | E28 | STEPHENS | 1716700.57 | 709135.08 | 659.4 | YES | 689 | 339.4 | 201.4 |
| 0403051412 | STP0503 | 34 | S28 | E28 | STEPHENS | 1716994.04 | 709113.87 | 659.5 | YES | 714 | 360.51 | 227.51 |
| 0403051413 | STP0504 | 34 | S28 | E28 | STEPHENS | 1716693.93 | 708784.13 | 656.8 | YES | 727 | 346.8 | 190.8 |
| 0403051414 | STP0505 | 34 | S28 | E28 | STEPHENS | 1717063.97 | 708779.58 | 657.7 | YES | 719 | 367.7 | 37.72 |
| 0403051416 | STP0507 | 34 | S28 | E28 | STEPHENS | 1717098.5 | 708420.13 | 625.8 | YES | 722 | 315.8 | 183.8 |
| 0402944903 | SYC0511 | 31 | S28 | E28 | SYCAMORE | 1701342 | 712299 | 776 | NO | 1496 | -8 | -604 |
| 0402968030 | SYC0516 | 31 | S28 | E28 | SYCAMORE | 1701008 | 712361 | 774 | NO | 1463 | 42 | -610 |
| 0403055243 | SYC0524 | 31 | S28 | E28 | SYCAMORE | 1701393.67 | 712495.12 | 788.4 | YES | 1632 | -565.03 | -614 |
| 0403055244 | SYC0525 | 31 | S28 | E28 | SYCAMORE | 1701341.47 | 712569.83 | 789.3 | YES | 1732 | -552.1 | -604.03 |
| 0403055338 | SYC0526 | 31 | S28 | E28 | SYCAMORE | 1701236.65 | 712598.03 | 788.7 | YES | 1675 | -583.7 | -598.7 |
| 0402967286 | TEJ0510 | 36 | S28 | E27 | TEJON | 1697569 | 711039 | 696 | NO | 1544 | -287 | -464 |
| 0403028605 | TEJ0518R | 36 | S28 | E27 | TEJON | 1698236.88 | 713023.2 | 716 | YES | 1663 | -251.99 | -480.97 |
| 0403003055 | TEJ0522 | 36 | S28 | E27 | TEJON | 1698124 | 712524 | 777 | YES | 1626 | -154.45 | -467.2 |
| 0403003058 | TEJ0525 | 36 | S28 | E27 | TEJON | 1697922 | 712319 | 769 | NO | 1677 | -154 | -487 |
| 0403033212 | TEJ0534 | 36 | S28 | E27 | TEJON | 1697886.86 | 713045.79 | 751 | YES | 1592 | -471.95 | -496.95 |
| 0403033213 | TEJ0535 | 36 | S28 | E27 | TEJON | 1697989.96 | 712580.53 | 775 | YES | 1602 | -447.56 | -496.54 |
| 0403034102 | TEJ0537 | 36 | S28 | E27 | TEJON | 1698340.81 | 712337.73 | 730 | YES | 1592 | -172.86 | -513.38 |
| 0403038182 | TEJ0538 | 36 | S28 | E27 | TEJON | 1698374.33 | 710783.06 | 670.9 | YES | 1612 | -401.44 | -481.43 |
| 0403049694 | TEJ0540 | 36 | S28 | E27 | TEJON | 1698732.74 | 712034.53 | 690 | YES | 1645 | -437.09 | -481.07 |
| 0403049695 | TEJ0541 | 36 | S28 | E27 | TEJON | 1698758.69 | 711721.69 | 690.3 | YES | 1645 | -439.55 | -493.53 |
| 0403049696 | TEJ0543 | 36 | S28 | E27 | TEJON | 1698757.76 | 711025.35 | 702.5 | YES | 1690 | -476.69 | -514.69 |
| 0402957408 | TM_0500 | 8 | S29 | E28 | TARR & MCCOMB | 1704618 | 702387 | 494 | NO | 1407 | -36 | -591 |
| 0402957411 | TM_0503 | 8 | S29 | E28 | TARR & MCCOMB | 1704353 | 701691 | 480 | NO | 1453 | -289 | -438 |
| 0402957413 | TM_0505 | 8 | S29 | E28 | TARR & MCCOMB | 1704324 | 701310 | 471 | NO | 1465 | -309 | -458 |
| 0403011217 | USA0500 | 18 | S28 | E28 | USA | 1701777 | 724489 | 1083 | YES | 1339 | -47.67 | -61.67 |
| 0403011218 | USA0501 | 18 | S28 | E28 | USA | 1701713 | 724162 | 1062 | NO | 1319 | -51 | -74 |
| 0403011219 | USA0502 | 18 | S28 | E28 | USA | 1702059 | 724509 | 1071 | NO | 1322 | -26 | -46 |
| 0403011220 | USA0503 | 18 | S28 | E28 | USA | 1702172 | 724292 | 1038 | YES | 1289 | -32.35 | -49.31 |
| 0403011221 | USA0504 | 18 | S28 | E28 | USA | 1702156 | 723857 | 1012 | NO | 1262 | -43 | -56 |
| 0403011222 | USA0505 | 18 | S28 | E28 | USA | 1702538 | 724477 | 1037 | NO | 1250 | 141 | -51 |
| 0403011223 | USA0506 | 18 | S28 | E28 | USA | 1702536 | 724132 | 1063 | NO | 1262 | 134 | -123 |
| 0403011224 | USA0507 | 18 | S28 | E28 | USA | 1701758 | 723870 | 1032 | NO | 1290 | -62 | -81 |
| 0403039543 | USA0508 | 18 | S28 | E28 | USA | 1702936.37 | 724831.81 | 1062.5 | YES | 1437 | 129.57 | 32.58 |
| 0403039544 | USA0509 | 18 | S28 | E28 | USA | 1702927.41 | 724113.15 | 1084.8 | YES | 1517 | 116.86 | -12.13 |
| 0403043859 | USA0510 | 18 | S28 | E28 | USA | 1701762.86 | 724890.17 | 1031.8 | YES | 1510 | -34.6 | -51.58 |
| 0403043860 | USA0511 | 18 | S28 | E28 | USA | 1702052.75 | 724740.09 | 1060.6 | YES | 1510 | -17.19 | -31.19 |
| 0403043861 | USA0512 | 18 | S28 | E28 | USA | 1702536.03 | 724838.31 | 1062.2 | YES | 1469 | 112.24 | -17.76 |

## Exhbit E-1: Kern River Formation Active Steam Injection Well Summary

| API No. | Well ID | Section | Township | Range | Lease Name | Surface Coordinates[1] X | Surface Coordinates[1] Y | Elevation (feet, amsl)[2] | Directional Drilled | Well Depth[3] (feet) | Top of Perferation (TVDSS)[4] | Bottom of Perferation (TVDSS) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0403043862 | USA0513 | 18 | S28 | E28 | USA | 1702963.64 | 724430.44 | 1098.9 | YES | 1511 | 123.46 | 18.53 |
| 0403041676 | USL0510R | 24 | S28 | E27 | USL | 1698658.8 | 720411.28 | 930.5 | YES | 1722 | -277.71 | -406.71 |
| 0403040484 | USL0528 | 24 | S28 | E27 | USL | 1698711.45 | 720346.8 | 930 | YES | 1533 | -251.71 | -388.71 |
| 0402944838 | VES0502 | 31 | S28 | E28 | VESTA | 1702273 | 712970 | 782 | NO | 1414 | 179 | -533 |
| 0402900198 | VES0503 | 31 | S28 | E28 | VESTA | 1702609 | 712947 | 743 | NO | 1443 | 183 | -556 |
| 0402944745 | VES0505 | 31 | S28 | E28 | VESTA | 1701953 | 712623 | 779 | NO | 1509 | 156 | -595 |
| 0402946041 | VES0506 | 31 | S28 | E28 | VESTA | 1702312 | 712630 | 816 | NO | 1477 | 183 | -539 |
| 0402944905 | VES0507 | 31 | S28 | E28 | VESTA | 1702651 | 712620 | 734 | NO | 1365 | 174 | -538 |
| 0402940532 | VES0508 | 31 | S28 | E28 | VESTA | 1702938 | 712613 | 727 | NO | 1308 | 227 | -531 |
| 0402944839 | VES0509 | 31 | S28 | E28 | VESTA | 1701672 | 712284 | 767 | NO | 1487 | 113 | -597 |
| 0402944840 | VES0510 | 31 | S28 | E28 | VESTA | 1702022 | 712260 | 818 | NO | 1509 | 136 | -567 |
| 0402956610 | VES0514 | 31 | S28 | E28 | VESTA | 1702661 | 712228 | 722 | NO | 1357 | 188 | -553 |
| 0402979786 | VES0515 | 31 | S28 | E28 | VESTA | 1701989 | 712750 | 771 | YES | 1490 | 45.6 | -574.46 |
| 0403054845 | VES0516 | 31 | S28 | E28 | VESTA | 1702073.37 | 712152.31 | 818.4 | YES | 1720 | -529.31 | -574.31 |
| 0403055247 | VES0517 | 31 | S28 | E28 | VESTA | 1702818.93 | 712908.55 | 739.5 | YES | 1551 | -481.22 | -538.21 |
| 0403058330 | WES0334R | 24 | S28 | E27 | WESTATES | 1697399.54 | 718837.83 | 868.4 | YES | 1712 | -256.99 | -445.99 |
| 0403010551 | WES0500 | 24 | S28 | E27 | WESTATES | 1697372 | 718626 | 881 | NO | 1441 | -9 | -449 |
| 0403010553 | WES0502 | 24 | S28 | E27 | WESTATES | 1697702 | 718632 | 876 | YES | 1501 | 0.72 | -354.04 |
| 0403049208 | WES0503 | 24 | S28 | E27 | WESTATES | 1697001.1 | 719375.7 | 865.2 | YES | 1676 | -290.87 | -453.86 |
| 0403055132 | WES0504 | 24 | S28 | E27 | WESTATES | 1697037.25 | 718936.93 | 847.7 | YES | 1628 | -290.45 | -456.44 |
| 0403055133 | WES0505 | 24 | S28 | E27 | WESTATES | 1697116.02 | 719731.84 | 871.6 | YES | 1627 | -238.03 | -454.01 |
| 0403055134 | WES0506 | 24 | S28 | E27 | WESTATES | 1697392.22 | 719329.53 | 880.9 | YES | 1621 | -268.12 | -450.11 |
| 0403055248 | WES0507 | 24 | S28 | E27 | WESTATES | 1697438.61 | 719596.11 | 893.3 | YES | 1602 | -270.68 | -454.68 |
| 0402986928 | WLM0804 | 20 | S28 | E28 | WILMAR | 1705905 | 721441 | 985 | NO | 1010 | 239 | 97 |

**Notes**

[1] North American Datum, 1927

[2] above mean sea level

[3] Depth measured along the casing length.

[4] True vertical depth relative to mean sea level

# Exhibit E-2: Station 36 Produced Water/Injectate Water Quality

| Constituent | Units | Influent Result | Effluent Result |
|---|---|---|---|
| Sodium | mg/l[(a)] | 125 | 113 |
| Potassium | mg/l | 5.5 | 5.8 |
| Magnesium | mg/l | 5.3 | 5.6 |
| Calcium | mg/l | 30.8 | 27.4 |
| Strontium | mg/l | 0.5 | 0.3 |
| Barium | mg/l | 0.1 | 0.1 |
| Iron | mg/l | 3.9 | 3.5 |
| Manganese | mg/l | 0.1 | 0.1 |
| Lead | mg/l | ND[(b)] | NA[(c)] |
| Zinc | mg/l | ND | NA |
| Chloride | mg/l | 123.8 | 112 |
| Sulfate | mg/l | 34.1 | 1.7 |
| Borate | mg/l | ND | NA |
| Fluoride | mg/l | ND | NA |
| Bromide | mg/l | ND | NA |
| Nitrite($NO_2$) | mg/l | ND | NA |
| Nitrate($NO_3$) | mg/l | ND | NA |
| Phosphate | mg/l | 0.2 | NA |
| Silica | mg/l | 89.2 | 68.2 |
| Bicarbonate ($HCO_3$) | mg/l | 254 | NA |
| Carbonate ($CO_3$) | mg/l | ND | NA |
| Hydroxide (OH) | mg/l | ND | NA |
| pH | pH Units | 6.7 | 6.7 |
| EC[(d)] | µmhos/cm[(e)] | 1,100 | 7,181 |
| TDS[(f)] | mg/l | 583 | 614 |
| Initial Temperature | F[(g)] | 250 | 80 |
| Final Temperature | F | 136 | NA |

**Notes:**
(a) mg/l - milligrams per liter.
(b) ND - not detected.
(c) NA - not analyzed.
(d) EC - electrical conductivity.
(e) µmhos/cm - micromhos per centimeter.
(f) TDS - total dissolved solids.
(g) F - degrees Farenheit.

# Appendix F

CalGEM Memorandum, Water Well Capture Radius Analysis Update, Kern River Aquifer Exemption, 22 March 2019

California
Department of Conservation
Division of Oil, Gas, & Geothermal Resources

Gavin Newsom, Governor
David Bunn, Director

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# MEMORANDUM

**DATE:** March 22, 2019

**TO:** Cameron Campbell
Inland District Deputy,
Division of Oil, Gas, and Geothermal Resources (DOGGR)

**FROM:** Jimmy Schloss, P.G. (No. 9464)
Assoc. Oil & Gas Engineer, DOGGR

William Long
Supervising Oil & Gas Engineer, DOGGR

Matthew Van Grinsven
Assoc. Oil & Gas Engineer, DOGGR

**SUBJECT:** Water Well Capture Radius Analysis Update, Kern River Aquifer Exemption

## Objective

The objective of this memorandum is to provide an update to previous capture radius calculations and to perform capture radius calculations for wells not previously identified in the January 2017 Kern River aquifer exemption application. This memorandum serves an update to the original dated 12/18/2018.

## Conclusions

The following are conclusions from this evaluation:

1. Thirty-year (30) fixed capture 2D radius calculations were made for sixty-seven (67) water wells in or near the Kern River Aquifer Exemption Area. Capture radius intrusion into the proposed Aquifer Exemption is observed in two (2) water wells.
2. Application of fixed capture 2D radius calculations to vertically separated geological zones significantly increases the certainty of hydraulic isolation.

Gavin Newsom, Governor
David Bunn, Director

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## Recommendations

The following recommendations are given for this evaluation:

1. Reduce the proposed Aquifer Exemption area to a three-hundred (300) feet offset from the 30-year capture rate boundary in water wells which have capture potential and honoring primacy area. These water wells include Z, 11, AA, Y, 9, 15, and X (Figures 1, 4.1, 4.2, 4.3, 5.1, 5.2, 5.3). The 30-year calculated capture radius should be used in water well 23 (Figures 4.3, 5.3).
2. Do not make additional analytical calculations with fixed capture rate equations for hydraulic isolation determination.

## Discussion

Capture radius calculations have been performed multiple times for the Kern River aquifer exemption (KRAE), but each iteration lacked coverage for all water wells identified in the study area and/or did not have alignment on the correct input variables of the model. Examples of this includes the capture radius analysis and supporting documentation from the January 2017 aquifer exemption application, and numerous discussions between DOGGR and the State Water Board (SWB) and Regional Water Quality Board (RWQB) for the past two years.

## Water Wells and Completion Information

The most up to date water well search is shown in Figure 1 and Table 1. The water well search was performed using a combination of Division of Water Resource (DWR) water well completion reports, Kern County Environmental Health (KCEH) water well completion reports, GeoTracker GAMA, and field reconnaissance. The water well search has been iterative over the past two years between DOGGR, the SWB, and RWQB such that some water wells have been removed once they have been determined to be inactive and or destroyed.

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The 67 wells of the Kern River Water Well Survey can be divided into the following categories. Figure 2 conceptually illustrates the water well categories.

A. *Wells penetrating or with high probability for hydraulic connection to the proposed aquifer exemption interval.* Three wells are noted in orange on Figure 1. Limited water well construction data and a close three-dimensional proximity to the expansion interval create uncertainty for the hydraulic connectivity for these wells with the oil bearing interval. Steam is injected into this formation and isolation is empirically proven by the lack of steam production from the water wells.
B. *Wells in the shallower, A and/or B Kern River Interval.* Thirty wells are noted in blue on Figure 1. These water wells are completed in the shallowest portions of the Kern River Formation which is not currently considered for exemption expansion. These wells are stratigraphically isolated from the exemption expansion interval with an average vertical separation of 1,484 feet which includes packages of low permeability geological materials such as silts and clays. These water wells are hydraulically isolated from the hydrocarbon bearing portion and producing interval of the Kern River formation. Steam is injected into this formation and isolation is empirically proven by the lack of steam production from the water wells.
C. *Wells in shallow perched aquifer laterally separated from the exemption interval*. Twenty-one water wells are noted in yellow on Figure 1. These wells are in shallow perched aquifers laterally separated from the exemption expansion interval and can be stratigraphically equivalent or deeper than the oil-bearing exemption expansion interval.
D. *Wells in shallow perched aquifer vertically above the current exemption interval*. Thirteen wells are noted in purple on Figure 1. Though some of these water wells are completed within the currently exempt interval of the Kern River Formation, they are hydraulically isolated from the oil bearing and producing interval into which steam is injected.

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These four categories are further discussed in the draft water well write up shared with the SWB and RWQCB on October 3, 2018.

## Method

The equation used in this analysis is the same as that of previous analysis provided in the January 2017 aquifer exemption application. The calculated fixed radius equation by the United States Environmental Protection Agency (US EPA) was again used and is outlined as follows:

$$r_t = \left(\frac{Qt}{\pi\phi h}\right)^{1/2}$$

where $r_t$ = capture radius, Q = pumping rate, *t* = time of travel threshold, $\phi$ = effective porosity, *h* = open interval or length of well screen (Equation 4.2: US EPA, 1994).

## Analysis

### *Effective Porosity*

The effective porosity in this analysis remains at 22% and has not changed from the original capture analysis. Please refer to the Kern River aquifer exemption from January 2017 for this documentation and other data.

### *Interval Length*

Previous capture analysis assumed interval length (*h*) was equivalent to the length of the water well screens. The minimum screen length of forty (40) feet is assumed in wellbores without documentation. However, these assumptions may not fully reflect the capture potential from a water well since the saturated thickness of the aquifer and other well construction details such as gravel pack could also influence the capture potential. In addition, per the 11/29/2018 meeting discussion, the interval (h) was interpreted to assume that a water well was fully penetrating the aquifer it was

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completed in or that the screen length would fully penetrate the aquifer. In order to properly address these concerns, DOGGR re-evaluated the open interval in the water wells with the following considerations.

1. All water wells in the study area are completed in the upper portions of the Kern River formation / Kern River aquifer.
2. All of the gravel pack is completed above the static water levels. This is important because the gravel pack allows for the well to be hydraulically connected everywhere it is present and not just across the screened interval.
3. The open interval (*h)* was determined through from the static water level to base of screened interval.

Static water levels were obtained from the Spring 2017 Kern River aquifer water table/potentiometric surface map published by the Kern County Water Agency Map (KCWA 2018, pg 70). The water level elevations overlie most of water wells and the study area. Water level elevations were interpolated by georeferencing the KCWA map in ArcMap and inferring the water levels. Water level elevations where the map did not extend were inferred by extending the contour lines. Figure 3 and Table 1 show a summary of the Spring 2017 water level elevations in each of the water wells.

## *Time of Travel*

Calculations use both 10 years and 30 years for the capture radius calculations. However, the 10-year travel time is likely the most appropriate for use. The California Department of Health Services (DHS) has specified recommendations for the evaluation of groundwater protection such as the Drinking Water Source Assessment and Protection Program (DWSAP) which defines ground water zones based on time of travel. The DWSAP document has adapted the usage of the US EPA’s fixed calculated radius method, among other methods, for the appropriate analysis for groundwater protection. DHS defines the zone of capture (ZOC) essentially as the potential for well capture in a specified time of travel criterion. A maximum ZOC of 10 years has been applied to this analysis. This assumption of 10 years assumes that a well is pumped

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continuously for the given 10-year period, which is itself a conservative assumption. More commonly, pumps are used infrequently and on demand for domestic water needs.

### *Pumping Rates*

The pumping rate for each water well was re-visited in this capture analysis and updated for municipal wells based on measured water demand provided by the State Water Board. Pumping rates were determined using the information available to DOGGR that is based on measured water demand volumes. Pumping rates were maintained from the previous capture analysis where new information was not available.

Pumping rates for wells in the previous analysis were cited based on a combination of values taken from water well completion reports and numbers cited by owners. These pumping rates do not appear to reflect the actual water demand and actual pumping rates.

The Oildale Mutual Water Company (OMWC) is the primary water supplier in the study area and public documents were used to determine water demand. The OMWC has two primary customer populations located in the communities of Oildale and Shafter (OMWC 2010). The water demand in this investigation focused on the water provided to the "Oildale Service Area" which serves a population of approximately 32,374 as of 2009 (OMWC 2010). The OMWC cites that its 2010 water use in the "Oildale Service Area" was 0.88 acre-feet per connection (OMWC 2010, pg. 7).

It should be noted that the OMWC does not rely on groundwater as a primary resource for the "Oildale Service Area". The OMWC did rely on groundwater from wells in the "Oildale Service Area" in the past up until 1977 (OMWC 2010). However, "reliance on groundwater as a primary resource contributed to progressive decline in the regional water table (OMWC 2010, pg. 17)". The OMWC relies on imported water from the State Water Project and the North of the River Municipal Water District to supply over 95% of

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its total system requirements (OMWC 2010). Groundwater reliance is so minimal that the OMWC did not even pump groundwater for the Oildale Sub Basin in 2015 (OMWC 2015).

The OMWC uses a small volume of groundwater and the pumping rate in this assessment is based on projected groundwater demand for the "Oildale Service Area". Table 19 (OMWC 2010, pg. 21) highlights the projected groundwater demand from the Oildale Sub Basin from 2015 to 2030 and averages 585 acre-feet per year which is equivalent to 362 gallons per minute (gpm).

The pumping rate for domestic water wells was determined through the following assumptions. As previously stated, water use in the "Oildale Service Area" was 0.88 acre-feet per connection (OMWC 2010, pg. 7). This is equivalent to a pumping rate of 0.55 gpm. This water demand services an urban population that may not reflect the water demand for homeowners who own private domestic water wells in the study area.

The California Water Well Standards cites typical domestic water well pumping rates based on demand where "[…] a well supplying one to three gallons per minute is a reasonable amount for a single-family dwelling (DWR, 1981, 1990). In order to reflect these cited water demands, **2 gpm** was assumed to be the pumping rate for all domestic water wells in the study area.

It should be noted that the original capture analysis used a pumping rate of 10 gpm. This original pumping rate was used as a conservative measure and does not reflect the water cited water demands in this area from OMWC (OMWC 2010) and those in the California Water Well Standards (DWR, 1981, 1990). A total of twelve (12) active wells owned and operated by Oildale Mutual Water Company (OMWC) were identified in the water well study area.

The OMWC pumping rates were revised in this capture radius analysis. A pumping rate of 30 gpm per OMWC municipal water well was used in the 12/21/18 capture radius

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calculations. However, new measured water demand from active water wells was used in this analysis using data from 2013 to 2017. This data showed that the OMWC had up to 5 active water wells with an average annual water demand of 175.6 Acre-feet between 2013 to 2017. The 175.6 Acre-feet water demand was divided evenly among the 5 active water wells for a pumping rate of **109 gpm**. The OMWC measured water demand and pumping rates are summarized in Table 3.

The estimates for OMWC may be over-conservative. Only 5 OMWC water wells were active whereas a total of 13 OMWC water wells exist in the study area. At least 7 of the wells identified in this study were unused since 2013. As a conservative measure, a pumping rate of 109 gpm was assumed and used in the revised capture radius calculations for all OMWC wells. Caution must be exercised because it is unknown which wells were active.

Pumping rates for other municipal wells in the study area were also updated using information provided from the State Water Board. The 12/21/2018 had previously assumed a representative 2 gpm multiplied by the cited number of service connections in the Safe Drinking Water Information System (SDWIS). Table 3 was updated to reflect the revised pumping rates for municipal water wells and summarizes the pumping rates which were used in the updated capture radius calculations. Updates include pumping rates for Meadows of Kern Mutual Water Company, Uplands of the Kern Mutual Water Company, and Ranchos Del Rio Mutual Water Company. Note that the most recent water demand data from 2013 to 2017 shows that Ranchos Rio Equestrian Center was inactive. However, a pumping of 73 gpm was selected for this water well based on the equivalent water demand of the Ranchos Del Rio Mutual Water Company.

### *Combined Pumping Effects*

January 2019 correspondence between DOGGR and the State Water Board identify three groups of wells which may benefit from further analysis on the cumulative impacts of well pumping and capture analysis. These wells are wells 2 & 3, 16 & 17, and J & H.

Wells 2 & 3 cover a small area, have minimal overlap, and are completely within the current exemption area where there is no proposed expansion. Because of this, analysis of the cumulative impact is not necessary. For Wells 16 & 17, the capture area is small, and already has a 300-foot buffer applied. Furthermore Wells 15 and 9 are closer to the proposed exemption area and we have recommended to decrease the proposed expansion areas near these wells. For these reasons, an analysis of the cumulative impact is not necessary. Wells J & H are far from the exemption area and separated from the exemption area by the Kern River and well Y's capture area setback.

For discussion purposes, the combined pumping effects for two water wells were evaluated in this revised capture analysis. Water wells H and J are in relatively close proximity to one another and are classified as being completed in the shallow, perched aquifer but laterally separated from the proposed exemption (Classification C in the Water Well Completion Information Section above). A simplistic approach was taken to consider the combined pumping effects from these water wells which took combines the individual 10 and 30-year travel times in the capture radii at a common mid-point location between the water wells. This is discussed in further detail in the next section.

## Capture Radius Summary

### *Individual Capture Radius*

The calculated capture radius for all water wells in the study area are summarized in Tables 1 and 2. The capture radii are also shown visually in Figures 4.1, 4.2, 4.3, and 4.4 where 10-year travel times radii are shown in black and 30-year travel times are shown in red.

Overall, the capture radii are minimal whether the travel time is 10 years or 30 years. There are a few wells with capture radii that intersect the lateral extent of the proposed KRAE boundary (Figures 3.1, 3.2 and Tables 1, 2. It is recommended that the Aquifer Exemption boundary near water well Z be modified to provide for a buffer distance not

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less than two-hundred feet from the capture radii. Water wells 9 and 11 are not as likely completed in the proposed KRAE but the same buffer distance is recommended.

Other areas where capture radii intersect the KRAE occur in Sections 17 and 18 (T29S, R28E); however, these capture radii intersect the 1973 hydrocarbon exempt area which has been exempted for the past 45 years.

There is some apparent overlap of capture analysis areas for water wells completed in the A & B zones that are vertically above the proposed KRAE (Figure 4.3 and Tables 1, 2). It should be noted that the capture radii for these water wells only appears to cut into the proposed aquifer exemption boundary. The A & B zones have a high degree of vertical separation from the deeper oil-bearing portion of the Kern River aquifer exemption and are hydraulically isolated from any oil-bearing portions of the Kern River formation with packages of low permeability siltstones and shales. This is discussed in more detail in the writeup shared with the SWB and CVRWQCB on October 3, 2018.

Although the capture analysis for these wells appear to overlap, it is hard to justify the need for further analysis such as transient state equations, numerical modeling, etc. because these water wells are hydraulically isolated from the proposed exemption area and will not be impacted (see draft water well write up shared with the SWB and CVRWQCB on October 3, 2018).

### *Combined Pumping Effects*

The combined pumping effects for water wells H and J can be found in Tables 1, 2 and Figures 4.2, 5.2. The 10 and 30-year travel time combined capture radius is equal to 271 feet and 469 feet, respectively. The combined capture radius for water wells H and J does not encroach upon the proposed exemption area.

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## Cutout Areas

The revised capture radius calculations resulted in a larger capture radius for water well Y (Tables 1, 2 and Figure 4.3). To ensure protection for water well Y, the proposed exemption area should be cutout to an area equal to the capture radius.

In addition, despite the outlined calculated capture radii for the water wells (Tables 1, 2 and Figures 4.1 – 4.4), DOGGR nevertheless recommends cutting out portions of the proposed aquifer exemption boundary in order to ensure safety for certain water wells including Z, 11, 9, 15, and X (Table 2). The following rationale explains the recommended exemption cut out for these water wells.

Underground injection control (UIC) projects for steam flood currently use the Neuman equation for zone of endangering influence (ZEI) calculations to evaluate how far steam can migrate in the oil-bearing portions of the Kern River formation. Several Kern River field UIC steam flood projects use ZEIs of approximately three hundred (300) feet.

In order to provide the maximum safety to the water wells of concern, the largest possible value was selected between the calculated capture radius and the 300-foot buffer distance. The 300-foot buffer distance value was greater than all the 30-year capture radii for water wells Z, 11, 9, 15, and X (Table 2). The 30-year calculated capture radius was the largest for water well 23 (Table 2). Using these values, cutout recommendations were applied to the proposed exemption area. The proposed aquifer exemption cutout areas are shown in Figures 5.1, 5.2, and 5.3.

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**Table 1, KRAE Water Wells Capture Radii, 10 Year Travel Time - Revised**

| Map ID | T | R | Sec | LAT_Y | LON_X | Water Well Type | Compl. Depth (ft) | Compl. Depth EL (ft) | Top Perf. (ft) | Bottom Perf. (ft) | Screen Length (ft) | Ground EL (ft) | Spring '17 Water Level EL (ft) | Sat. Thickness, b (ft) | Over HC Zone? | Q (gpm) | $\phi$e (%) | t (years) | $r_t$ (feet) | Oil Zone Comment | Water Well Owner |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 29S | 28E | 6 | 35.440698 | -119.013290 | Domestic | 750 | -158 | 600 | 750 | 150 | 592 | 302 | 460 | No | 2 | 22% | 10 | 66 | TD Above Oil Zone | Dexzel Inc. |
| 2 | 29S | 28E | 2 | 35.436807 | -118.942442 | Domestic | 273 | 211 | 173 | 273 | 100 | 484 | 422 | 211 | Yes | 2 | 22% | 10 | 98 | Inside 73-74 AE and screened interval v | John Wilson |
| 3 | 29S | 28E | 2 | 35.435682 | -118.942218 | Domestic | 170 | 323 | 70 | 170 | 100 | 493 | 421 | 98 | No | 2 | 22% | 10 | 144 | Inside 73-74 AE, TD Above Oil Zone | Roger Hatch |
| 4 | 29S | 28E | 2 | 35.430761 | -118.943210 | Domestic | 220 | 241 | 140 | 220 | 80 | 461 | 425 | 184 | No | 2 | 22% | 10 | 105 | Inside 73-74 AE, TD Above Oil Zone | Terry DeLaMater |
| 5 | 29S | 28E | 2 | 35.432954 | -118.943032 | Domestic | 175 | 290 | 100 | 175 | 75 | 465 | 420 | 130 | Yes | 2 | 22% | 10 | 125 | Inside 73-74 AE and partially within Oil | Dwight Bowers |
| 6 | 29S | 28E | 8 | 35.422739 | -118.996271 | Domestic | 520 | -52 | | | 40 | 468 | 322 | 374 | No | 2 | 22% | 10 | 74 | TD Above Oil Zone | Alon Asphalt Bakersfield Inc. |
| 7 | 29S | 28E | 8 | 35.423164 | -118.994763 | Domestic | 520 | -46 | | | 40 | 474 | 325 | 371 | No | 2 | 22% | 10 | 74 | TD Above Oil Zone | Alon Asphalt Bakersfield Inc. |
| 8 | 29S | 28E | 8 | 35.417322 | -118.997985 | Municipal | 970 | -525 | | | 40 | 445 | 320 | 845 | No | 30 | 22% | 10 | 190 | TD Above Oil Zone | River Ranch HOA |
| 9 | 29S | 28E | 10 | 35.419752 | -118.954278 | Domestic | 310 | 193 | 115 | 310 | 195 | 503 | 408 | 215 | No | 2 | 22% | 10 | 97 | TD Above Oil Zone | Ace Stables |
| 10 | 28S | 28E | 7 | 35.507857 | -118.988423 | Unknown | 1135 | -18 | | | 0 | 1117 | 350 | 368 | Yes | 2 | 22% | 10 | 74 | The Top of the interpolated oil zone is s | |
| 11 | 28S | 27E | 24 | 35.479372 | -119.020860 | Domestic | 800 | 124 | 500 | 800 | 300 | 924 | 315 | 191 | No | 2 | 22% | 10 | 103 | TD Above Oil Zone | Dwight Grimmes |
| 12 | 28S | 27E | 36 | 35.441567 | -119.029430 | Municipal | 970 | -362 | 502 | 970 | 468 | 608 | 278 | 640 | No | 109 | 22% | 10 | 416 | TD Above Oil Zone | Oildale Mutual Water Company |
| 13 | 29S | 28E | 2 | 35.434215 | -118.939435 | Domestic | 200 | 282 | 60 | 200 | 140 | 482 | 430 | 148 | No | 2 | 22% | 10 | 117 | Interpreted east of oil zone pinchout | Francis B. Perry |
| 14 | 29S | 28E | 10 | 35.418958 | -118.965281 | Domestic | 460 | 14 | 380 | 460 | 80 | 474 | 370 | 356 | No | 2 | 22% | 10 | 76 | TD Above Oil Zone | Derrel's Mini Storage |
| 15 | 29S | 28E | 10 | 35.419418 | -118.960299 | Domestic | 420 | 63 | 100 | 420 | 320 | 483 | 395 | 332 | No | 2 | 22% | 10 | 78 | TD Above Oil Zone | Rep. Kevin Flem (420 Club) |
| 16 | 29S | 28E | 10 | 35.418923 | -118.956228 | Domestic | 248 | 257 | 100 | 248 | 148 | 505 | 405 | 148 | No | 2 | 22% | 10 | 117 | TD Above Oil Zone | Terry J. Easton |
| 17 | 29S | 28E | 10 | 35.418839 | -118.956949 | Domestic | 300 | 213 | 175 | 255 | 80 | 513 | 405 | 192 | No | 2 | 22% | 10 | 103 | TD Above Oil Zone | Tom & Donna Chisum |
| 18 | 29S | 28E | 7 | 35.412678 | -119.011317 | Domestic | 250 | 174 | 190 | 250 | 40 | 424 | 407 | 233 | No | 2 | 22% | 10 | 93 | TD Above Oil Zone | Val Butler |
| 19 | 29S | 28E | 18 | 35.410600 | -119.011185 | Irrigation | 415 | 4 | | | 40 | 419 | 295 | 291 | No | 100 | 22% | 10 | 591 | TD Above Oil Zone | Irma Roberston |
| 20 | 29S | 28E | 18 | 35.410655 | -119.011187 | Domestic | 300 | 119 | 200 | 300 | 100 | 419 | 295 | 176 | No | 2 | 22% | 10 | 107 | TD Above Oil Zone | Wm Robertson |
| 21 | 29S | 28E | 18 | 35.410958 | -119.006979 | Domestic | 300 | 123 | 220 | 300 | 80 | 423 | 305 | 182 | No | 2 | 22% | 10 | 106 | TD Above Oil Zone | Priscilla Mueller |
| 22 | 29S | 28E | 18 | 35.411481 | -119.005561 | Domestic | 50 | 372 | | | 40 | 422 | 307 | 40 | No | 2 | 22% | 10 | 225 | TD Above Oil Zone | Rancho Not So Grande |
| 23 | 29S | 28E | 17 | 35.409636 | -119.006232 | Unknown | - | - | | | 40 | 645 | 305 | 40 | No | 73 | 22% | 10 | 1,358 | TD Above Oil Zone | Ranchos Rio Equestrian Center |
| 24 | 29S | 28E | 18 | 35.407006 | -119.006600 | Domestic | 250 | 169 | | | 40 | 419 | 310 | 141 | No | 2 | 22% | 10 | 120 | TD Above Oil Zone | Bill Norman |
| 25 | 29S | 28E | 17 | 35.405797 | -118.999507 | Municipal | 382 | 51 | 215 | 380 | 135 | 433 | 290 | 239 | No | 73 | 22% | 10 | 556 | TD Above Oil Zone | Ranchos Del Rio Mutual Water Company |
| 26 | 29S | 28E | 18 | 35.405848 | -118.999507 | Municipal | 420 | 15 | 215 | 380 | 165 | 435 | 290 | 275 | No | 73 | 22% | 10 | 518 | TD Above Oil Zone | Ranchos Del Rio Mutual Water Company |
| 27 | 29S | 28E | 17 | 35.406698 | -118.986445 | Irrigation | 390 | 226 | | | 40 | 616 | 290 | 64 | No | 100 | 22% | 10 | 1,260 | TD Above Oil Zone | GreenLawn Memorial Park |
| A | 28S | 28E | 8 | 35.513366 | -118.979901 | Domestic | 800 | 94 | 400 | 800 | 400 | 894 | 380 | 286 | No | 2 | 22% | 10 | 84 | Interpreted east of oil zone pinchout | Wendell Weller |
| B | 28S | 28E | 7 | 35.511329 | -118.996894 | Domestic | 800 | 182 | 500 | 800 | 300 | 982 | 350 | 168 | No | 2 | 22% | 10 | 110 | Interpreted east of oil zone pinchout | Mike Combs |
| C | 28S | 28E | 8 | 35.507854 | -118.986059 | Domestic | 975 | 59 | 715 | 975 | 260 | 1034 | 360 | 301 | No | 2 | 22% | 10 | 82 | Interpreted east of oil zone pinchout | John Tart |
| D | 28S | 28E | 8 | 35.512732 | -118.988606 | Domestic | 813 | 166 | 540 | 813 | 273 | 979 | 360 | 194 | No | 2 | 22% | 10 | 102 | Interpreted east of oil zone pinchout | Mike Hood |
| E | 28S | 28E | 8 | 35.511516 | -118.984895 | Domestic | 800 | 158 | 400 | 800 | 400 | 958 | 370 | 212 | No | 2 | 22% | 10 | 98 | Interpreted east of oil zone pinchout | Susan Abarros-Deltoro |
| F | 28S | 28E | 17 | 35.496949 | -118.986021 | Domestic | 800 | 315 | 400 | 800 | 400 | 1115 | 370 | 55 | No | 2 | 22% | 10 | 192 | Interpreted east of oil zone pinchout | Tom Wilson |
| G | 28S | 28E | 17 | 35.497446 | -118.991226 | Domestic | 1200 | -112 | 880 | 1200 | 320 | 1088 | 360 | 472 | No | 2 | 22% | 10 | 66 | Well is Interpreted to penetrate oil zone | Thomas Gafford |
| H | 28S | 28E | 35 | 35.447766 | -118.938986 | Domestic | 263 | 207 | 163 | 263 | 100 | 470 | 460 | 253 | No | 2 | 22% | 10 | 90 | Interpreted east of oil zone pinchout | Tenneco West, Inc. |
| I | 28S | 28E | 35 | 35.441589 | -118.937504 | Domestic | 320 | 145 | 140 | 320 | 180 | 465 | 460 | 315 | No | 10 | 22% | 10 | 181 | Interpreted east of oil zone pinchout | Meadows of the Kern Mutual Water Co. |
| J | 28S | 28E | 35 | 35.447348 | -118.937762 | Municipal | 320 | 148 | 120 | 320 | 200 | 468 | 460 | 312 | No | 10 | 22% | 10 | 181 | Interpreted east of oil zone pinchout | Meadows of the Kern Mutual Water Co. |
| K | 29S | 27E | 12 | 35.425828 | -119.037008 | Domestic | 730 | -235 | 507 | 730 | 223 | 495 | 248 | 483 | No | 109 | 22% | 10 | 479 | Interpreted west of oil zone pinchout | Oildale Mutual Water Company |
| L | 29S | 27E | 12 | 35.419184 | -119.034220 | municipal | 892 | -431 | 597 | 892 | 295 | 461 | | 431 | No | 109 | 22% | 10 | 507 | Interpreted west of oil zone pinchout | Oildale Mutual Water Company |
| M | 29S | 27E | 12 | 35.425707 | -119.036844 | municipal | 425 | 69 | | | 0 | 494 | 248 | 179 | No | 109 | 22% | 10 | 787 | Interpreted west of oil zone pinchout | Oildale Mutual Water Company |
| N | 29S | 27E | 12 | 35.422438 | -119.035698 | Municipal | 722 | -245 | 290 | 697 | 407 | 477 | 248 | 493 | No | 109 | 22% | 10 | 474 | Interpreted west of oil zone pinchout | Oildale Mutual Water Company |
| O | 29S | 27E | 12 | 35.412747 | -119.029672 | Municipal | 620 | -184 | 192 | 620 | 428 | 436 | 255 | 439 | No | 109 | 22% | 10 | 502 | Well TD is above TKRAE (Interpreted a | Oildale Mutual Water Company |
| P | 29S | 27E | 12 | 35.419238 | -119.025492 | Domestic | 700 | -231 | 292 | 700 | 408 | 469 | 258 | 489 | No | 109 | 22% | 10 | 476 | Well TD is above TKRAE (Interpreted a | Oildale Mutual Water Company |
| Q | 29S | 27E | 12 | 35.419254 | -119.034000 | Municipal | 670 | -208 | 300 | 600 | 300 | 462 | 248 | 456 | No | 109 | 22% | 10 | 493 | Interpreted west of oil zone pinchout | Oildale Mutual Water Company |
| R | 29S | 27E | 13 | 35.401802 | -119.034643 | Municipal | 610 | -201 | 299 | 600 | 301 | 409 | 260 | 461 | No | 109 | 22% | 10 | 490 | Interpreted west of oil zone pinchout | North of the River MWD |
| S | 29S | 27E | 13 | 35.403256 | -119.029590 | Domestic | 577 | -167 | 264 | 577 | 313 | 410 | 240 | 407 | No | 109 | 22% | 10 | 522 | Interpreted west of oil zone pinchout | Oildale Mutual Water Company |
| T | 29S | 27E | 13 | 35.410865 | -119.033957 | Municipal | 600 | -167 | 330 | 600 | 270 | 433 | 248 | 415 | No | 109 | 22% | 10 | 517 | Interpreted west of oil zone pinchout | Oildale Mutual Water Company |
| U | 29S | 27E | 13 | 35.410767 | -119.033798 | domestic | 954 | -521.4 | | | 0 | 432.6 | 248 | 769.4 | No | 109 | 22% | 10 | 379 | Interpreted west of oil zone pinchout | Oildale Mutual Water Company |
| V | 29S | 27E | 13 | 35.405173 | -119.038597 | Domestic | 400 | 18 | | | 0 | 418 | 240 | 222 | No | 2 | 22% | 10 | 96 | Interpreted west of oil zone pinchout | Janco Pump Co. |
| W | 29S | 27E | 13 | 35.410978 | -119.038633 | Municipal | 643 | -203 | 307 | 643 | 336 | 440 | 243 | 446 | No | 109 | 22% | 10 | 498 | Interpreted west of oil zone pinchout | Oildale Mutual Water Company |
| X | 29S | 28E | 7 | 35.415216 | -119.013781 | Domestic | 435 | 1 | | | 0 | 436 | 290 | 289 | No | 2 | 22% | 10 | 84 | Well TD is above TKRAE (Interpreted a | Dr. A.E. Angell |
| Y | 28S | 28E | 34 | 35.445095 | -118.942250 | Municipal | 266 | 209 | 146 | 266 | 120 | 475 | 440 | 231 | No | 170 | 22% | 10 | 864 | Interpreted east of oil zone pinchout | UPLANDS OF THE KERN MUTUAL WATER COMPANY |
| AA | 28S | 28E | 34 | 35.446759 | -118.944501 | Domestic | 266 | -266 | 146 | 266 | 120 | 0 | 440 | 706 | Yes | 2 | 22% | 10 | 54 | Interpreted right at the oil zone pinch ou | UNK |
| Z | 28S | 27E | 12 | 35.513286 | -119.020807 | Domestic | 1200 | -183 | 450 | 1200 | 750 | 1017 | 440 | 623 | Yes | 2 | 22% | 10 | 57 | Interpreted within thinning portion of oil | UNK |
| AD | 28S | 28E | 34 | 35.445320 | -118.942874 | Domestic | 266 | 215 | 146 | 266 | 120 | 481 | 440 | 225 | Yes | 2 | 22% | 10 | 95 | Interpreted right within the oil zone pincl | UNK |

| Map ID | T | R | Sec | LAT_Y | LON_X | Water Well Type | Compl. Depth (ft) | Compl. Depth EL (ft) | Top Perf. (ft) | Bottom Perf. (ft) | Screen Length (ft) | Ground EL (ft) | Spring '17 Water Level EL (ft) | Sat. Thickness, b (ft) | Over HC Zone? | Q (gpm) | $\phi e$ (%) | t (years) | $r_t$ (feet) | Oil Zone Comment | Water Well Owner |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AB | 29S | 27E | 13 | 35.401537 | -119.033400 | domestic | 400 | 9 | 340 | 400 | 60 | 409 | 240 | 231 | No | 2 | 22% | 10 | 94 | Interpreted west of oil zone pinchout | M. E. beachlor |
| AC | 29S | 27E | 13 | 35.403013 | -119.025210 | domestic | 200 | 211 | 140 | 200 | 60 | 411 | 277 | 66 | No | 2 | 22% | 10 | 176 | Well TD is above TKRAE (Interpreted a | Jim Pair |
| AF | 29S | 27E | AC | 35.401860 | 119.030718 | domestic | 60 | -60 | 36 | 60 | 24 | 0 | 365 | 425 | | 2 | 22% | 10 | 69 | | Mrs. Mary C. Gray |
| AG | 29S | 27E | 13 | 35.401800 | 119.031383 | domestic | 100 | -100 | 50 | 100 | 50 | 0 | 370 | 470 | | 2 | 22% | 10 | 66 | | Willie Wile |
| AN | 28S | 28E | 8 | 35.507857 | -118.988423 | domestic | 1135 | -44 | | | 0 | 1091 | 380 | 424 | No | 2 | 22% | 10 | 69 | Interpreted east of oil zone pinchout. As | |
| AF | 28S | 28E | 8 | 35.507857 | -118.988423 | domestic | 1135 | -91 | | 1135 | 0 | 1044 | 370 | 461 | No | 2 | 22% | 10 | 66 | Interpreted east of oil zone pinchout. | |
| AG | 28S | 28E | 8 | 35.508180 | -118.985680 | domestic | 1135 | -213 | | | 0 | 922 | 370 | 583 | No | 2 | 22% | 10 | 59 | Interpreted east of oil zone pinchout. As | |
| AH | 28S | 28E | 8 | 35.513082 | -118.983907 | domestic | 1135 | -78 | | | 0 | 1057 | 370 | 448 | No | 2 | 22% | 10 | 67 | Interpreted east of oil zone pinchout. As | |
| AI | 28S | 28E | 8 | 35.508068 | -118.993782 | domestic | 1135 | -75 | | | 0 | 1060 | 360 | 435 | No | 2 | 22% | 10 | 68 | Interpreted east of oil zone pinchout. As | |
| AJ | 28S | 28E | 8 | 35.503603 | -118.992526 | domestic | 1135 | -119 | | | 0 | 1016 | 360 | 479 | No | 2 | 22% | 10 | 65 | Interpreted east of oil zone pinchout. As | |
| AK | 28S | 28E | 8 | 35.503928 | -118.982596 | domestic | 1135 | -115 | | | 0 | 1020 | 370 | 485 | No | 2 | 22% | 10 | 65 | Interpreted east of oil zone pinchout. As | |
| AL | 28S | 28E | 8 | 35.508423 | -118.977910 | domestic | 1135 | -78 | | | 0 | 1057 | 380 | 458 | No | 2 | 22% | 10 | 67 | Interpreted east of oil zone pinchout. As | |
| AM | 28S | 28E | 8 | 35.501309 | -118.986317 | domestic | 1135 | -79 | | | 0 | 1056 | 360 | 439 | No | 2 | 22% | 10 | 68 | Interpreted east of oil zone pinchout. As | |

**Table 2, KRAE Water Wells Capture Radii, 30 Year Travel Time - Revised**

| Map ID | T | R | Sec | LAT_Y | LON_X | Water Well Type | Compl. Depth (ft) | Compl. Depth EL (ft) | Top Perf. (ft) | Bottom Perf. (ft) | Screen Length (ft) | Ground EL (ft) | Spring '17 Water Level EL (ft) | Sat. Thickness, b (ft) | Over HC Zone? | Q (gpm) | $\phi$e (%) | t (years) | $r_t$ (feet) | Oil Zone Comment | Water Well Owner |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 29S | 28E | 6 | 35.4407 | -119.013 | Domestic | 750 | -158 | 600 | 750 | 150 | 592 | 302 | 460 | No | 2 | 22% | 30 | 115 | TD Above Oil Zone | Dexzel Inc. |
| 2 | 29S | 28E | 2 | 35.43681 | -118.942 | Domestic | 273 | 211 | 173 | 273 | 100 | 484 | 422 | 211 | Yes | 2 | 22% | 30 | 170 | Inside 73-74 AE and screened ir | John Wilson |
| 3 | 29S | 28E | 2 | 35.43568 | -118.942 | Domestic | 170 | 323 | 70 | 170 | 100 | 493 | 421 | 98 | No | 2 | 22% | 30 | 249 | Inside 73-74 AE, TD Above Oil Z | Roger Hatch |
| 4 | 29S | 28E | 2 | 35.43076 | -118.943 | Domestic | 220 | 241 | 140 | 220 | 80 | 461 | 425 | 184 | No | 2 | 22% | 30 | 182 | Inside 73-74 AE, TD Above Oil Z | Terry DeLaMater |
| 5 | 29S | 28E | 2 | 35.43295 | -118.943 | Domestic | 175 | 290 | 100 | 175 | 75 | 465 | 420 | 130 | Yes | 2 | 22% | 30 | 217 | Inside 73-74 AE and partially wit | Dwight Bowers |
| 6 | 29S | 28E | 8 | 35.42274 | -118.996 | Domestic | 520 | -52 | | | 40 | 468 | 322 | 374 | No | 2 | 22% | 30 | 128 | TD Above Oil Zone | Alon Asphalt Bakersfield Inc. |
| 7 | 29S | 28E | 8 | 35.42316 | -118.995 | Domestic | 520 | -46 | | | 40 | 474 | 325 | 371 | No | 2 | 22% | 30 | 128 | TD Above Oil Zone | Alon Asphalt Bakersfield Inc. |
| 8 | 29S | 28E | 8 | 35.41732 | -118.998 | Municipal | 970 | -525 | | | 40 | 445 | 320 | 845 | No | 30 | 22% | 30 | 329 | TD Above Oil Zone | River Ranch HOA |
| 9 | 29S | 28E | 10 | 35.41975 | -118.954 | Domestic | 310 | 193 | 115 | 310 | 195 | 503 | 408 | 215 | No | 2 | 22% | 30 | 168 | TD Above Oil Zone | Ace Stables |
| 10 | 28S | 28E | 7 | 35.50786 | -118.988 | Unknown | 1135 | -18 | | | 0 | 1117 | 350 | 368 | Yes | 2 | 22% | 30 | 129 | The Top of the interpolated oil zo | |
| 11 | 28S | 27E | 24 | 35.47937 | -119.021 | Domestic | 800 | 124 | 500 | 800 | 300 | 924 | 315 | 191 | No | 2 | 22% | 30 | 179 | TD Above Oil Zone | Dwight Grimmes |
| 12 | 28S | 27E | 36 | 35.44157 | -119.029 | Municipal | 970 | -362 | 502 | 970 | 468 | 608 | 278 | 640 | No | 109 | 22% | 30 | 721 | TD Above Oil Zone | Oildale Mutual Water Company |
| 13 | 29S | 28E | 2 | 35.43422 | -118.939 | Domestic | 200 | 282 | 60 | 200 | 140 | 482 | 430 | 148 | No | 2 | 22% | 30 | 203 | Interpreted east of oil zone pinch | Francis B. Perry |
| 14 | 29S | 28E | 10 | 35.41896 | -118.965 | Domestic | 460 | 14 | 380 | 460 | 80 | 474 | 370 | 356 | No | 2 | 22% | 30 | 131 | TD Above Oil Zone | Derrel's Mini Storage |
| 15 | 29S | 28E | 10 | 35.41942 | -118.96 | Domestic | 420 | 63 | 100 | 420 | 320 | 483 | 395 | 332 | No | 2 | 22% | 30 | 136 | TD Above Oil Zone | Rep. Kevin Flem (420 Club) |
| 16 | 29S | 28E | 10 | 35.41892 | -118.956 | Domestic | 248 | 257 | 100 | 248 | 148 | 505 | 405 | 148 | No | 2 | 22% | 30 | 203 | TD Above Oil Zone | Terry J. Easton |
| 17 | 29S | 28E | 10 | 35.41884 | -118.957 | Domestic | 300 | 213 | 175 | 255 | 80 | 513 | 405 | 192 | No | 2 | 22% | 30 | 178 | TD Above Oil Zone | Tom & Donna Chisum |
| 18 | 29S | 28E | 7 | 35.41268 | -119.011 | Domestic | 250 | 174 | 190 | 250 | 40 | 424 | 407 | 233 | No | 2 | 22% | 30 | 162 | TD Above Oil Zone | Val Butler |
| 19 | 29S | 28E | 18 | 35.4106 | -119.011 | Irrigation | 415 | 4 | | | 40 | 419 | 295 | 291 | No | 100 | 22% | 30 | 1024 | TD Above Oil Zone | Irma Roberston |
| 20 | 29S | 28E | 18 | 35.41066 | -119.011 | Domestic | 300 | 119 | 200 | 300 | 100 | 419 | 295 | 176 | No | 2 | 22% | 30 | 186 | TD Above Oil Zone | Wm Robertson |
| 21 | 29S | 28E | 18 | 35.41096 | -119.007 | Domestic | 300 | 123 | 220 | 300 | 80 | 423 | 305 | 182 | No | 2 | 22% | 30 | 183 | TD Above Oil Zone | Priscilla Mueller |
| 22 | 29S | 28E | 18 | 35.41148 | -119.006 | Domestic | 50 | 372 | | | 40 | 422 | 307 | 40 | No | 2 | 22% | 30 | 390 | TD Above Oil Zone | Rancho Not So Grande |
| 23 | 29S | 28E | 17 | 35.40964 | -119.006 | Unknown | - | - | | | 40 | 645 | 305 | 40 | No | 73 | 22% | 30 | 2353 | TD Above Oil Zone | Ranchos Rio Equestrian Center |
| 24 | 29S | 28E | 18 | 35.40701 | -119.007 | Domestic | 250 | 169 | | | 40 | 419 | 310 | 141 | No | 2 | 22% | 30 | 208 | TD Above Oil Zone | Bill Norman |
| 25 | 29S | 28E | 17 | 35.4058 | -119 | Municipal | 382 | 51 | 215 | 380 | 135 | 433 | 290 | 239 | No | 73 | 22% | 30 | 963 | TD Above Oil Zone | Ranchos Del Rio Mutual Water Company |
| 26 | 29S | 28E | 18 | 35.40585 | -119 | Municipal | 420 | 15 | 215 | 380 | 165 | 435 | 290 | 275 | No | 73 | 22% | 30 | 897 | TD Above Oil Zone | Ranchos Del Rio Mutual Water Company |
| 27 | 29S | 28E | 17 | 35.4067 | -118.986 | Irrigation | 390 | 226 | | | 40 | 616 | 290 | 64 | No | 100 | 22% | 30 | 2183 | TD Above Oil Zone | GreenLawn Memorial Park |
| A | 28S | 28E | 8 | 35.51337 | -118.98 | Domestic | 800 | 94 | 400 | 800 | 400 | 894 | 380 | 286 | No | 2 | 22% | 30 | 146 | Interpreted east of oil zone pinch | Wendell Weller |
| B | 28S | 28E | 7 | 35.51133 | -118.997 | Domestic | 800 | 182 | 500 | 800 | 300 | 982 | 350 | 168 | No | 2 | 22% | 30 | 191 | Interpreted east of oil zone pinch | Mike Combs |
| C | 28S | 28E | 8 | 35.50785 | -118.986 | Domestic | 975 | 59 | 715 | 975 | 260 | 1034 | 360 | 301 | No | 2 | 22% | 30 | 142 | Interpreted east of oil zone pinch | John Tart |
| D | 28S | 28E | 8 | 35.51273 | -118.989 | Domestic | 813 | 166 | 540 | 813 | 273 | 979 | 360 | 194 | No | 2 | 22% | 30 | 177 | Interpreted east of oil zone pinch | Mike Hood |
| E | 28S | 28E | 8 | 35.51152 | -118.985 | Domestic | 800 | 158 | 400 | 800 | 400 | 958 | 370 | 212 | No | 2 | 22% | 30 | 170 | Interpreted east of oil zone pinch | Susan Abarros-Deltoro |
| F | 28S | 28E | 17 | 35.49695 | -118.986 | Domestic | 800 | 315 | 400 | 800 | 400 | 1115 | 370 | 55 | No | 2 | 22% | 30 | 333 | Interpreted east of oil zone pinch | Tom Wilson |
| G | 28S | 28E | 17 | 35.49745 | -118.991 | Domestic | 1200 | -112 | 880 | 1200 | 320 | 1088 | 360 | 472 | No | 2 | 22% | 30 | 114 | Well is Interpreted to penetrate c | Thomas Gafford |
| H | 28S | 28E | 35 | 35.44777 | -118.939 | Domestic | 263 | 207 | 163 | 263 | 100 | 470 | 460 | 253 | No | 2 | 22% | 30 | 155 | Interpreted east of oil zone pinch | Tenneco West, Inc. |
| I | 28S | 28E | 35 | 35.44159 | -118.938 | Domestic | 320 | 145 | 140 | 320 | 180 | 465 | 460 | 315 | No | 10 | 22% | 30 | 313 | Interpreted east of oil zone pinch | Meadows of the Kern Mutual Water Co. |
| J | 28S | 28E | 35 | 35.44735 | -118.938 | Municipal | 320 | 148 | 120 | 320 | 200 | 468 | 460 | 312 | No | 10 | 22% | 30 | 314 | Interpreted east of oil zone pinch | Meadows of the Kern Mutual Water Co. |
| K | 29S | 27E | 12 | 35.42583 | -119.037 | Domestic | 730 | -235 | 507 | 730 | 223 | 495 | 248 | 483 | No | 109 | 22% | 30 | 830 | Interpreted west of oil zone pincl | Oildale Mutual Water Company |
| L | 29S | 27E | 12 | 35.41918 | -119.034 | municipal | 892 | -431 | 597 | 892 | 295 | 461 | | 431 | No | 109 | 22% | 30 | 878 | Interpreted west of oil zone pincl | Oildale Mutual Water Company |
| M | 29S | 27E | 12 | 35.42571 | -119.037 | municipal | 425 | 69 | | | 0 | 494 | 248 | 179 | No | 109 | 22% | 30 | 1363 | Interpreted west of oil zone pincl | Oildale Mutual Water Company |
| N | 29S | 27E | 12 | 35.42244 | -119.036 | Municipal | 722 | -245 | 290 | 697 | 407 | 477 | 248 | 493 | No | 109 | 22% | 30 | 821 | Interpreted west of oil zone pincl | Oildale Mutual Water Company |
| O | 29S | 27E | 12 | 35.41275 | -119.03 | Municipal | 620 | -184 | 192 | 620 | 428 | 436 | 255 | 439 | No | 109 | 22% | 30 | 870 | Well TD is above TKRAE (Interp | Oildale Mutual Water Company |
| P | 29S | 27E | 12 | 35.41924 | -119.025 | Domestic | 700 | -231 | 292 | 700 | 408 | 469 | 258 | 489 | No | 109 | 22% | 30 | 825 | Well TD is above TKRAE (Interp | Oildale Mutual Water Company |
| Q | 29S | 27E | 12 | 35.41925 | -119.034 | Municipal | 670 | -208 | 300 | 600 | 300 | 462 | 248 | 456 | No | 109 | 22% | 30 | 854 | Interpreted west of oil zone pincl | Oildale Mutual Water Company |
| R | 29S | 27E | 13 | 35.4018 | -119.035 | Municipal | 610 | -201 | 299 | 600 | 301 | 409 | 260 | 461 | No | 109 | 22% | 30 | 849 | Interpreted west of oil zone pincl | North of the River MWD |
| S | 29S | 27E | 13 | 35.40326 | -119.03 | Domestic | 577 | -167 | 264 | 577 | 313 | 410 | 240 | 407 | No | 109 | 22% | 30 | 904 | Interpreted west of oil zone pincl | Oildale Mutual Water Company |
| T | 29S | 27E | 13 | 35.41087 | -119.034 | Municipal | 600 | -167 | 330 | 600 | 270 | 433 | 248 | 415 | No | 109 | 22% | 30 | 895 | Interpreted west of oil zone pincl | Oildale Mutual Water Company |
| U | 29S | 27E | 13 | 35.41077 | -119.034 | domestic | 954 | -521.4 | | | 0 | 432.6 | 248 | 769.4 | No | 109 | 22% | 30 | 657 | Interpreted west of oil zone pincl | Oildale Mutual Water Company |
| V | 29S | 27E | 13 | 35.40517 | -119.039 | Domestic | 400 | 18 | | | 0 | 418 | 240 | 222 | No | 2 | 22% | 30 | 166 | Interpreted west of oil zone pincl | Janco Pump Co. |
| W | 29S | 27E | 13 | 35.41098 | -119.039 | Municipal | 643 | -203 | 307 | 643 | 336 | 440 | 243 | 446 | No | 109 | 22% | 30 | 863 | Interpreted west of oil zone pincl | Oildale Mutual Water Company |
| X | 29S | 28E | 7 | 35.41522 | -119.014 | Domestic | 435 | 1 | | | 0 | 436 | 290 | 289 | No | 2 | 22% | 30 | 145 | Well TD is above TKRAE (Interp | Dr. A.E. Angell |
| Y | 28S | 28E | 34 | 35.4451 | -118.942 | Municipal | 266 | 209 | 146 | 266 | 120 | 475 | 440 | 231 | No | 170 | 22% | 30 | 1496 | Interpreted east of oil zone pinch | UPLANDS OF THE KERN MUTUAL WATER ( |
| AA | 28S | 28E | 34 | 35.44676 | -118.945 | Domestic | 266 | -266 | 146 | 266 | 120 | 0 | 440 | 706 | Yes | 2 | 22% | 30 | 93 | Interpreted right at the oil zone p | UNK |
| Z | 28S | 27E | 12 | 35.51329 | -119.021 | Domestic | 1200 | -183 | 450 | 1200 | 750 | 1017 | 440 | 623 | Yes | 2 | 22% | 30 | 99 | Interpreted within thinning portio | UNK |
| AD | 28S | 28E | 34 | 35.44532 | -118.943 | Domestic | 266 | 215 | 146 | 266 | 120 | 481 | 440 | 225 | Yes | 2 | 22% | 30 | 165 | Interpreted right within the oil zo | UNK |

| Map ID | T | R | Sec | LAT_Y | LON_X | Water Well Type | Compl. Depth (ft) | Compl. Depth EL (ft) | Top Perf. (ft) | Bottom Perf. (ft) | Screen Length (ft) | Ground EL (ft) | Spring '17 Water Level EL (ft) | Sat. Thickness, b (ft) | Over HC Zone? | Q (gpm) | $\phi$e (%) | t (years) | $r_t$ (feet) | Oil Zone Comment | Water Well Owner |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AB | 29S | 27E | 13 | 35.40154 | -119.033 | domestic | 400 | 9 | 340 | 400 | 60 | 409 | 240 | 231 | No | 2 | 22% | 30 | 162 | Interpreted west of oil zone pinc | M. E. beachlor |
| AC | 29S | 27E | 13 | 35.40301 | -119.025 | domestic | 200 | 211 | 140 | 200 | 60 | 411 | 277 | 66 | No | 2 | 22% | 30 | 304 | Well TD is above TKRAE (Interp | Jim Pair |
| AF | 29S | 27E | 13 | 35.40186 | -119.031 | domestic | 60 | -60 | 36 | 60 | 24 | 0 | 365 | 425 | | 2 | 22% | 30 | 120 | | Mrs. Mary C. Gray |
| AE | 29S | 27E | 13 | 35.4018 | -119.031 | domestic | 100 | -100 | 50 | 100 | 50 | 0 | 370 | 470 | | 2 | 22% | 30 | 114 | | Willie Wile |
| AN | 28S | 28E | 8 | 35.50786 | -118.988 | domestic | 1135 | -44 | | | 0 | 1091 | 380 | 424 | No | 2 | 22% | 30 | 120 | Interpreted east of oil zone pinch | |
| AF | 28S | 28E | 8 | 35.50786 | -118.988 | domestic | 1135 | -91 | | 1135 | 0 | 1044 | 370 | 461 | No | 2 | 22% | 30 | 115 | Interpreted east of oil zone pinch | |
| AG | 28S | 28E | 8 | 35.50818 | -118.986 | domestic | 1135 | -213 | | | 0 | 922 | 370 | 583 | No | 2 | 22% | 30 | 102 | Interpreted east of oil zone pinch | |
| AH | 28S | 28E | 8 | 35.51308 | -118.984 | domestic | 1135 | -78 | | | 0 | 1057 | 370 | 448 | No | 2 | 22% | 30 | 117 | Interpreted east of oil zone pinch | |
| AI | 28S | 28E | 8 | 35.50807 | -118.994 | domestic | 1135 | -75 | | | 0 | 1060 | 360 | 435 | No | 2 | 22% | 30 | 118 | Interpreted east of oil zone pinch | |
| AJ | 28S | 28E | 8 | 35.5036 | -118.993 | domestic | 1135 | -119 | | | 0 | 1016 | 360 | 479 | No | 2 | 22% | 30 | 113 | Interpreted east of oil zone pinch | |
| AK | 28S | 28E | 8 | 35.50393 | -118.983 | domestic | 1135 | -115 | | | 0 | 1020 | 370 | 485 | No | 2 | 22% | 30 | 112 | Interpreted east of oil zone pinch | |
| AL | 28S | 28E | 8 | 35.50842 | -118.978 | domestic | 1135 | -78 | | | 0 | 1057 | 380 | 458 | No | 2 | 22% | 30 | 115 | Interpreted east of oil zone pinch | |
| AM | 28S | 28E | 8 | 35.50131 | -118.986 | domestic | 1135 | -79 | | | 0 | 1056 | 360 | 439 | No | 2 | 22% | 30 | 118 | Interpreted east of oil zone pinch | |

## Table 3, Revised Municipal Water Well Information & Pumping Rates

### Oildale Mutual Water Company

| Service Details | Year | | | | | Avg. Annual Pumping Volume / Well (2013 - 2017) | | |
|---|---|---|---|---|---|---|---|---|
| | 2013 | 2014 | 2015 | 2016 | 2017 | Acre-ft | Gallons | Pumping Rate Equivalent (gpm) |
| Population | 26,000 | 32,684 | 34,133 | 34,133 | 34,133 | | | |
| # of Service Connections | 8,126 | 8,120 | 8,120 | 8,120 | 9,863 | | | |
| # of Wells | 4 | 4 | 4 | 5 | 5 | | | |
| Groundwater use (Acre-ft) | 492 | 2,626 | 0 | 124 | 622 | 176 | 57,232,914 | 109 |

### Meadows of the Kern

| Service Details | Year | | | | | Avg. Annual Pumping Volume / Well (2013 - 2017) | | |
|---|---|---|---|---|---|---|---|---|
| | 2013 | 2014 | 2015 | 2016 | 2017 | Acre-ft | Gallons | Equivalent Pumping Rate (gpm) |
| Population | 32 | 32 | 32 | 32 | 32 | | | |
| # of Service Connections | 16 | 16 | 16 | 16 | 16 | | | |
| # of Wells | 4 | 4 | 4 | 4 | 4 | | | |
| Groundwater use (Acre-ft) | 0 | 1 | 85 | 111 | 129 | 16 | 5,327,780 | 10 |

### Ranchos Del Rio

| Service Details | Year | | | | | Avg. Annual Pumping Volume / Well (2013 - 2017) | | |
|---|---|---|---|---|---|---|---|---|
| | 2013 | 2014 | 2015 | 2016 | 2017 | Acre-ft | Gallons | Equivalent Pumping Rate (gpm) |
| Population | 62 | 62 | 62 | 62 | 62 | | | |
| # of Service Connections | 24 | 24 | 24 | 24 | 24 | | | |
| # of Wells | 4 | 4 | 4 | 4 | 4 | | | |
| Groundwater use (Acre-ft) | 0 | 0 | 113 | 2028 | 202 | 117 | 38,167,905 | 73 |

### Ranchos Rio Equestrian Center

| Service Details | Year | | | | | Avg. Annual Pumping Volume / Well (2013 - 2017) | | |
|---|---|---|---|---|---|---|---|---|
| | 2013 | 2014 | 2015 | 2016 | 2017 | Acre-ft | Gallons | Equivalent Pumping Rate (gpm) |
| Population | 25* | 25* | 25* | 25* | 25* | | | |
| # of Service Connections | 4 | 4 | 4 | 4 | 4 | | | |
| # of Wells | 1 | 1 | 1 | 1 | 1 | | | |
| Groundwater use (Acre-ft) | 0 | 0 | 0 | 0 | 0 | - | - | - |

* Listed as transient connections.

### Uplands of the Kern

| Service Details | Year | | | | | Avg. Annual Pumping Volume / Well (2013 - 2017) | | |
|---|---|---|---|---|---|---|---|---|
| | 2013 | 2014 | 2015 | 2016 | 2017 | Acre-ft | Gallons | Equivalent Pumping Rate (gpm) |
| Population | 80 | 80 | 80 | 80 | 80 | | | |
| # of Service Connections | 20 | 20 | 20 | 20 | 20 | | | |
| # of Wells | 1 | 1 | 1 | 1 | 1 | | | |
| Groundwater use (Acre-ft) | 0 | 0 | 1,002 | 160 | 207 | 274 | 89,204,781 | 170 |

Figure 1, Water Wells: Kern River Aquifer Exemption

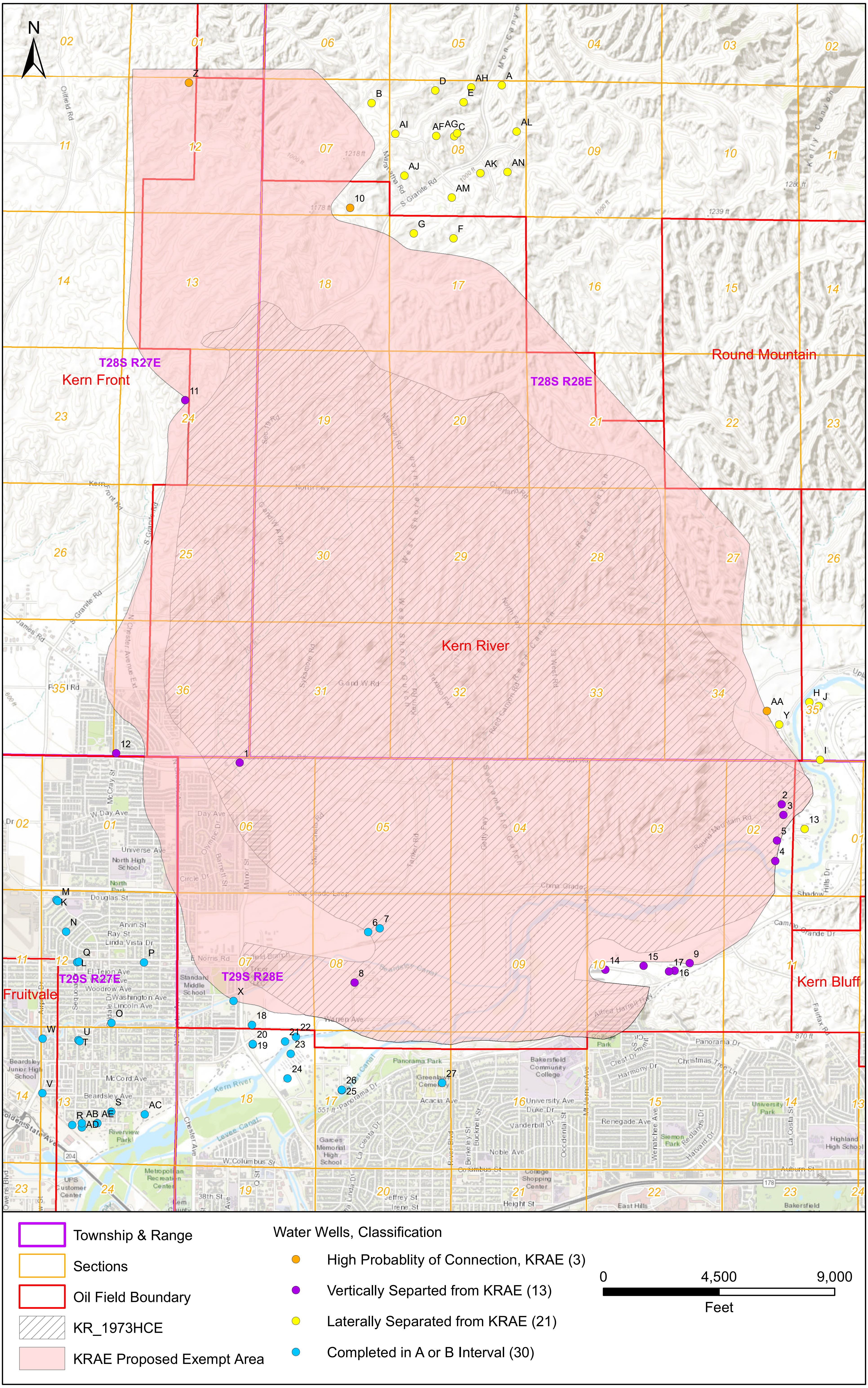
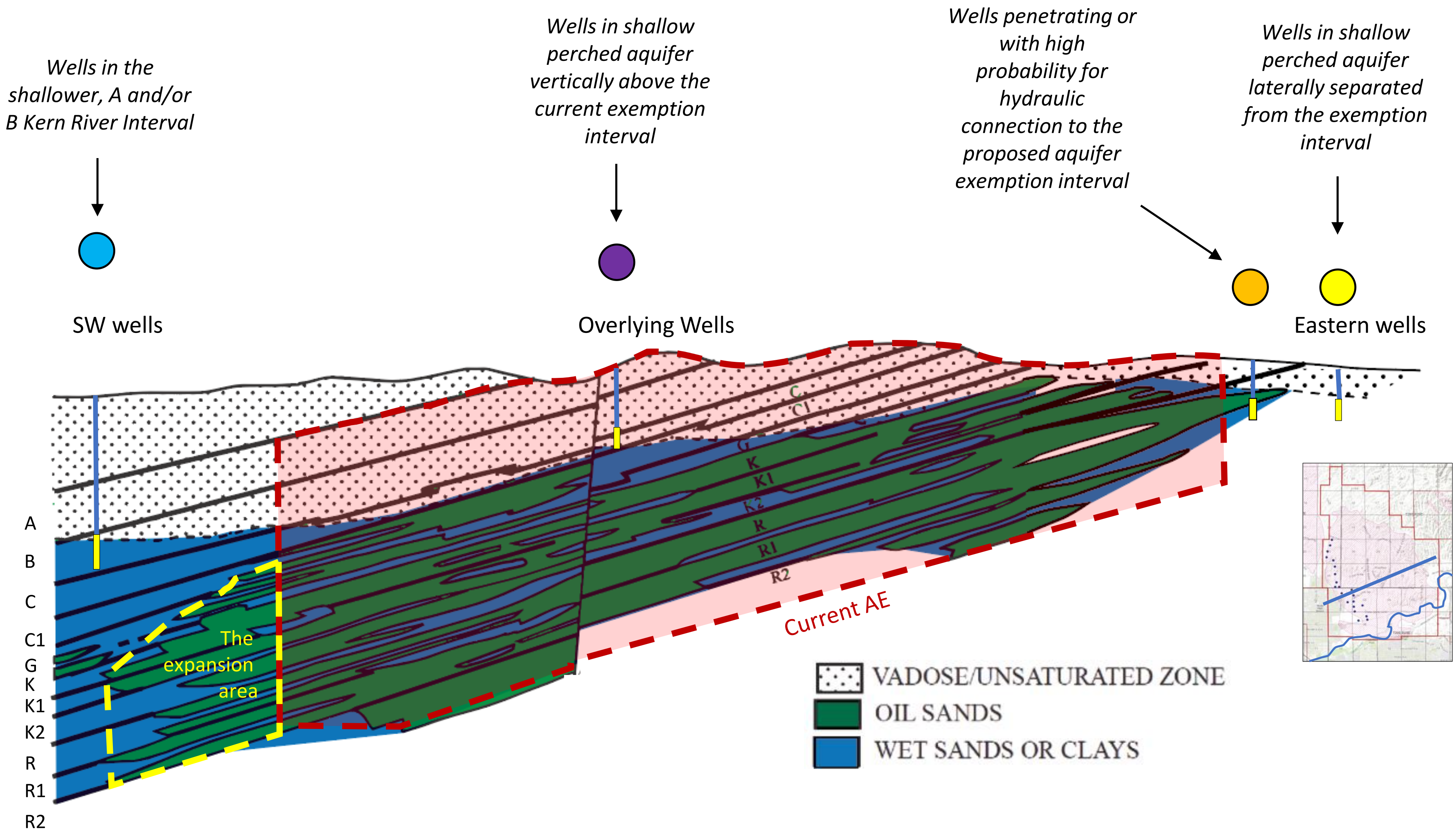
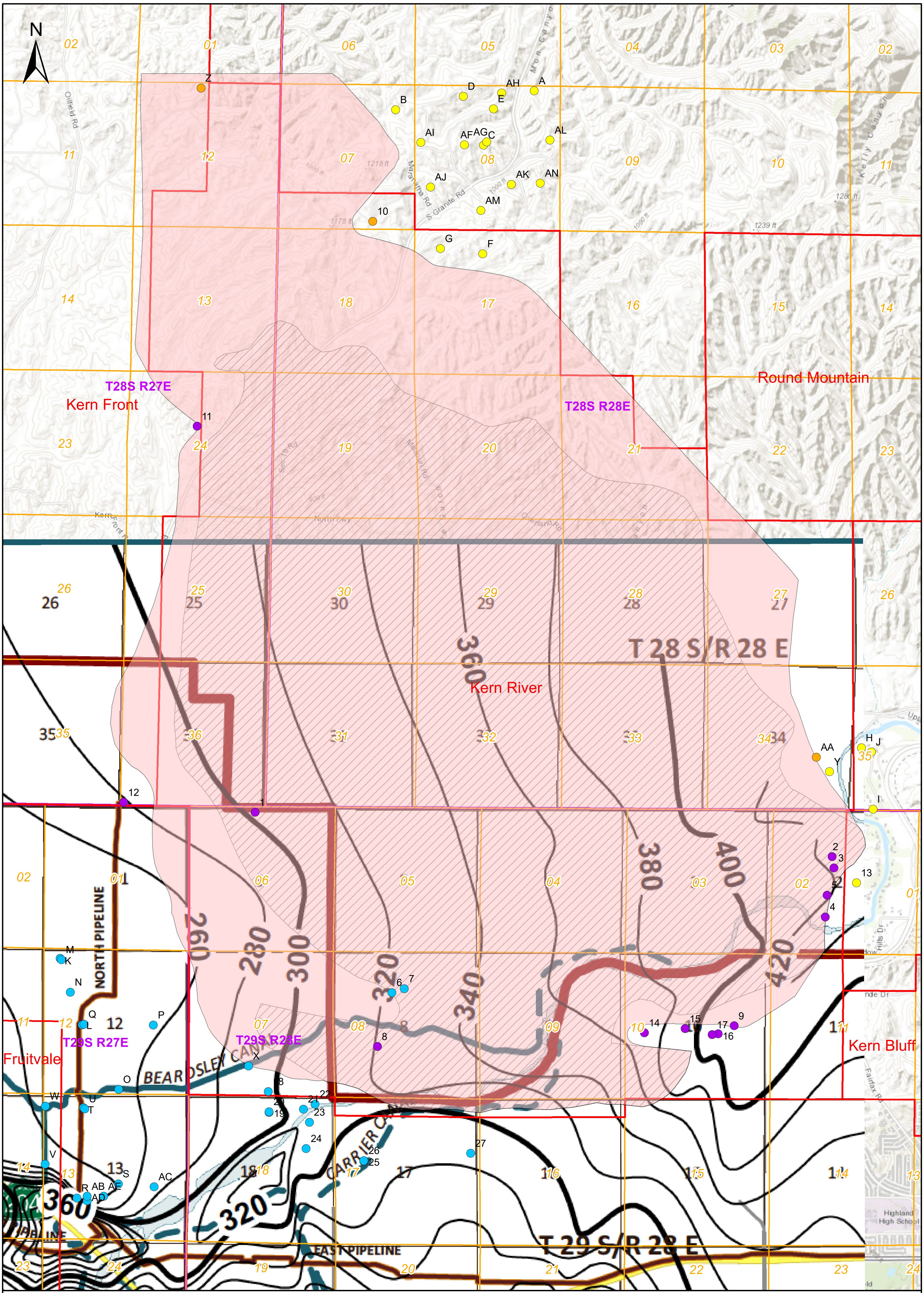


Figure 2, Categories of Water Wells and Completion Information




Adapted from Coburn and Gillespie 2006

Figure 3, KCWA Water Levels, Kern River Aquifer Exemption




Township & Range
Sections
Oil Field Boundary
KR_1973HCE
KRAE Proposed Exempt Area

Water Wells, Classification

High Probablity of Connection, KRAE (3)
Vertically Separted from KRAE (13)
Laterally Separated from KRAE (21)
Completed in A or B Interval (30)

0 4,500 9,000
Feet

Figure 4.1, Capture Analysis: North

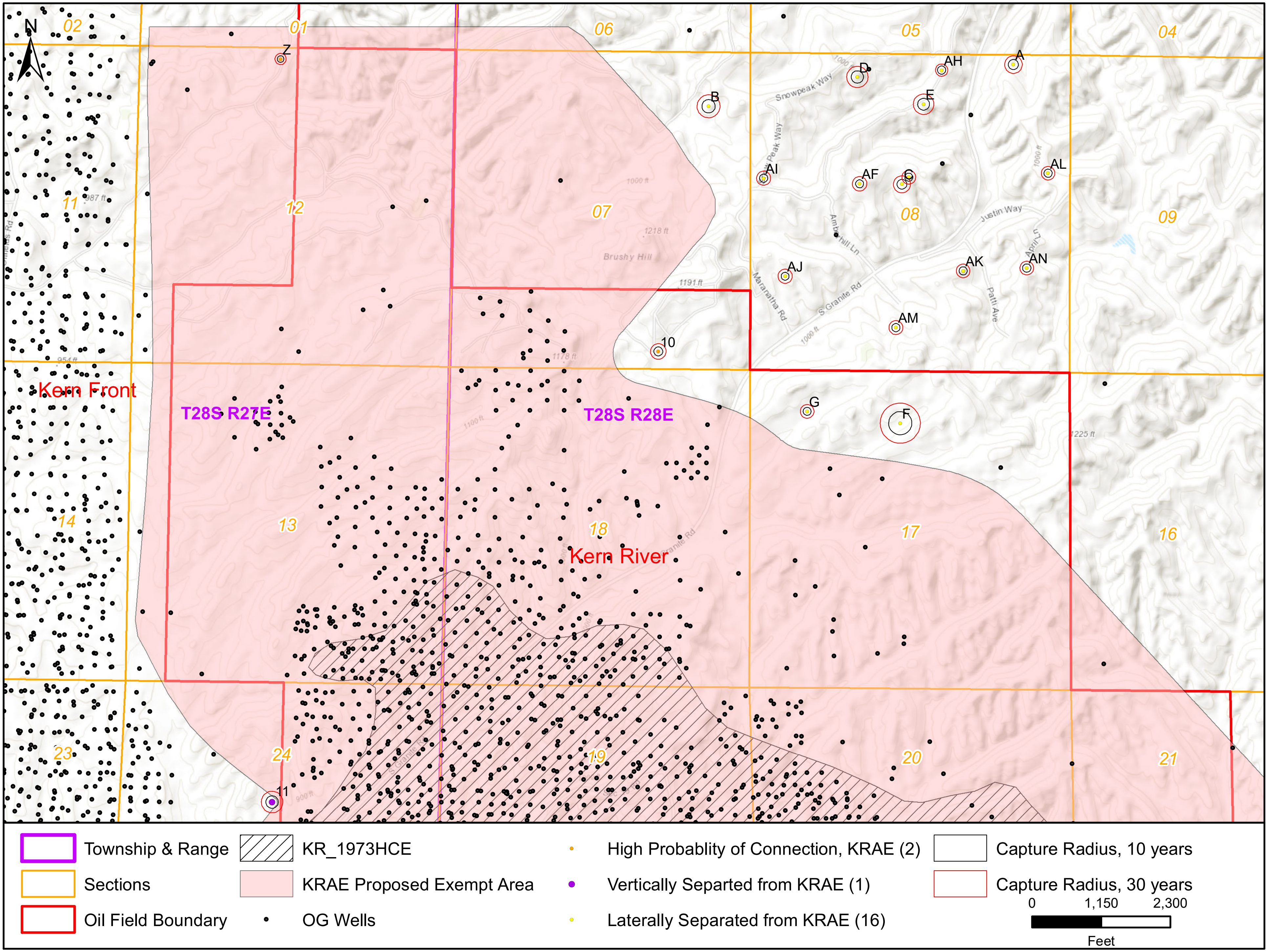


Figure 4.2, Capture Analysis: Southeast

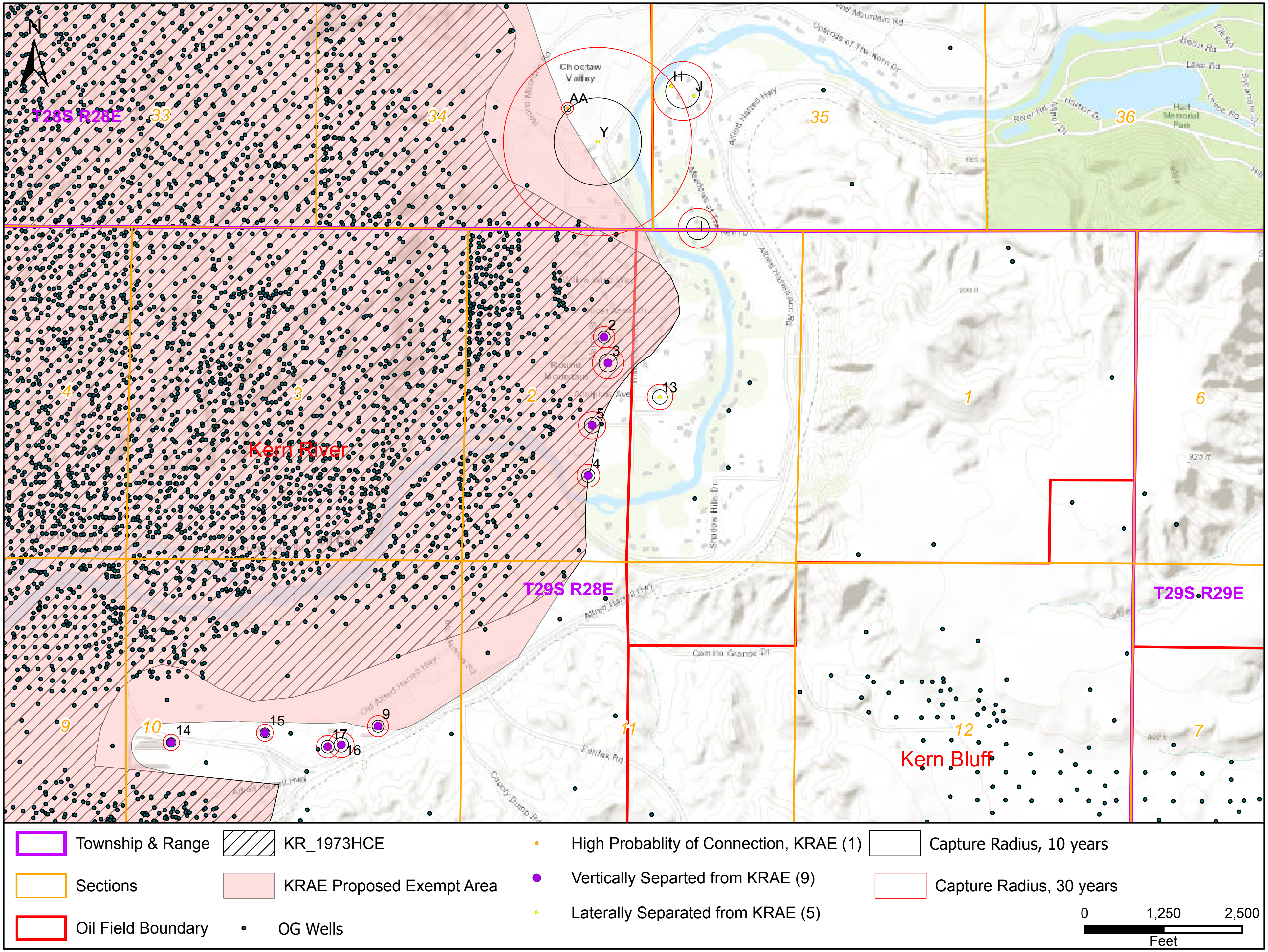
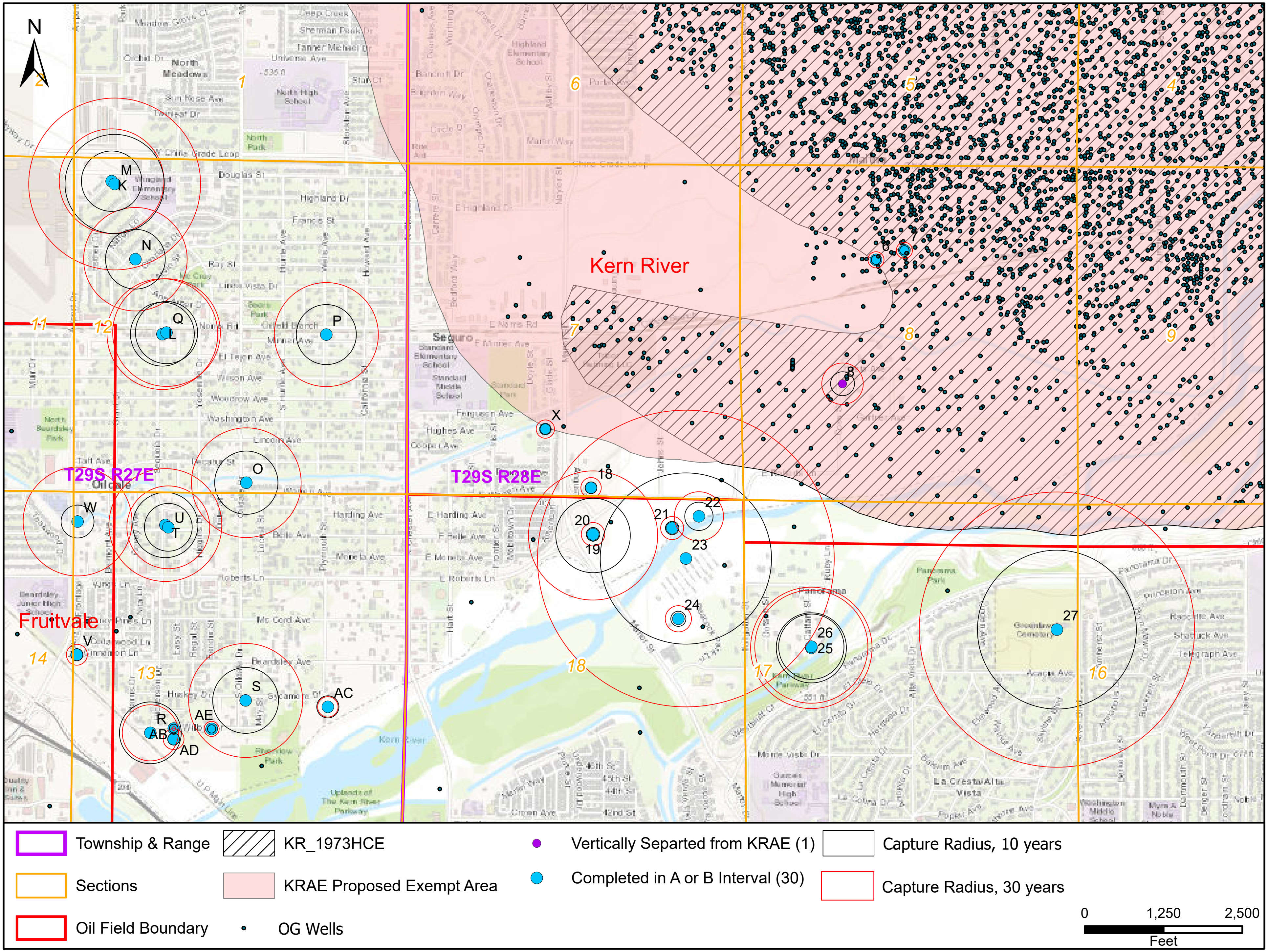
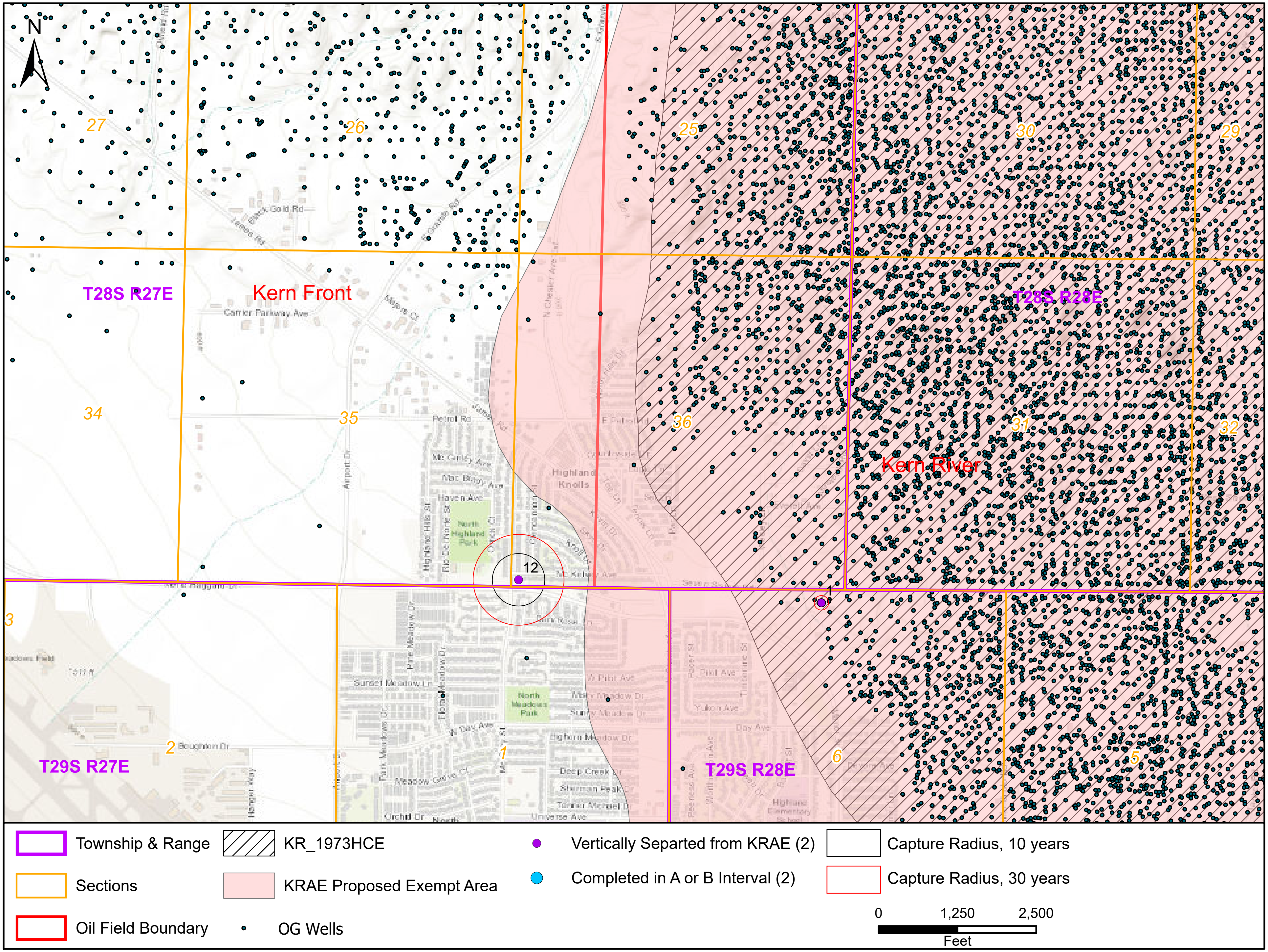


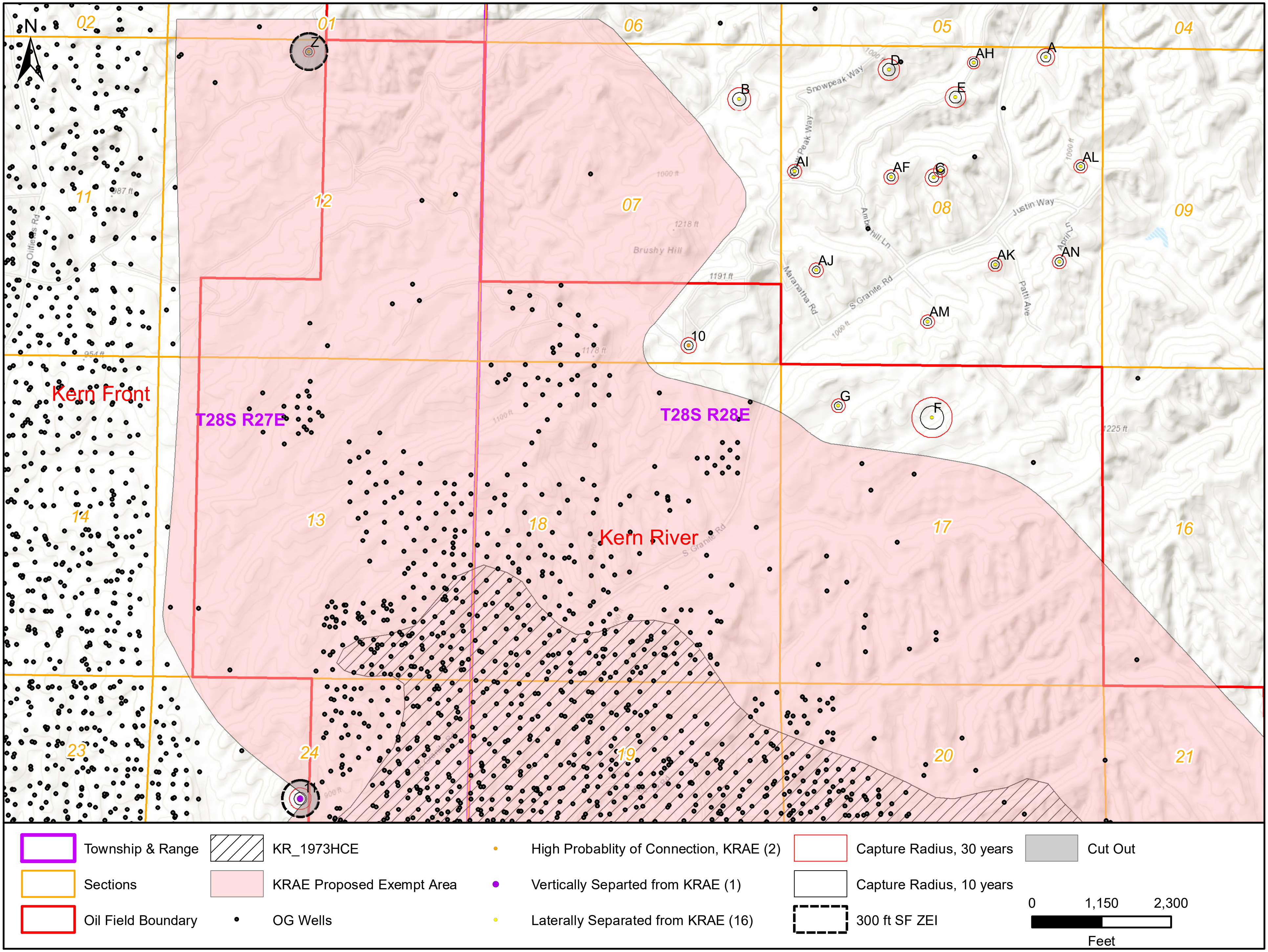
Figure 4.3, Capture Analysis: Southwest

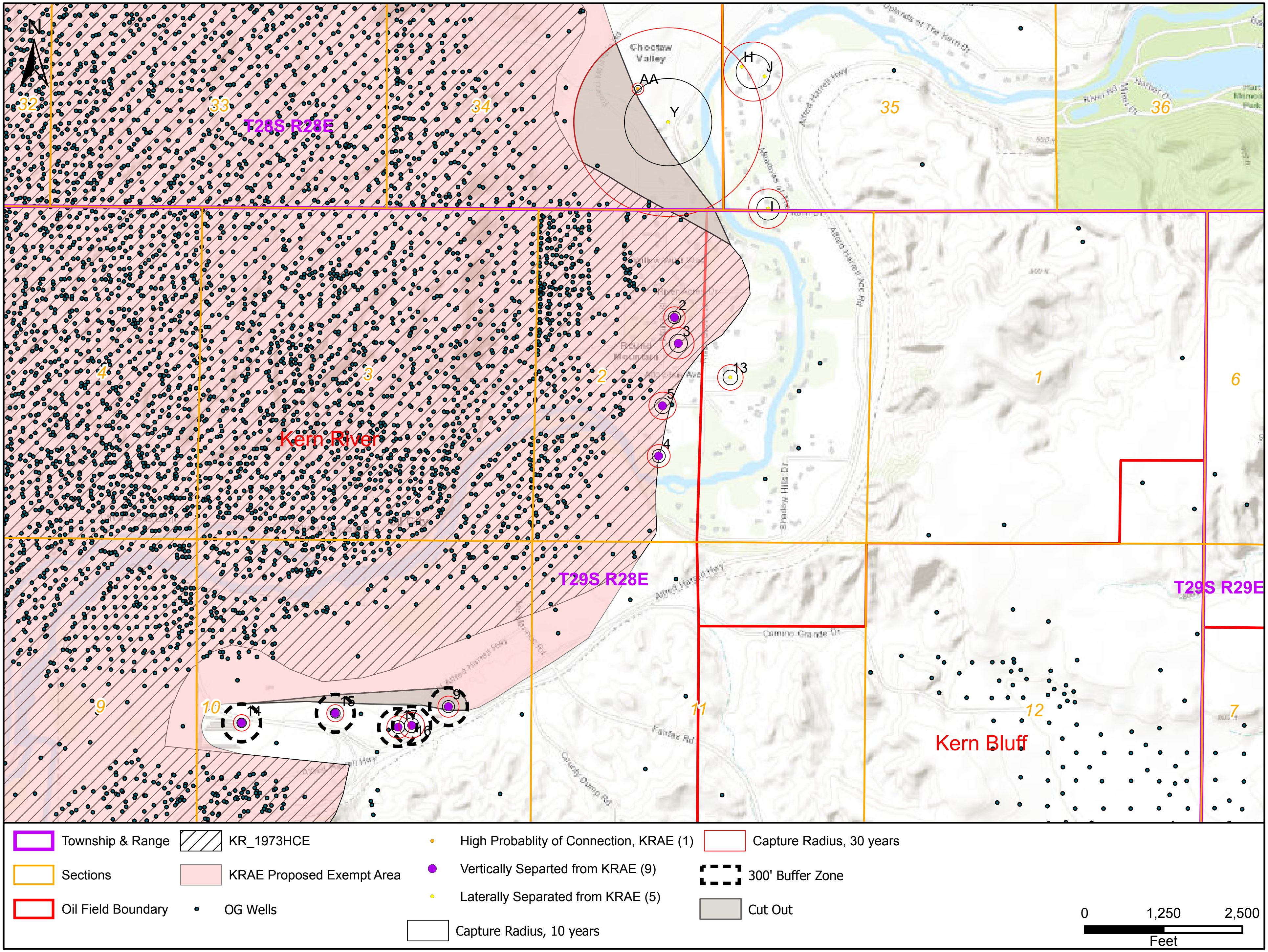




N
T28S R27E
Kern Front
T28S R28E
Kern River
T29S R27E
T29S R28E
27
26
25
30
29
34
35
36
31
32
3
2
1
6
5
12
Township & Range
Sections
Oil Field Boundary
KR_1973HCE
KRAE Proposed Exempt Area
OG Wells
Vertically Separted from KRAE (2)
Completed in A or B Interval (2)
Capture Radius, 10 years
Capture Radius, 30 years
0
1,250
2,500
Feet

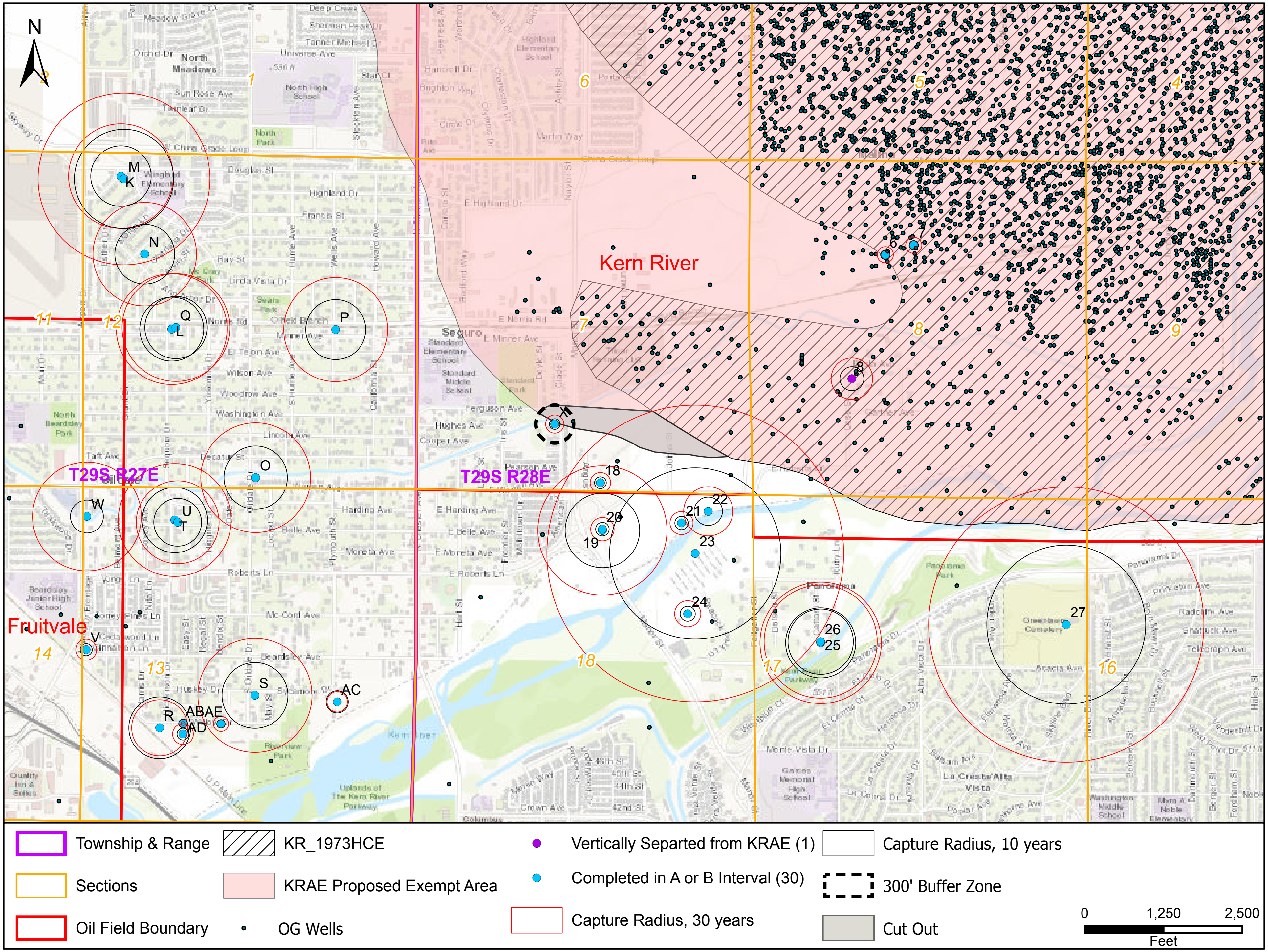
Figure 5.1, Capture Analysis & Cutout: North





N
Choctaw Valley
AA
Y
H
J
I
32
33
34
35
36
T28S R28E
2
3
13
5
4
1
2
3
4
6
Kern River
T29S R28E
T29S R29E
9
10
11
12
7
14
15
17
16
Kern Bluff
Township & Range
Sections
Oil Field Boundary
KR_1973HCE
KRAE Proposed Exempt Area
OG Wells
High Probablity of Connection, KRAE (1)
Vertically Separted from KRAE (9)
Laterally Separated from KRAE (5)
Capture Radius, 10 years
Capture Radius, 30 years
300' Buffer Zone
Cut Out
0
1,250
2,500
Feet

Figure 5.3, Capture Analysis & Cutout: Southwest



# Appendix G

Revised Potential Conduit Well Assessment, 26 March 2025

2121 N. California Blvd., Suite 810
Walnut Creek, CA 94596
415-243-2502

# Revised Potential Conduit Well Assessment Kern River Reservoir Aquifer Exemption Boundary Expansion Application Kern River Oil Field Kern County, California

**26 March 2025**

Prepared for

**Chevron North America Exploration and Production**
San Joaquin Valley Business Unit
9525 Camino Media
Bakersfield, CA 93311

KJ Project No. 2565005*00

26 March 2025

Ryan Jones
CalGEM Agent
Chevron North America Exploration and Production
San Joaquin Valley Business Unit
9525 Camino Media
Bakersfield, California 93311

Subject: Revised Potential Conduit Well Assessment
Kern River Aquifer Exemption Boundary Expansion
KJ Project No. 2565004.00

Dear Mr. Jones,

The attached *Revised Potential Conduit Well Assessment For The Kern River Reservoir Aquifer Exemption Boundary Expansion Application, Kern River Oil Field, Kern County, California* has been prepared for submittal to the California Geologic Energy Management (CalGEM) Division by Kennedy/Jenks Consultants, Inc, in association with Chevron North America Exploration and Production Company (Chevron). The interpretations, calculations, recommendations, and professional opinions presented herein were prepared in accordance with generally accepted professional geologic and engineering practices and within the scope of the project; and, to the best of our knowledge and belief, are true, accurate, and complete.

Respectfully,

Kennedy/Jenks Consultants, Inc.

Todd Miller, PG, CHG No. 695

Lynn Endeavors, Inc.

Charlie Wyatt, PE No. 58318

Enclosure

# Table of Contents

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## List of Tables



## List of Figures



## List of Appendices

# Section 1: Introduction

Kennedy/Jenks Consultants, Inc. (Kennedy Jenks) submits this Revised Potential Conduit Well Assessment in support of the Kern River Reservoir Aquifer Exemption Boundary Expansion Application for the Kern River Oil Field, located in Kern County, California. The information presented in this report was prepared in general accordance with the Remediation and Monitoring of Potential Conduit Wells for Proposed Aquifer Exemptions (CalGEM 2024). This report has been updated based on additional information requested by CalGEM in a meeting with Chevron on 22 October 2024 and further comments from CalGEM via email to Chevron on 13 March 2025.

## 1.1 Background

Chevron North America Exploration and Production (Chevron) provided the California Department of Conservation Geologic Energy Management Division (CalGEM) with a Potential Conduit Well (PCW) Analysis on 10 February 2022 (Chevron 2022a) in support of their aquifer exemption boundary expansion application for the Kern River Oil Field (Kennedy Jenks 2020). The 2022 PCW Analysis identified 24 idle and abandoned wells where completion, plugging, or abandonment information indicated that fluids injected into the exempted aquifer could potentially impact the quality of beneficial use waters above or below the existing exempted aquifer if those fluids were to encounter the well. Chevron submitted a Mitigation Strategy Addendum to CalGEM on 18 July 2022 (Chevron 2022b) and in an email dated 22 July 2022, CalGEM responded to Chevron's PCW Analysis, requesting additional information. Chevron provided the additional information in an email dated 30 July 2022.

In an email dated 25 January 2024, CalGEM returned the PCW Analysis to Chevron and requested that it be revised to meet the framework outlined in Remediation and Monitoring of Potential Conduit Wells for Proposed Aquifer Exemptions (CalGEM 2024). In 2024 Chevron elected to revise the Aquifer Exemption boundaries such that only seven PCWs remain. This revised PCW Analysis presents plugging and abandonment information for the seven remaining wells that are within the revised Aquifer Exemption boundaries.

# Section 2: Potential Conduit Well Assessment and Mitigation

The conduit analysis study area is defined by the spatially overlapping regions of the proposed aquifer exemption zone and any overlying or underlying aquifers containing water of beneficial use (CalGEM 2024). PCWs inside an Underground Injection Control (UIC) Area of Review (AOR) are to be addressed per the requirements in Title 14 California Code of Regulation (14 CCR) Section 1724.8 (§1724.8). PCWs within an aquifer exemption area should be addressed through remediation, monitoring or an alternative demonstration (CalGEM 2024).

Kennedy Jenks and Chevron reviewed wellbore diagrams and cement calculations for wells considered under this Conduit Analysis. Based on the review, discussions with CalGEM and the Water Board, and revisions to the Aquifer Exemption boundaries, seven wells were identified as PCWs needing further assessment and possibly remediation. The seven wells are listed in Table 1 and the well locations are shown on Figure 1.

The seven PCWs were plugged and abandoned in 2022 and 2023. Appendix A contains wellbore diagrams documenting plugging and abandonment for the seven wells.

## References

California Department of Conservation Geologic Energy Management Division and State Water Resources Control Board, 2024, Remediation and Monitoring of Potential Conduit Wells for Proposed Aquifer Exemptions, January

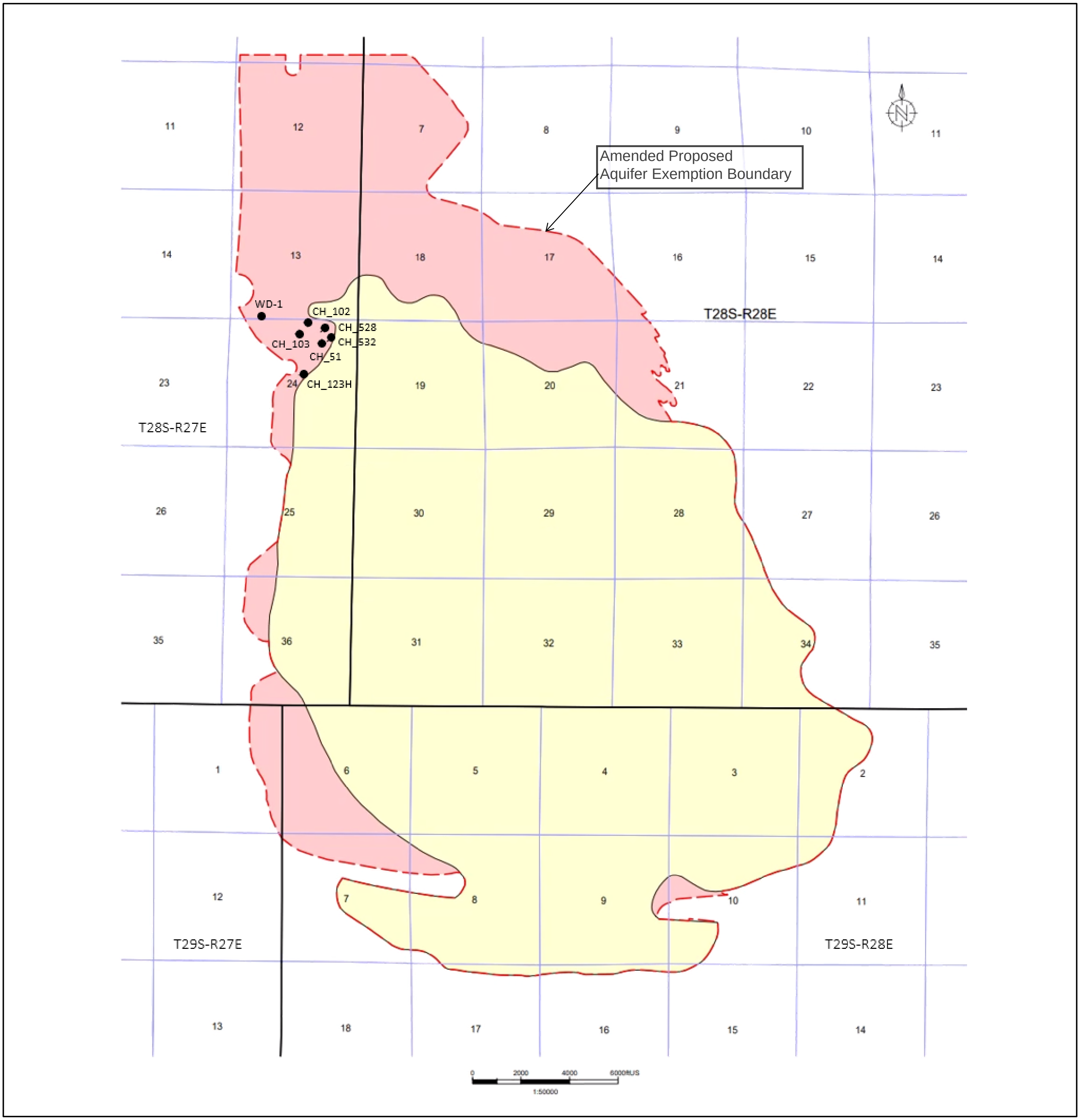
Chevron North America Exploration and Production Company, 2022a, Conduit Analysis, 10 February 2022.

Chevron North America Exploration and Production Company, 2022b, Kern River Aquifer Exemption Conduit Analysis, Kern River Field, Kern River Reservoir, Mitigation Strategy Addendum A, July

Kennedy/Jenks Consultants, Inc., 2020, Data In Support of The Aquifer Exemption Boundary Expansion Application For The Kern River Reservoir Including the Ker River Formation and Upper Chanac Formation, Kern River Field, Kern County, California, September.

## Table 1. Potential Conduit Well Summary

| Well Count | API 10 | Extension | Well Name | Operator | Remediation Completed |
|---|---|---|---|---|---|
| 1 | 0403051465 | 00 | Chanslor 102 | Chevron | P&A 2023 |
| 2 | 0403051466 | 00 | Chanslor 103 | Chevron | P&A 2023 |
| 3 | 0403052041 | 00 | Chanslor 528 | Chevron | P&A 2023 |
| 4 | 0403052045 | 00 | Chanslor 532 | Chevron | P&A 2023 |
| 5 | 0403063442 | 00 | Chanslor 123H | Chevron | P&A 2023 |
| 6 | 0403010190 | 00, 01 | Chanslor 51 | Chevron | P&A 2023 |
| 7 | 0403010794 | 00 | Unspecified WD-1 | CRC | P&A 2023 |




• Potential Conduit Well

Kennedy Jenks

Revised Potential Conduit Well Assessment
Kern River Reservoir
Kern County, California

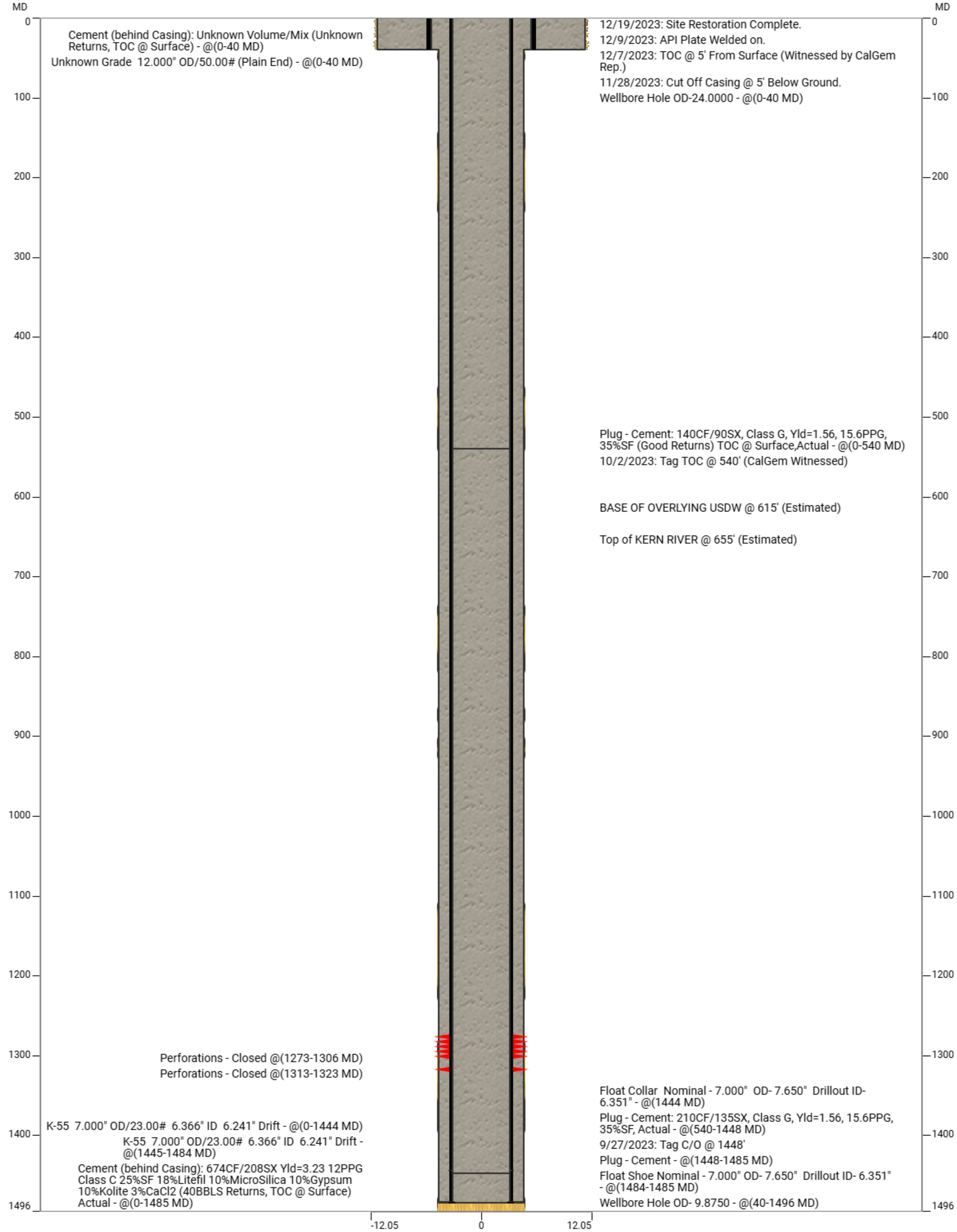
**Map Showing Amended Proposed Aquifer Exemption Boundary and Potential Conduit Wells**

March 2025

**Figure 1**

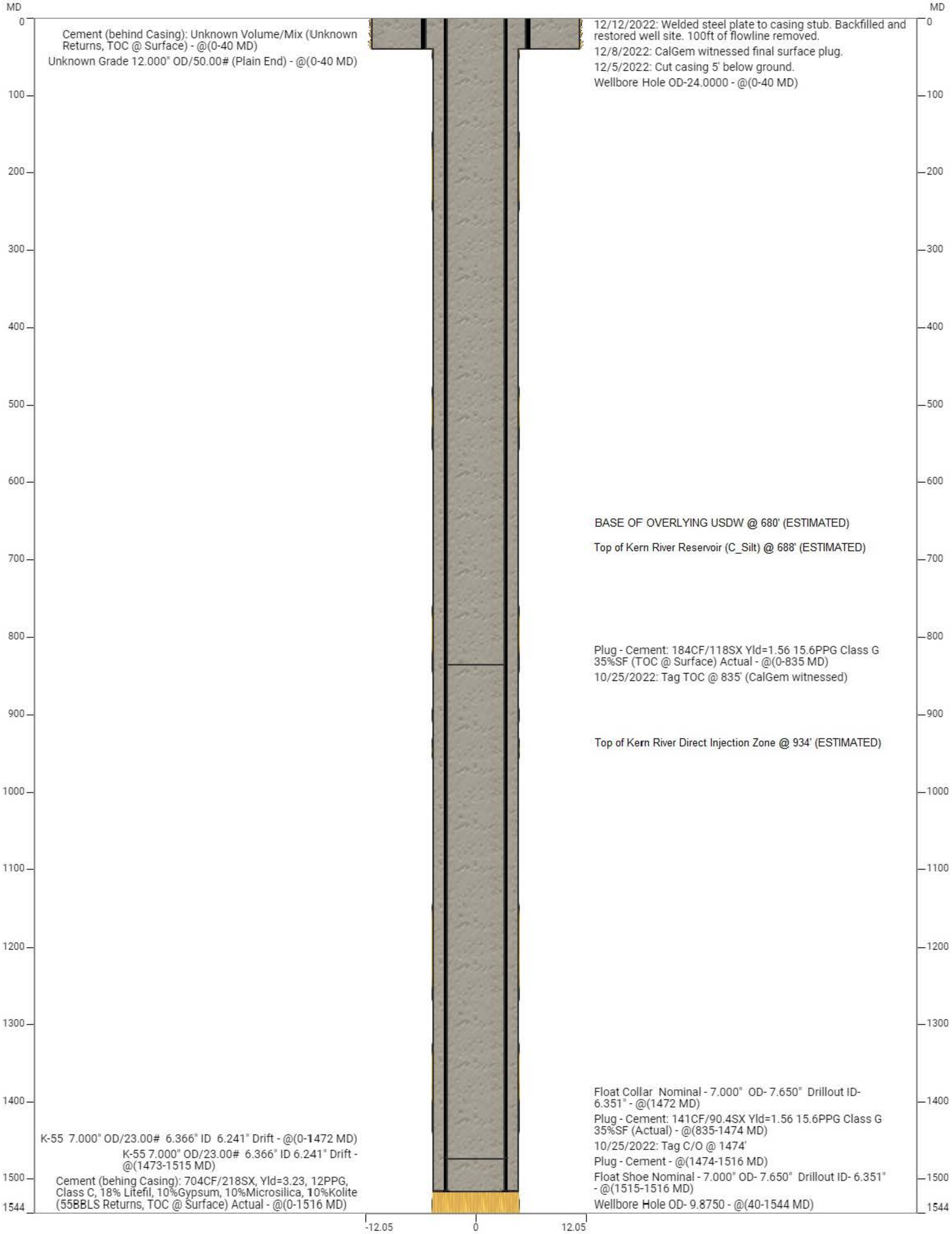
# Appendix A: Wellbore Diagrams

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Operator Name:** | Chevron U.S.A. Inc. | **Field:** | Kern River | **Well Name:** | ZCH 102 | | |
| **Fee/Lease:** | Chanslor | | | **Well Number:** | 102 | | |
| **County:** | Kern (2) | **St:** | California | **API:** | 0403051465 | **API12:** | 040305146500 |
| **Section:** | 24 | **Township:** | 28S | **Range:** | 27E | **Base Meridian:** | MD |
| **Well Profile:** | Vertical | | | | | | |



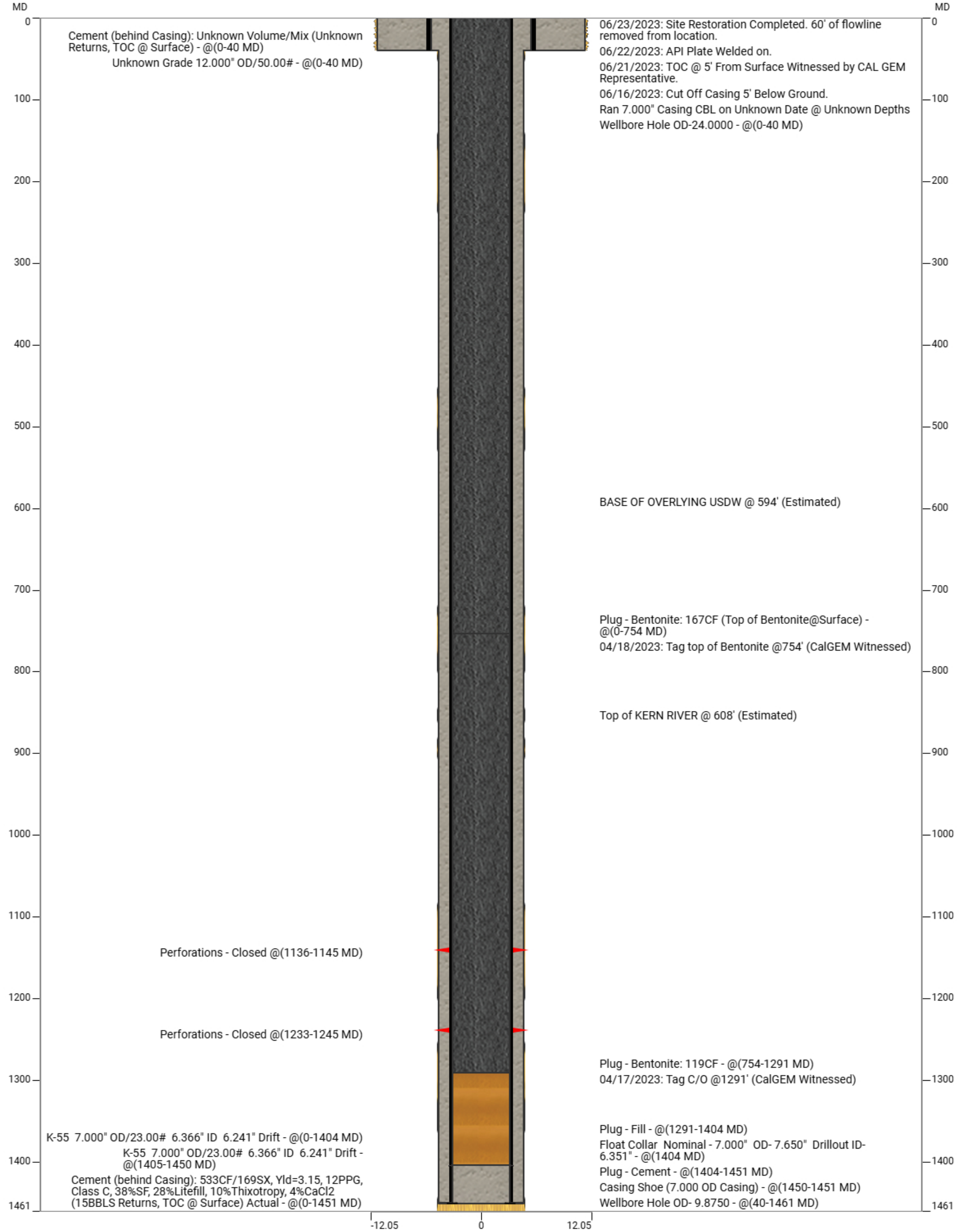

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Ground Elevation (MSL):** | 947.70 ft | | | **Spud Date:** | 10/17/2013 | **Compl. Date:** | 12/10/2013 |
| **Well Depth Datum:** | Ground Level | | | **Elevation (MSL):** | 947.70 ft | **Correction Factor:** | 0.00 ft |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Field:** | Kern River | **Well Name:** | ZCH 103 | | | | |
| **Lease Name:** | Chanslor | **CalGEM Lease Name:** | Chanslor | **CalGEM Well Number:** | 103 | | |
| **County:** | Kern (2) | **St:** | California | **API:** | 0403051466 | **API12:** | 040305146600 |
| **Section:** | 24 | **Township:** | 28S | **Range:** | 27E | **Base Meridian:** | MD |
| **Well Profile:** | Vertical | | | | | | |



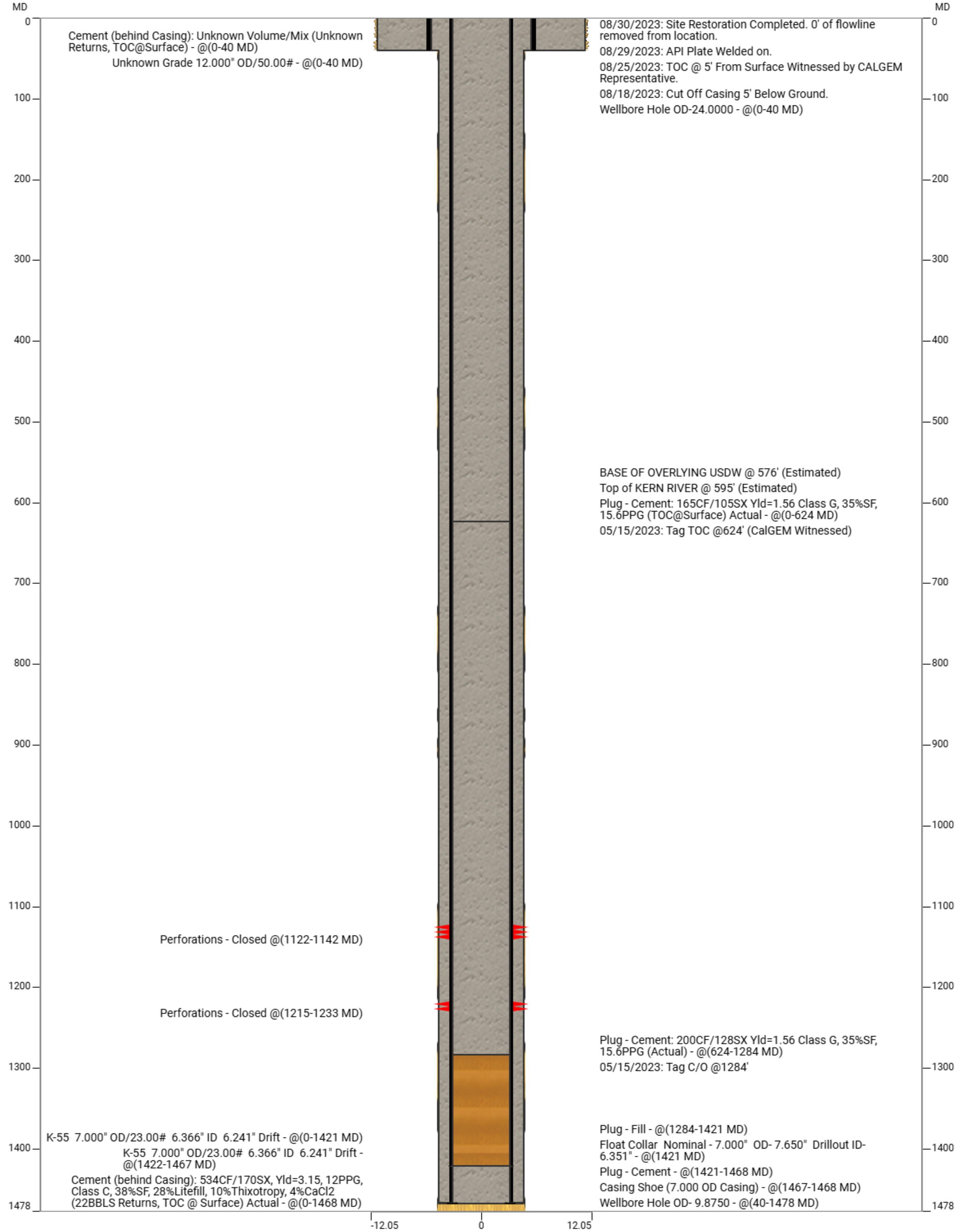

| | | | | | |
|---|---|---|---|---|---|
| **Ground Elevation (MSL):** | 954.60 ft | **Spud Date:** | 10/13/2013 | **Compl. Date:** | 10/14/2013 |
| **Well Depth Datum:** | Ground Level | **Elevation (MSL):** | 954.60 ft | **Correction Factor:** | 0.00 ft |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Operator Name:** | Chevron U.S.A. Inc. | **Field:** | Kern River | **Well Name:** | ZCH 528 | | |
| **Fee/Lease:** | Chanslor | | | **Well Number:** | 528 | | |
| **County:** | Kern (2) | **St:** | California | **API:** | 0403052041 | **API12:** | 040305204100 |
| **Section:** | 24 | **Township:** | 28S | **Range:** | 27E | **Base Meridian:** | MD |
| **Well Profile:** | Vertical | | | | | | |



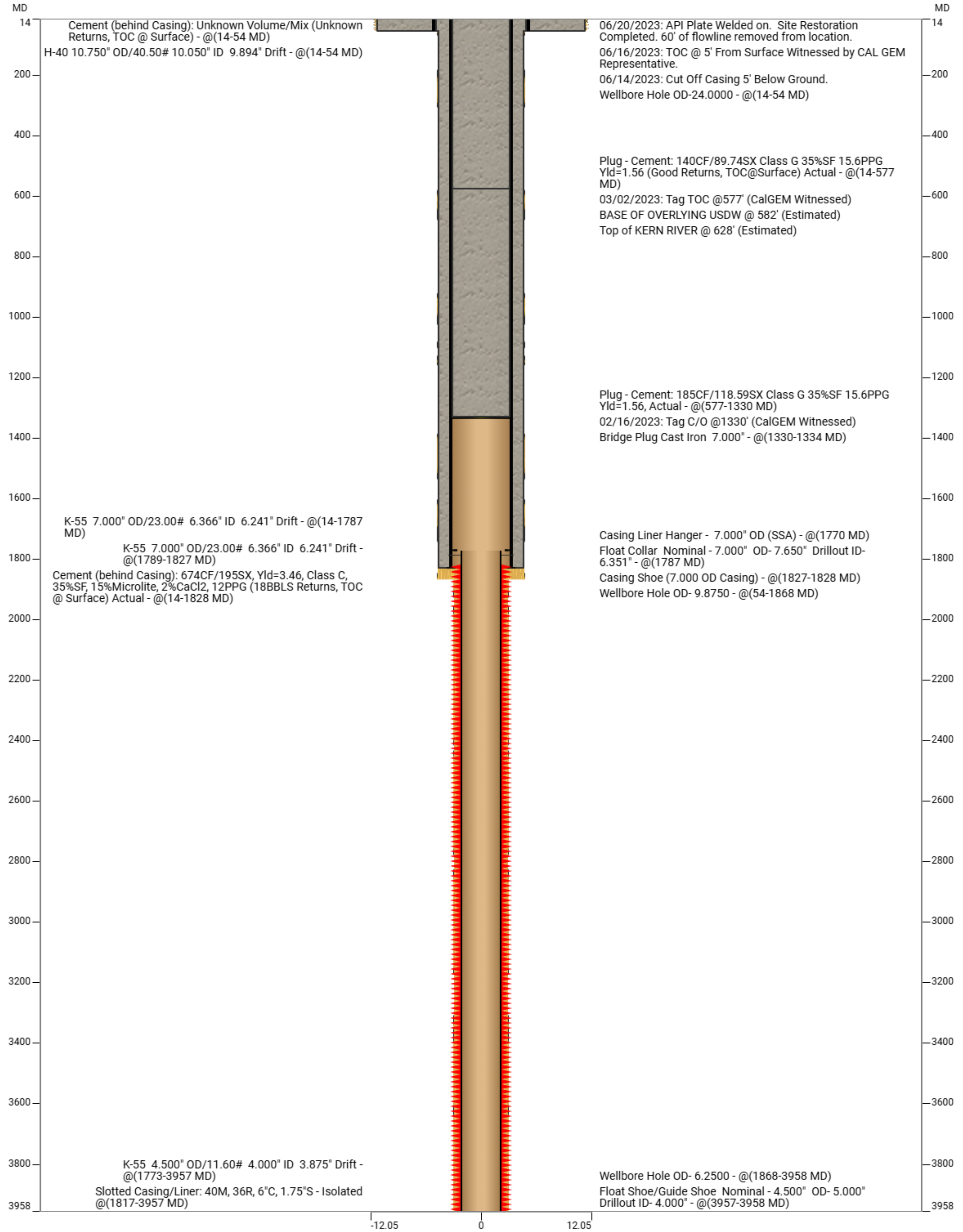

| | | | | | |
|---|---|---|---|---|---|
| **Ground Elevation (MSL):** | 937.90 ft | **Spud Date:** | 12/17/2013 | **Compl. Date:** | 1/30/2014 |
| **Well Depth Datum:** | Ground Level | **Elevation (MSL):** | 937.90 ft | **Correction Factor:** | 0.00 ft |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Operator Name:** | Chevron U.S.A. Inc. | **Field:** | Kern River | **Well Name:** | ZCH 532 | | |
| **Fee/Lease:** | Chanslor | | | **Well Number:** | 532 | | |
| **County:** | Kern (2) | **St:** | California | **API:** | 0403052045 | **API12:** | 040305204500 |
| **Section:** | 24 | **Township:** | 28S | **Range:** | 27E | **Base Meridian:** | MD |
| **Well Profile:** | Directional | | | | | | |



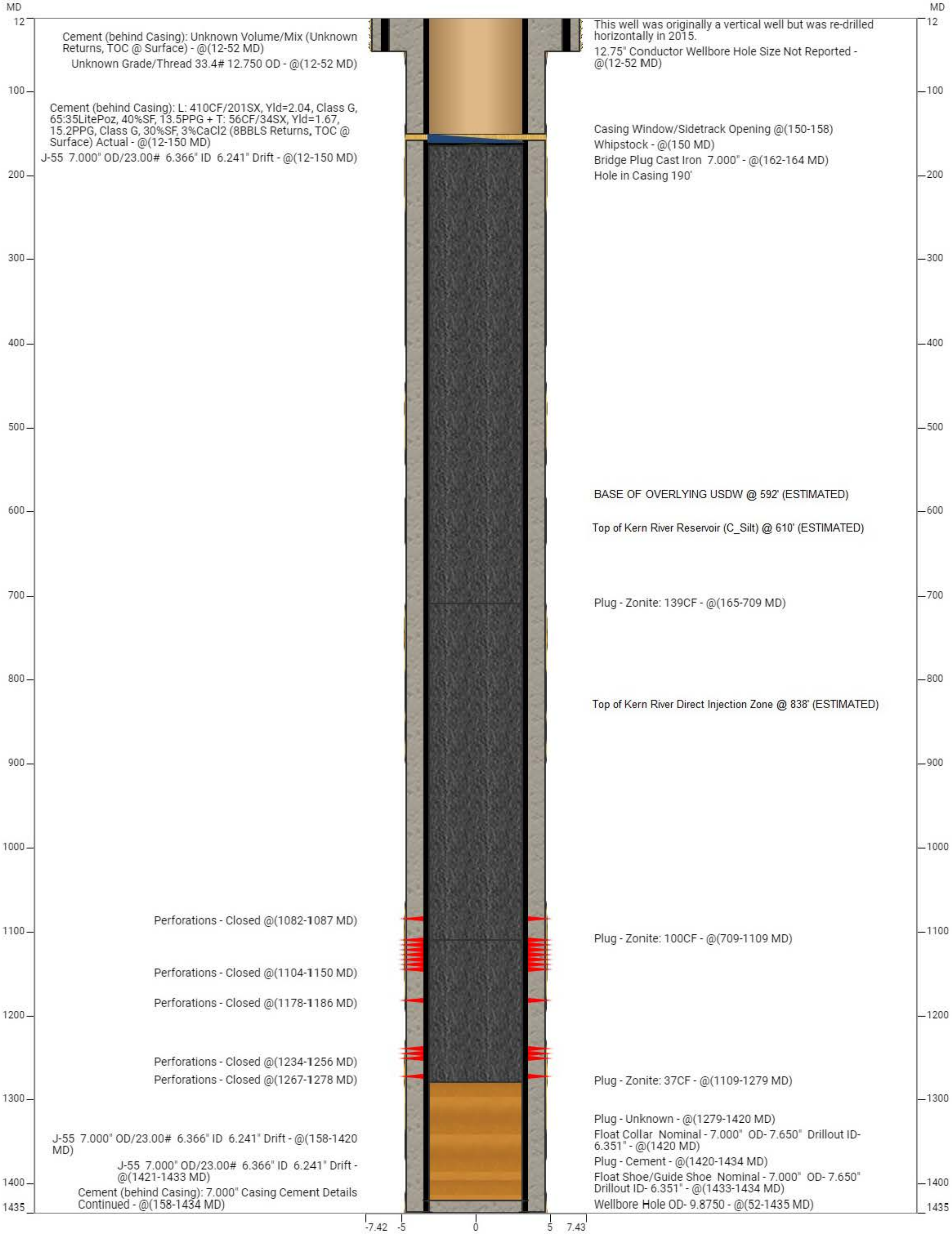

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Ground Elevation (MSL):** | 926.50 ft | | | **Spud Date:** | 12/6/2013 | **Compl. Date:** | 1/30/2014 |
| **Well Depth Datum:** | Ground Level | | | **Elevation (MSL):** | 926.50 ft | **Correction Factor:** | 0.00 ft |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Operator Name:** | Chevron U.S.A. Inc. | **Field:** | Kern River | **Well Name:** | ZCH 123H | | |
| **Fee/Lease:** | Chanslor | | | **Well Number:** | 123H | | |
| **County:** | Kern (2) | **St:** | California | **API:** | 0403063442 | **API12:** | 040306344200 |
| **Section:** | 24 | **Township:** | 28S | **Range:** | 27E | **Base Meridian:** | MD |
| **Well Profile:** | Horizontal | | | | | | |



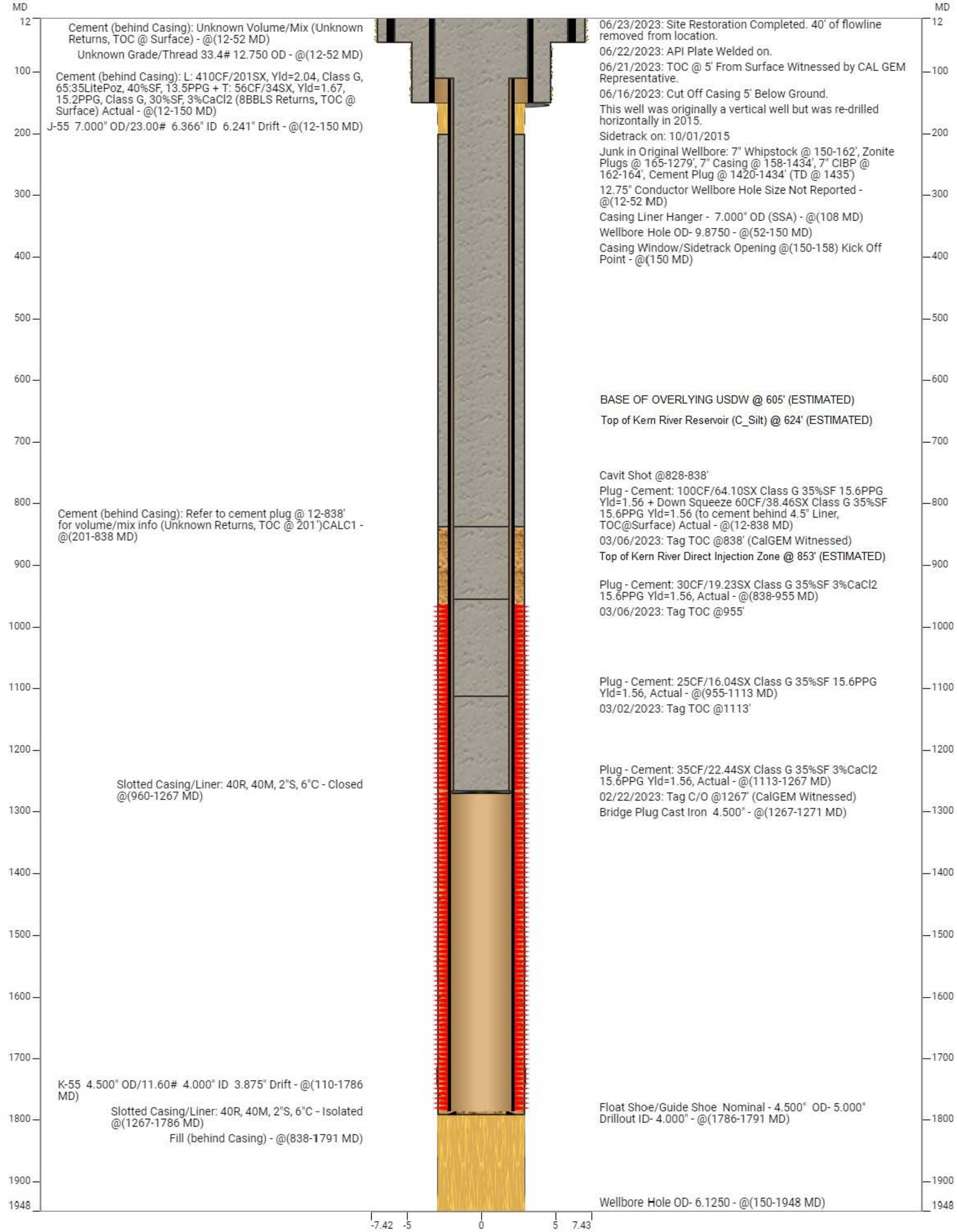

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Ground Elevation (MSL):** | 870.20 ft | | | **Spud Date:** | 3/13/2018 | **Compl. Date:** | 4/3/2018 |
| **Well Depth Datum:** | Kelly Bushing | | | **Elevation (MSL):** | 884.20 ft | **Correction Factor:** | 14.00 ft |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Field:** | Kern River | **Well Name:** | ZCH 51 | | | | |
| **Lease Name:** | Chanslor | **CalGEM Lease Name:** | Chanslor | **CalGEM Well Number:** | 51 | | |
| **County:** | Kern (2) | **St:** | California | **API:** | 0403010190 | **API12:** | 040301019000 |
| **Section:** | 24 | **Township:** | 28S | **Range:** | 27E | **Base Meridian:** | MD |
| **Well Profile:** | Horizontal | | | | | | |




| | | | | | |
|---|---|---|---|---|---|
| **Ground Elevation (MSL):** | 930.00 ft | **Spud Date:** | 1/11/1998 | **Compl. Date:** | 1/22/1998 |
| **Well Depth Datum:** | Kelly Bushing | **Elevation (MSL):** | 942.00 ft | **Correction Factor:** | 12.00 ft |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Field:** | Kern River | **Well Name:** | ZCH 51 | | | | |
| **Lease Name:** | Chanslor | **CalGEM Lease Name:** | Chanslor | **CalGEM Well Number:** | 51 | | |
| **County:** | Kern (2) | **St:** | California | **API:** | 0403010190 | **API12:** | 040301019001 |
| **Section:** | 24 | **Township:** | 28S | **Range:** | 27E | **Base Meridian:** | MD |
| **Well Profile:** | Horizontal | | | | | | |




| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Ground Elevation (MSL):** | 930.00 ft | | | **Spud Date:** | 1/11/1998 | **Compl. Date:** | 1/22/1998 |
| **Well Depth Datum:** | Kelly Bushing | | | **Elevation (MSL):** | 942.00 ft | **Correction Factor:** | 12.00 ft |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Field:** | Kern River | **Well Name:** | WD - 1 | | | | |
| **Lease Name:** | Lease by California Resources | **CalGEM Lease Name:** | Lease by California Resources | **CalGEM Well Number:** | 1 | | |
| **County:** | | **St:** | | **API:** | 0403010794 | **API12:** | 040301079400 |
| **Section:** | 13 | **Township:** | 28S | **Range:** | 27E | **Base Meridian:** | * |
| **Well Profile:** | Vertical | | | | | | |

Cement (behind Casing) Unknown Volume/Mix (Unknown Returns, TOC @ Surface) - @(0-40 MD)

Unknown Grade 13.375" OD/48.00# 12.715" ID 12.559" Drift - @(0-40 MD)

Cement (behind Casing) Top Job: 200CF/128.34SX, Yld=1.56, Class G, 35%SF (TOC @ Surface)Actual - @(0-100 MD)

Unknown Grade 5.500" OD/17.00# 4.892" ID 4.767" Drift (Tie-back Assembly) - @(0-278 MD)

J-55 7.000" OD/23.00# 6.366" ID 6.241" Drift - @(0-280 MD)

Unknown Grade 5.500" OD/17.00# 4.892" ID 4.767" Drift (Tie-back Assembly) - @(279-299 MD)

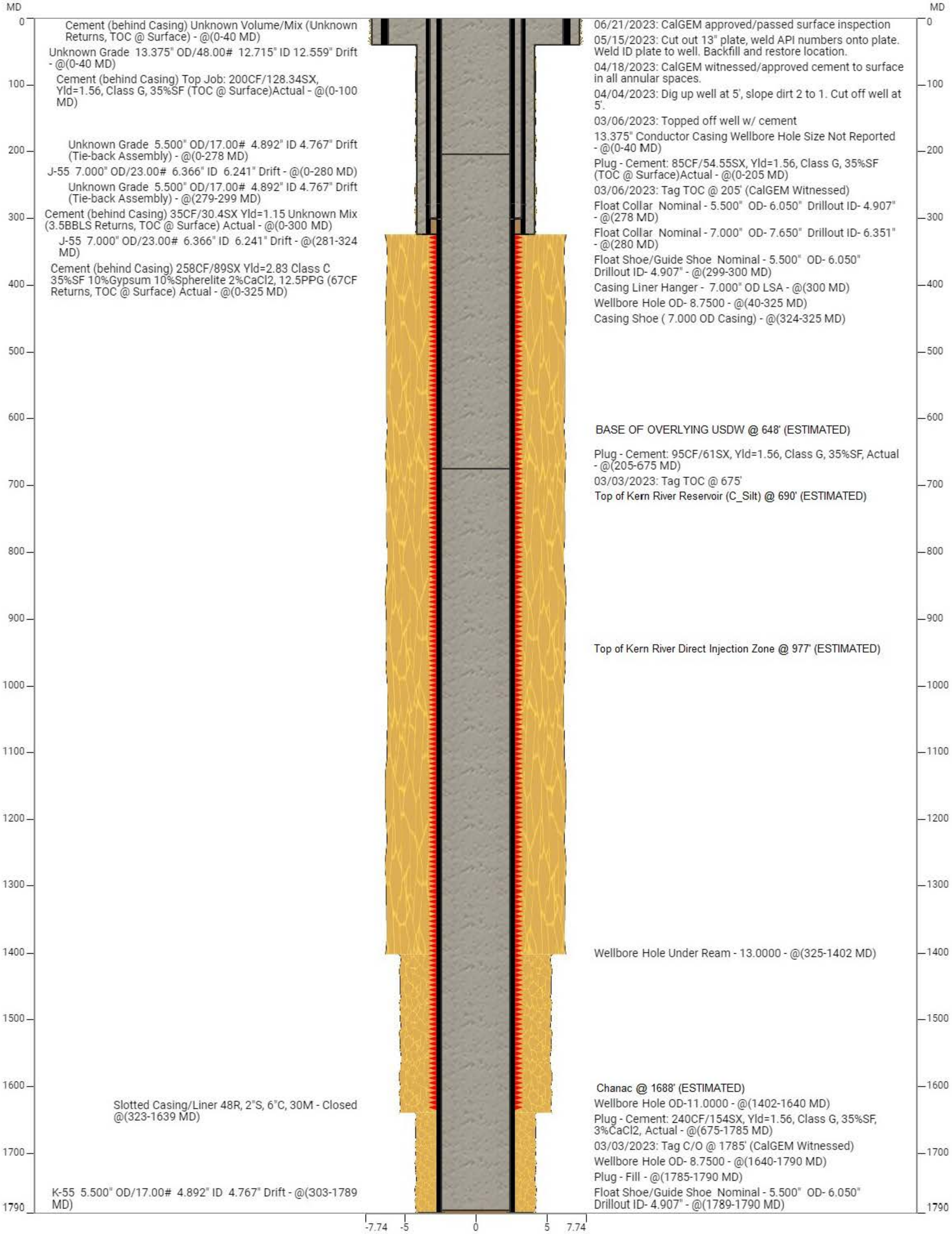
Cement (behind Casing) 35CF/30.4SX Yld=1.15 Unknown Mix (3.5BBLS Returns, TOC @ Surface) Actual - @(0-300 MD)

J-55 7.000" OD/23.00# 6.366" ID 6.241" Drift - @(281-324 MD)

Cement (behind Casing) 258CF/89SX Yld=2.83 Class C 35%SF 10%Gypsum 10%Spherelite 2%CaCl2, 12.5PPG (67CF Returns, TOC @ Surface) Actual - @(0-325 MD)

Slotted Casing/Liner 48R, 2"S, 6"C, 30M - Closed @(323-1639 MD)

K-55 5.500" OD/17.00# 4.892" ID 4.767" Drift - @(303-1789 MD)




06/21/2023: CalGEM approved/passed surface inspection

05/15/2023: Cut out 13" plate, weld API numbers onto plate. Weld ID plate to well. Backfill and restore location.

04/18/2023: CalGEM witnessed/approved cement to surface in all annular spaces.

04/04/2023: Dig up well at 5', slope dirt 2 to 1. Cut off well at 5'.

03/06/2023: Topped off well w/ cement

13.375" Conductor Casing Wellbore Hole Size Not Reported - @(0-40 MD)

Plug - Cement: 85CF/54.55SX, Yld=1.56, Class G, 35%SF (TOC @ Surface)Actual - @(0-205 MD)

03/06/2023: Tag TOC @ 205' (CalGEM Witnessed)

Float Collar Nominal - 5.500" OD- 6.050" Drillout ID- 4.907" - @(278 MD)

Float Collar Nominal - 7.000" OD- 7.650" Drillout ID- 6.351" - @(280 MD)

Float Shoe/Guide Shoe Nominal - 5.500" OD- 6.050" Drillout ID- 4.907" - @(299-300 MD)

Casing Liner Hanger - 7.000" OD LSA - @(300 MD)

Wellbore Hole OD- 8.7500 - @(40-325 MD)

Casing Shoe ( 7.000 OD Casing) - @(324-325 MD)

BASE OF OVERLYING USDW @ 648' (ESTIMATED)

Plug - Cement: 95CF/61SX, Yld=1.56, Class G, 35%SF, Actual - @(205-675 MD)

03/03/2023: Tag TOC @ 675'

Top of Kern River Reservoir (C_Silt) @ 690' (ESTIMATED)

Top of Kern River Direct Injection Zone @ 977' (ESTIMATED)

Wellbore Hole Under Ream - 13.0000 - @(325-1402 MD)

Chanac @ 1688' (ESTIMATED)

Wellbore Hole OD-11.0000 - @(1402-1640 MD)

Plug - Cement: 240CF/154SX, Yld=1.56, Class G, 35%SF, 3%CaCl2, Actual - @(675-1785 MD)

03/03/2023: Tag C/O @ 1785' (CalGEM Witnessed)

Wellbore Hole OD- 8.7500 - @(1640-1790 MD)

Plug - Fill - @(1785-1790 MD)

Float Shoe/Guide Shoe Nominal - 5.500" OD- 6.050" Drillout ID- 4.907" - @(1789-1790 MD)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Ground Elevation (MSL):** | 914.00 ft | **Spud Date:** | 3/11/1998 | **Compl. Date:** | 3/18/1998 | | |
| **Well Depth Datum:** | Ground Level | **Elevation (MSL):** | 914.00 ft | **Correction Factor:** | 0.00 ft | | |