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## ACRONYMS AND OTHER ABBREVIATIONS

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>AF</td>
<td>acre-feet</td>
</tr>
<tr>
<td>AFY</td>
<td>acre-feet per year</td>
</tr>
<tr>
<td>Amec</td>
<td>Amec Foster Wheeler</td>
</tr>
<tr>
<td>As</td>
<td>arsenic</td>
</tr>
<tr>
<td>AFO-BC</td>
<td>Analysis of Future Operations—Buildout Conditions</td>
</tr>
<tr>
<td>AFO-EC</td>
<td>Analysis of Future Operations—Existing Conditions</td>
</tr>
<tr>
<td>APO</td>
<td>Analysis of Past Operations</td>
</tr>
<tr>
<td>bgs</td>
<td>below ground surface</td>
</tr>
<tr>
<td>cfs</td>
<td>cubic feet per second</td>
</tr>
<tr>
<td>COC</td>
<td>constituent of concern</td>
</tr>
<tr>
<td>DBCP</td>
<td>Dibromochloropropane</td>
</tr>
<tr>
<td>DEIR</td>
<td>draft environmental impact report</td>
</tr>
<tr>
<td>DWR or Department</td>
<td>California Department of Water Resources</td>
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<tr>
<td>EC</td>
<td>electrical conductivity</td>
</tr>
<tr>
<td>EDB</td>
<td>ethylene dibromide</td>
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<tr>
<td>EIR</td>
<td>environmental impact report</td>
</tr>
<tr>
<td>KCWA</td>
<td>Kern County Water Agency</td>
</tr>
<tr>
<td>KFE</td>
<td>Kern Fan Element</td>
</tr>
<tr>
<td>KFMC</td>
<td>Kern Fan Monitoring Committee</td>
</tr>
<tr>
<td>KWB</td>
<td>Kern Water Bank</td>
</tr>
<tr>
<td>KWBA</td>
<td>Kern Water Bank Authority</td>
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<tr>
<td>MCL</td>
<td>maximum contaminant level</td>
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<td>Monterey Plus</td>
<td>Monterey Amendment to the State Water Project Contracts (Including Kern Water Bank Transfer) and Associated Actions as Part of a Settlement Agreement</td>
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<td>Environmental Impact Report for the Monterey Amendment to the State Water Project Contracts (including Kern Water Bank Transfer) and Associated Actions as Part of a Settlement Agreement</td>
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<td>Monterey Plus Revised EIR</td>
<td>REIR</td>
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<tr>
<td>NO₃</td>
<td>nitrate</td>
</tr>
<tr>
<td>SWP</td>
<td>State Water Project</td>
</tr>
<tr>
<td>SWRCB</td>
<td>State Water Resources Control Board</td>
</tr>
<tr>
<td>TCP</td>
<td>1,2,3-Trichloropropane</td>
</tr>
<tr>
<td>TDS</td>
<td>total dissolved solids</td>
</tr>
<tr>
<td>EPA</td>
<td>U.S. Environmental Protection Agency</td>
</tr>
<tr>
<td>VOC</td>
<td>volatile organic compound</td>
</tr>
<tr>
<td>WQO</td>
<td>water quality objective</td>
</tr>
<tr>
<td>WSD</td>
<td>water storage district</td>
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7.3 INTRODUCTION

7.3.1 INTRODUCTION

This appendix presents technical information in support of Section 7.2, Surface and Groundwater Water Quality, of the Revised Environmental Impact Report (REIR). Specifically, this appendix presents reference well data, time-concentration graphs and hydrographs from selected wells, tables summarizing the number of constituents of concern or wells exceeding maximum contaminant levels (MCLs), and results of particle tracking evaluations using the California Department of Water Resources (Department or DWR) Kern Water Bank Model (DWR KWB Model) to assess potential groundwater (and indirectly potential constituents of concern [COC]) movement from the KWB boundaries under three modeling scenarios:


MCLs are established by the U.S. Environmental Protection Agency (EPA) to protect the public against consumption of drinking water contaminants that present a risk to human health. An MCL is the maximum allowable amount of a contaminant in drinking water which is delivered to the consumer.

7.3.2 REFERENCE WELL LIST DATA

A subset of the wells in the Kern County Water Agency (KCWA) database was selected for data evaluations. This subset of wells is the “reference list” for Section 7.2, Surface and Groundwater Water Quality, in the REIR. Reference list wells were selected to represent the quality of groundwater across the Kern Fan Element (KFE) property (referred to as “KWB Lands” after 1995) and from which historical sample results had been previously analyzed statistically in Kern Fan Monitoring Committee (KFMC) reports (KFMC 2013). Descriptive information on reference wells is presented in Table 7.3-1. As cited in other appendix sections, additional sets of wells were used to evaluate water level changes (hydrographs) and time-concentration trends.

7.3.3 GROUNDWATER QUALITY SAMPLE COMPARISONS

KCWA and Kern Water Bank Authority (KWBA) database information was compiled to compare and evaluate the most recent (2012 through 2015) groundwater sample data against MCLs. Table 7.3-2 presents data on wells with constituents that exceeded California or U.S. MCLs in samples collected during 2012 through 2015 (shaded rows are recovery wells). In addition, KFMC data base information

---

was used to compare the same criteria set against KWB production well samples exceeding specific criteria to evaluate major COCs detected by year from 2001 to 2014. This is discussed in Section 7.2 and summarized in the following tables:

- Table 7.3-3A & B, Total Number of Production Wells Exceeding MCLs (2001 – 2014)
- Table 7.3-4, Concentration Range of Constituents of Concern in KWB Production Well Samples (2001 – 2014)

### 7.3.4 WELLS USED FOR IMPACT EVALUATION

A select set of wells (well clusters) distributed within and along the perimeter of KWB Lands were used to evaluate water level and water quality trends for select constituents of concern (arsenic, nitrate as NO₃, total dissolved solids [TDS]), alpha, and uranium in shallow, middle, and deep zone wells. This is discussed in text and summarized in the following figures:

- Figure 7.3-1, Select Wells Used for Impact Evaluations (time-concentration graphs)
- Figures 7.3-2-1 to 7.3-2-14, Hydrographs from Well Clusters
- Figures 7.3-3A to 3D, Arsenic in Shallow and Deep Monitoring Wells
- Figures 7.3-4A to 4C, Nitrate as NO₃ in Shallow, Middle, and Deep Monitoring Wells
- Figures 7.3-5A to 5C, Total Dissolved Solids in Shallow, Middle, and Deep Monitoring Wells

These figures are followed by time-concentration graphs for alpha and uranium from wells that were sampled for those COCs. They are placed in order by township and range rather than having figure numbers. The wells with alpha and uranium results can be indexed from Figure 7.3-1.

### 7.3.5 IMPACT EVALUATION – PARTICLE TRACKING

To assess potential groundwater movement and potential COC movement from the outer boundary of the KWB, a particle tracking evaluation was completed using the DWR KWB Model for the various project scenarios (APO, AFO-EC, and AFO-BC with and without KWB recharge and recovery). The results of this evaluation are included in Section 7.2 of the REIR. The following figures were developed (for all model layers combined) to show the maximum extent a molecule of groundwater could travel under each modeling scenario:

- Figure 7.3-6, APO Particle Tracking Results (1995 – 2014) – Maximum Travel Distance with and without KWB Recharge and Recovery;
- Figure 7.3-7, AFO-EC Particle Tracking Results (2015 - 2035) – Maximum Travel Distance with and without KWB Recharge and Recovery; and
- Figure 7.3-8, AFO-BC Particle Tracking Results (2015 - 2035) – Maximum Travel Distance with and without KWB Recharge and Recovery.

### 7.3.6 GROUNDWATER QUALITY IMPACTS - HAZARDOUS MATERIAL SITES

Groundwater quality impacts associated with hazardous material sites (Impact Section 7.2.3.2) were evaluated by assessing the potential for mobilization of impacted soil contaminants or the migration of impacted groundwater as a result of high water level fluctuations. The minimum depth to water was simulated at two observation points for the APO, AFO-EC, and AFO-BC modeling scenarios. The depth to water was determined by subtracting the ground surface elevation at the observation point from the model simulated groundwater elevation. Frequency and duration of high water levels were then evaluated with the depth of residual soil and/or groundwater contamination. Hydrographs for each
observation point under the APO, AFO-EC, and AFO-BC modeling scenarios are presented in Figures 7.3-9 to Figure 7.3-11.

7.3.7 GROUNDWATER QUALITY IMPACTS ASSOCIATED WITH SALT ACCUMULATION

For the salt balance analysis (Impact 7.2.3.6 in Section 7.2 of the REIR), calculations by the KFMC from 1995 to 2006 were used and new calculations for 2007 to 2014 were performed. TDS for salt loading from KWB recharge operations for 2007 to 2014 was calculated on a monthly basis (from milligrams/liter [mg/L] to tons/acre-foot) and then summed on an annual basis for each water recharge source (State Water Project [SWP], the Kern River, and the Friant-Kern Canal). Updated salt loading calculations were performed using average monthly TDS values for the SWP at the Check 29 location. TDS values for the Kern River and Friant-Kern Canal were obtained using quarterly sampling data collected from the Henry C. Garnett Water Purification Plant. Monthly TDS concentrations for the Kern River and Friant-Kern Canal were extrapolated by using the average concentration between quarterly sampling events.

TDS for salt extraction from KWB recovery operations for 2007 to 2014 was calculated on an annual basis for each KWB production well. Updated TDS values for each well were obtained by calculating the average Total Filterable Residue concentration from laboratory data available for 2007-2014 provided by KCWA. Where updated laboratory data were unavailable, the TDS value from KCWA's December 2014 Blending Model or the same value reported for 2001-2006 calculations was used.

The equations used in the salt balance calculations (Tables 7.2-10 and -11 in Section 7.2.3.6 of the REIR) are:

\[
\text{Solids/Salts Load (Tons)} = \frac{\text{Gross Recharge (AF)} \times 43,560 \text{ (ft}^3\text{)} \times 8.3451 \text{ (lb/gal)} \times \text{TDS (mg/L)}}{2,000 \text{ (lb/ton)} \times 1,000,000 \text{ (mg/L)}}
\]

\[
\text{Total Dissolved Solids Concentration} \left( \frac{\text{Tons}}{\text{AF}} \right) = \frac{\text{Solids/Salts Load (tons)}}{\text{Volume (Recharge/Recovery in AF)}}
\]

7.3.8 AREAS OF GROUNDWATER QUALITY CONCERN (PRIOR TO 1995)

KFMC previously delineated areas of elevated levels of TDS, fluoride, arsenic, ethylene dibromide (EDB), nitrate as NO₃, uranium, and dibromochloropropane (DBCP) on maps using historical data from approximately 1995 (Figure 7.2-3).

7.3.8.1 Total Dissolved Solids

TDS is made up of inorganic salts as well as a small amount of organic matter. Common inorganic salts that can be found in water include cations (calcium, magnesium, potassium, and sodium) and anions (carbonates, nitrates, bicarbonates, chlorides, fluoride, and sulfates).

KCWA sampling data from 1990 to 1995 identified three wells on the KFE property located outside of the delineated TDS area with concentrations exceeding the 500 mg/L MCL and the SWP water quality objective (WQO) criterion of 440 mg/L:

- Well 30/25-12C01 is located approximately 0.25 mile southwest of an area with extremely high TDS concentrations exceeding 5,000 mg/L in the upper aquifer and 800 mg/L in the deeper
The elevated concentration of TDS in well 30/25-12C01 is thought to be a result of past brine disposal in the Strand Oil Field.

- Multi-completion well cluster (a cluster of wells screened at different aquifer zone depths) 30/25-4J is located northwest of historic brine disposal activities in the Strand and Canal oil fields that disposed of approximately 120,000 tons of salt prior to 1970. Water quality data from this well cluster suggest that water quality is stratified in this area. High concentrations of TDS are limited to the shallow zone in well 30/25-04J02 (screened from 190-250 feet below ground surface [bgs]), while concentrations in the middle zone well 30/25-04J03 (screened at 345-455 feet bgs) had TDS concentrations ranging from 58 to 353 mg/L. Well 30/25-04J04 (screened at 565-625 ft) in the deep zone had TDS concentrations ranging from 109 to 242 mg/L from 1990 to 1995.

- Sampling data from well 30/24-13D indicated that groundwater quality is stratified in the vicinity of the well at depths and that only shallow well 30/24-13D01 (screened 150-250 ft) appeared to have elevated concentrations of TDS; while, wells zoned in the middle zone, well 30/24-13D02 (screened at 320-360 ft), and deep zone, well 30/24D03 (screened at 520-650 ft), had relatively lower concentrations of TDS ranging from 223 to 366 mg/L and from 254 to 345 mg/L, respectively, between 1990 and 1995.

- Another area where TDS in groundwater exceeds 500 mg/L is located to the northwest of the KFE property and north of the Kern River between Enos Lane and Highway 99 (Figure 7.2-3).

7.3.8.2 Chloride, Sulfate, Fluoride, and Nitrate

Chloride, sulfate, and fluoride are elements of concern when concentrations exceed 250 mg/L, 250 mg/L, and 2 mg/L, respectively. Six wells (30/25-10C01, 30/25-12C01, 30/25-04J02, 30/25-04J03, 30/25-36D01, and 30/25-20C01) exceeded the SWP WQO of 110 mg/L for chloride. Five wells (30/24-13D01, 30/24-13D02, 30/24-13D03, 30/24-24A01, and 30/25-18P01) exceeded the SWP WQO of 110 mg/L for sulfate.

While areas of nitrate in groundwater existed on the KFE property prior to 1995, all concentrations of nitrate were below the MCL of 45 mg/L. Additional sampling data from KCWA indicated that nitrate concentrations across the KFE property generally ranged from less than 0.1 mg/L to 44 mg/L between 1990 and 1995. Wells with concentrations of nitrate (above 20 mg/L) located outside of the area previously delineated by DWR include 30/25-04J02 (4.6 to 44 mg/L), 30/25-04J03 (3.8 to 21 mg/L), 30/25-04J04 (0.02 to 20 mg/L), 30/25-09A01 (22.2 mg/L), 30/25-09J01 (32.3 mg/L), and 30/25-04L01 (26.5 mg/L).

7.3.8.3 Metals

Arsenic

Arsenic is an element of concern when concentrations exceed the MCL of 10 µg/L. There were two main areas of elevated arsenic in the vicinity of the KFE property identified by the Kern Fan Monitoring Committee that exceeded the 50 µg/L MCL in 1995 (see Figure 7.2-1 in Section 7.2 in the REIR). The previously delineated areas of elevated arsenic include the southeast portion of the KFE property and a small area spanning across the Kern River below the Second Point of diversion (measurement location for City of Bakersfield downstream of the southern end of the 2,800-Acre Recharge Facility), west of Enos Land and south of the KWB Canal.

Additional KCWA water quality sampling data collected between 1990 and 1995 indicate that groundwater concentrations of arsenic across the KFE property ranged from less than 1 µg/L to 40 µg/L. A total of nine wells exceeded the MCL of 10 µg/L in 1995: 30/25-16L02, 30/25-16L03, 30/25-04J04, 30/25-15C01, 30/26-20N02, 30/25-09L01, 30S/25E-05K01, and 30S/25E-06K01. The majority
of these wells are screened within the deep zone of the aquifer; however, 30/25-04J04 is a very shallow well (screened from 45 to 65 ft).

**Boron**

Boron is an element of concern for irrigated agriculture when concentrations exceed 0.2 mg/L. The SWP WQO for boron is 0.6 mg/L. There is no MCL for boron. KCWA water quality sampling data collected between 1990 and 1995 identified approximately 30 wells on the KFE property that exceeded concentrations of 0.2 mg/L; however, all were below the SWP WQO of 0.6 mg/L except for three well locations. The three wells were comprised of multicompletion wells 30/24-13D, 30/25-04J, and 30/25-16L. A single monitoring well (30S/24E-24A01) had high concentrations of boron ranging from 100 to 400 mg/L.

**Barium**

Barium is an element of concern when concentrations exceed 1 mg/L. Groundwater investigations on the KFE property indicated that one monitoring well (30/25-12B) in the shallow zone exceeded the MCL for barium of 1 mg/L. The well contained high levels of TDS and is situated within a delineated area of TDS concern.

**Cadmium**

Cadmium is an element of concern when concentrations exceed 5 µg/L. Groundwater investigations on the KFE property indicated that six monitoring wells exceeded the MCL of 5µg/L for cadmium. The exceedances were isolated to two multi-completion monitoring wells, 30/24-13D and 30/25-04J. At 30/25-04J, cadmium concentrations ranging from 8 to 12 µg/L were relatively consistent through the shallow well 30S/26E-04J04 (screened at 45-65 ft), middle zone well 30S/26E-04J02 (screened at 223 to 375 ft), and the deep zone well 30S/26E-04J03 (screened at 560-650 ft). At 30/24-13D, concentrations in the shallow and deep aquifers were about twice as high as concentrations in the middle aquifer. Concentrations in the middle zone well 30S/24E-13D02 (screened at 320-360 ft) were approximately 6 µg/L; whereas, concentrations in the shallow well 30S/24E-13D01 (screened at 150-250 ft) and the deep well, 30S/24E-13D03 (screened at 520-650 ft) were approximately 12 to 13 µg/L between 1990 and 1995.

**Iron and Manganese**

Iron and Manganese are elements of concern when concentrations exceed approximately 300 and 50 µg/L respectively. During previous groundwater investigations, limited iron and manganese sampling was performed. Additional KCWA water quality sampling data collected between 1990 and 1995 indicate that groundwater concentrations of iron and manganese across the KFE property range from 0.08 µg/L to 1,715 µg/L and 0.1 µg/L to 78 µg/L, respectively.

A total of eleven wells on the KFE property exceeded the secondary MCL for iron of 300 µg/L and the SWP WQO for iron and manganese together of 300 µg/L. These wells are 30S/25E-04L01, 30S/25E-07G01, 30S/25E-07P01, 30S/25E-08F01, 30S/25E-09L01, 30S/25E-10C01, 30S/25E-16F01, 30S/25E-16R01, 30S/25E-20L01, 30S/26E-19M01, and 30S/26E-20L01.

Two wells on the KFE property (30S/25E-06K01 and 30S/25E-07P01) with respective manganese concentrations of 66 µg/L and 78 µg/L exceed the secondary MCL of 50 µg/L. (A secondary MCL is not enforced by EPA but is established only as a guideline to assist public water systems in managing their drinking water for aesthetic considerations, such as taste, color, and odor; secondary MCLs are not considered to present a risk to human health.)
7.3.8.4 Radiological Constituents

Limited groundwater sampling for radiological constituents was performed on the KFE property prior to 1995.

Uranium

Investigations by DWR in 1987 identified two areas that contained uranium in groundwater at concentrations that slightly exceed the 20 picocurie per liter (pCi/L) MCL on the KFE property; however, the location of these areas was not specified nor delineated at the time. KCWA water quality sampling data collected between 1990 and 1995 for 11 wells indicate that uranium concentrations on the KFE property ranged from less than 0.69 pCi/L to 72.7 pCi/L. A total of three wells had concentrations exceeding the MCL: 30S/24E-13D01 (7.27 pCi/L), 30S/24E-24A01 (26.2 pCi/L), and 30S/25E-04J02 (21.8 pCi/L).

Alpha Activity

KCWA water quality sampling data collected between 1990 and 1995 for 21 wells indicate that total alpha concentrations on the KFE property ranged from less than 0.91 pCi/L to 53.2 pCi/L. Total alpha activity consists of all alpha emitting radionuclides, including uranium, radon, and radium 226 and 228.

A total of three wells had concentrations exceeding the MCL: 30S/24E-13D01 (7.27 pCi/L), 30S/24E-24A01 (26.2 pCi/L), and 30S/25E-04J02 (21.8 pCi/L). The elevated alpha activity in the vicinity of the KFE property is generally considered to be attributed to uranium. There is no MCL for total alpha; however, the MCL for gross alpha is 15 pCi/L. Gross alpha is comprised of all alpha activity except radon and uranium.

Pesticides

Ethylene dibromide (EDB)

EDB, a common nematocide used to control nematodes on crops, was used on fairly large areas of the KFE property prior to it being banned in 1983. Areas of elevated concentration of EDB are located outside of and northeast of the KFE property to the north along Enos Lane and to the north of the Rosedale Highway (Figure 7.2-3). Additional KCWA water quality sampling data collected between 1990 and 1995 indicate that EDB was detected within five wells on the KFE property, four of which were found to have concentrations that exceed the MCL of 0.05 µg/L. These wells were: 30S/25E-03L01 (0.6 µg/L), 30S/25E-03Q01 (0.32 µg/L), 30S/25E-10C01 (0.13 µg/L), and 30S/25E-11C01 (0.37 µg/L).

1,2-dibromo-3-chloropropane (DBCP)

DBCP is a soil fumigant used in agriculture in the early 1970s. An area of DBCP (at or in excess of 0.2 µg/L in groundwater) was identified to the northeast of KWB Lands. Limited sampling for DBCP was performed during groundwater investigations between 1990 and 1995. Available water quality sampling data collected during 1990 to 1995 indicate that of the nine sampled wells located on KWB Lands; none contained concentrations above the MCL of 0.2 µg/L. As such, DBCP is not expected to be an issue for KWB operations.
Other Pesticides

Groundwater investigations by DWR and KWCA between 1990 and 1995 indicated low detections of toxaphene, EPTC, 1,2,3-trichloropropane (TCP), and 1,2-Dichloropropane in groundwater wells on the KFE property. Toxaphene, with an MCL of 3 µg/L, was detected in two wells: 30/25-19K1 and 30/24-12R01 at concentrations of 9 and 2 mg/L, respectively.

Diuron was present with a concentration of 0.26 µg/L in shallow well 30/26-19B; currently, there is no MCL for Diuron.

Eptam (EPTC) has been identified in samples from well 30/25/8P01 at a concentration of 170 µg/L in 1989. In 1991, the concentration was 5.6 µg/L. In 1993, EPTC concentrations were reported to be below detection limits in this well. No other sampling data for EPTC were available.

7.3.9 HYDROGRAPHS FROM KERN FAN MONITORING COMMITTEE

In order to evaluate changes in water quality with respect to water level fluctuations, hydrographs from a select set of wells (normally used for KWB water level monitoring activities) was generated that provide coverage within and adjacent to the KWB. The wells used for the hydrographs are included on Figure 7.3-12. Hydrographs from wells with multiple years of water level monitoring data are included as Figures 7.3-13 to 7.3-40. Many of the hydrographs include cluster wells and show the response and relationship of water levels (or potentiometric surfaces) from multiple depth-specific aquifer zones (i.e., well screen depths). For the most part cluster well hydrographs indicate the same pattern of fluctuation suggesting good vertical hydraulic connection. Depending on the location these wells the hydrographs show pronounced or dampened response to KWB recharge and recovery periods. Wells outside of the KWB may also show response to outside water banking activities or to the Kern River.

7.3.10 TIME/CONCENTRATION GRAPHS (COC SAMPLES FROM 1995 TO 2015)

Section 7.2 includes a series of Figures (7.2-5 through 7.2-9) that respectively show wells that were sampled for TDS, arsenic, NO3, alpha, and uranium from 1995 to 2015. Each figure indicates wells in which one or more samples were found to have a detection of the specific COC above the MCL (noted with a red dot) as a means of indicating a general COC distribution pattern as summarized in Section 7.2. The figures represent a broad overview of the 1995 to 2015 time period and were used in conjunction with other data, such as tables summarizing data sets and individual time/concentration graphs, to evaluate concentration patterns and the number of times a COC exceeded an MCL. This was used with the maps showing COC concentration distributions to add a time element (changing COC concentrations over time) to the maps. Accordingly, a set of time/concentration graphs was developed and included in this appendix.

The first set of time/concentration graphs include TDS, arsenic, and NO3 results per well when one or more of these COCs was found to exceed its respective MCL. The second set of time/concentration graphs include alpha and uranium results per well when one or more of these COCs was found to exceed its respective MCL. Each set of time/concentration graphs is set in order of township/range (i.e., 29S/25E, 29S/26E, 30S/24E, 30S/25E, and 30S/26E) with further breakdown in the section order (1-36) so the wells may be easily found using the respective figure as an index. For example, on Figure 7.2-5 well 30S/24E-13D01 was indicated as having an exceedence of the TDS secondary MCL of 500 mg/L. That well can be found in the 30S/24E section of the appendix (leafing down to 13D01). That graph indicates that shallow well 13D01 was found to exceed its MCL in every sample with a rising concentration pattern of TDS until 2005 and a declining concentration pattern after 2005 with more recent samples coming within range of the MCL. That time/concentration graph also indicates that the MCL for arsenic and NO3 was never exceeded in any sample. The time/concentration/graph also shows
a similar rise and fall pattern between NO3 and TDS. In contrast, well 30S/25E-11CO1 shows that sample data is limited (only 2 samples for NO3 and TDS) but only TDS just barely exceeded the MCL. As such, the time/concentration graphs display the concentration history of any given well that had an MCL exceedance in order to evaluate its overall significance respective to COC water quality.
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<td>120–220</td>
<td>Shallow</td>
<td>Monitoring</td>
</tr>
<tr>
<td>30S/26E-28J02</td>
<td>280–330</td>
<td>Middle</td>
<td>Monitoring</td>
</tr>
<tr>
<td>30S/26E-28J03</td>
<td>540–615</td>
<td>Deep</td>
<td>Monitoring</td>
</tr>
<tr>
<td>30S/26E-28J04</td>
<td>75–95</td>
<td>Shallow</td>
<td>Monitoring</td>
</tr>
<tr>
<td>30S/26E-32N01</td>
<td>210–330</td>
<td>Shallow</td>
<td>Monitoring</td>
</tr>
<tr>
<td>30S/26E-32N02</td>
<td>390–440</td>
<td>Middle</td>
<td>Monitoring</td>
</tr>
<tr>
<td>30S/26E-32N03</td>
<td>570–610</td>
<td>Deep</td>
<td>Monitoring</td>
</tr>
</tbody>
</table>

Notes: BVWSD = Buena Vista Water Storage District; ft = feet; ID = identification number; MCL = maximum contaminant level
### TABLE 7.3-2

**WELLS WITH CONSTITUENTS THAT EXCEEDED CALIFORNIA OR U.S. MAXIMUM CONTAMINANT LEVELS IN SAMPLES COLLECTED DURING 2012 THROUGH 2015**

<table>
<thead>
<tr>
<th>Well ID</th>
<th>Sample Date</th>
<th>Value*</th>
<th>Constituent</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>29S/24E-05Q61</td>
<td>7/15/14</td>
<td>3,260</td>
<td>Specific Electrical Conductance</td>
<td>µmhos/cm</td>
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<tr>
<td>29S/24E-27P61</td>
<td>7/15/14</td>
<td>1,820</td>
<td>Specific Electrical Conductance</td>
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</tr>
<tr>
<td>29S/24E-34N01</td>
<td>8/8/12</td>
<td>1,230</td>
<td>Specific Electrical Conductance</td>
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</tr>
<tr>
<td>29S/24E-34N01</td>
<td>7/29/14</td>
<td>900</td>
<td>Total Filterable Residue (analysis)</td>
<td>mg/L</td>
</tr>
<tr>
<td>29S/25E-34J61</td>
<td>3/4/12</td>
<td>610</td>
<td>Total Filterable Residue (analysis)</td>
<td>mg/L</td>
</tr>
<tr>
<td>30/26-07Q01</td>
<td>12/30/14</td>
<td>8.9</td>
<td>pH (H3=past HT not compliant)</td>
<td>Units</td>
</tr>
<tr>
<td>30S/24E-06B03</td>
<td>8/8/12</td>
<td>64</td>
<td>Dissolved Manganese</td>
<td>µg/L</td>
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<tr>
<td>30S/24E-06B03</td>
<td>8/8/12</td>
<td>440</td>
<td>Sulfate (SO₄)</td>
<td>mg/L</td>
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<td>8/8/12</td>
<td>900</td>
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<td>mg/L</td>
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<td>30S/24E-13C01</td>
<td>1/19/15</td>
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<td>mg/L</td>
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<td>30S/24E-13C01</td>
<td>1/19/15</td>
<td>26</td>
<td>Uranium by ICPMS as pCi/L</td>
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<td>30S/24E-13D01</td>
<td>7/26/12</td>
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<td>3/20/13</td>
<td>82.8</td>
<td>Total Alpha</td>
<td>pCi/L</td>
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<td>30S/24E-13D01</td>
<td>7/31/13</td>
<td>650</td>
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<td>30S/24E-13D02</td>
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<td>1/19/15</td>
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<td>30S/24E-14M02</td>
<td>8/10/12</td>
<td>8,470</td>
<td>Specific Electrical Conductance</td>
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<td>7/29/14</td>
<td>2,600</td>
<td>Total Filterable Residue (analysis)</td>
<td>mg/L</td>
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<td>30S/24E-14M02</td>
<td>7/24/13</td>
<td>3,100</td>
<td>Chloride (Cl)</td>
<td>mg/L</td>
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<td>mg/L</td>
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<td>8/10/12</td>
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<td>pCi/L</td>
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<tr>
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<td>1/19/15</td>
<td>53</td>
<td>Gross Alpha + Adjusted Error</td>
<td>pCi/L</td>
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<td>8/22/12</td>
<td>1,900</td>
<td>Dissolved Manganese</td>
<td>µg/L</td>
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<tr>
<td>30S/24E-24C01</td>
<td>8/22/12</td>
<td>11,000</td>
<td>Dissolved Iron</td>
<td>µg/L</td>
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<td>8/22/12</td>
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<td>Turbidity</td>
<td>NTU</td>
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<td>8/22/12</td>
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<td>ton</td>
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<tr>
<td>30S/24E-24C02</td>
<td>8/22/12</td>
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<td>Specific Electrical Conductance</td>
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<td>30S/24E-24C02</td>
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<td>mg/L</td>
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<td>Odor Threshold @60 C</td>
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<td>30S/24E-24C03</td>
<td>8/22/12</td>
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</tr>
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<td>pCi/L</td>
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<td>pCi/L</td>
</tr>
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<td>Units</td>
</tr>
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<td>1/16/12</td>
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<td>pCi/L</td>
</tr>
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<td>1/16/12</td>
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<td>Uranium (Natural, Total)</td>
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<tr>
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<td>Odor at 60 C (ton)</td>
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<tr>
<td>30S/25E-07P01</td>
<td>1/13/15</td>
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<td>Gross Alpha + Adjusted Error</td>
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<td>Uranium ICAP/MS</td>
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<td>Units</td>
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<td>NTU</td>
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<tr>
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<td>Units</td>
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<td>pCi/L</td>
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<td>Value*</td>
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<td>pCi/L</td>
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<td>Arsenic</td>
<td>µg/L</td>
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<tr>
<td>30S/25E-09J01</td>
<td>1/16/12</td>
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<td>Odor Threshold @60 C</td>
<td>Ton</td>
</tr>
<tr>
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<td>1/16/12</td>
<td>20</td>
<td>Total Alpha</td>
<td>pCi/L</td>
</tr>
<tr>
<td>30S/25E-11C02</td>
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<td>30S/25E-11C02</td>
<td>1/12/15</td>
<td>16</td>
<td>Gross Alpha + Adjusted Error</td>
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<tr>
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<td>pCi/L</td>
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<td>9/3/15</td>
<td>8.7</td>
<td>pH (H3=past HT not compliant)</td>
<td>Units</td>
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<tr>
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<td>1/18/12</td>
<td>4</td>
<td>Odor Threshold @60 C</td>
<td>Ton</td>
</tr>
<tr>
<td>30S/25E-11N01</td>
<td>12/22/14</td>
<td>8.6</td>
<td>pH (H3=past HT not compliant)</td>
<td>Units</td>
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<td>µg/L</td>
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<tr>
<td>30S/25E-13J01</td>
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<td>Units</td>
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<td>12/22/14</td>
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<td>Gross Alpha + Adjusted Error</td>
<td>pCi/L</td>
</tr>
<tr>
<td>30S/25E-14K01</td>
<td>12/22/14</td>
<td>8.6</td>
<td>pH (H3=past HT not compliant)</td>
<td>Units</td>
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<td>1/5/15</td>
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<td>pH (H3=past HT not compliant)</td>
<td>Units</td>
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<tr>
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<td>1/30/12</td>
<td>4</td>
<td>Odor Threshold @60 C</td>
<td>Ton</td>
</tr>
<tr>
<td>30S/25E-15C01</td>
<td>1/5/15</td>
<td>8.7</td>
<td>pH (H3=past HT not compliant)</td>
<td>Units</td>
</tr>
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<td>Units</td>
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<tr>
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<td>1/11/12</td>
<td>4</td>
<td>Odor Threshold @60 C</td>
<td>Ton</td>
</tr>
<tr>
<td>30S/25E-15N01</td>
<td>1/11/12</td>
<td>610</td>
<td>Iron</td>
<td>µg/L</td>
</tr>
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<td>30S/25E-15N01</td>
<td>12/30/14</td>
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<td>pH (H3=past HT not compliant)</td>
<td>Units</td>
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<td>pH (H3=past HT not compliant)</td>
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<td>pCi/L</td>
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<tr>
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<td>9/12/12</td>
<td>18</td>
<td>Total Alpha</td>
<td>pCi/L</td>
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<td>1/26/15</td>
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<td>Total Dissolved Solids (TDS)</td>
<td>mg/L</td>
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<tr>
<td>30S/25E-18K01</td>
<td>1/26/15</td>
<td>21</td>
<td>Uranium Dissolved ICAP/MS</td>
<td>pCi/L</td>
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<td>µg/L</td>
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<tr>
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<td>Dissolved Manganese</td>
<td>µg/L</td>
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<td>8/7/13</td>
<td>945</td>
<td>Specific Electrical Conductance</td>
<td>µmhos/cm</td>
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<tr>
<td>30S/25E-19N03</td>
<td>7/24/14</td>
<td>2,600</td>
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<td>mg/L</td>
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<tr>
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<td>Specific Electrical Conductance</td>
<td>µmhos/cm</td>
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<tr>
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<td>8/7/13</td>
<td>1,300</td>
<td>Total Filterable Residue (analysis)</td>
<td>mg/L</td>
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<tr>
<td>30S/25E-19N04</td>
<td>8/7/13</td>
<td>450</td>
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<td>mg/L</td>
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<td>8/2/12</td>
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<td>Specific Electrical Conductance</td>
<td>µmhos/cm</td>
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<td>7/24/14</td>
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<td>Total Filterable Residue (analysis)</td>
<td>mg/L</td>
</tr>
<tr>
<td>30S/25E-19R01</td>
<td>8/8/13</td>
<td>380</td>
<td>Chloride (CI)</td>
<td>mg/L</td>
</tr>
<tr>
<td>30S/25E-19R02</td>
<td>8/8/13</td>
<td>270</td>
<td>Sulfate (SO₄)</td>
<td>mg/L</td>
</tr>
<tr>
<td>30S/25E-19R02</td>
<td>8/8/13</td>
<td>903</td>
<td>Specific Electrical Conductance</td>
<td>µmhos/cm</td>
</tr>
<tr>
<td>30S/25E-19R02</td>
<td>8/8/13</td>
<td>670</td>
<td>Total Filterable Residue (analysis)</td>
<td>mg/L</td>
</tr>
<tr>
<td>30S/25E-20C01</td>
<td>1/26/15</td>
<td>510</td>
<td>Total Dissolved Solids (TDS)</td>
<td>mg/L</td>
</tr>
<tr>
<td>30S/25E-20L01</td>
<td>2/21/15</td>
<td>17</td>
<td>Alpha, Gross</td>
<td>pCi/L</td>
</tr>
<tr>
<td>30S/25E-21G01</td>
<td>1/11/12</td>
<td>23</td>
<td>Total Alpha</td>
<td>pCi/L</td>
</tr>
<tr>
<td>30S/25E-21G01</td>
<td>1/11/12</td>
<td>23</td>
<td>Uranium (Natural, Total)</td>
<td>pCi/L</td>
</tr>
</tbody>
</table>
# TABLE 7.3-2

## WELLS WITH CONSTITUENTS THAT EXCEEDED CALIFORNIA OR U.S. MAXIMUM CONTAMINANT LEVELS IN SAMPLES COLLECTED DURING 2012 THROUGH 2015

<table>
<thead>
<tr>
<th>Well ID</th>
<th>Sample Date</th>
<th>Value*</th>
<th>Constituent Description</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>30S/25E-23H01</td>
<td>12/22/14</td>
<td>270</td>
<td>Chloride</td>
<td>mg/L</td>
</tr>
<tr>
<td>30S/25E-23H01</td>
<td>12/22/14</td>
<td>8.8</td>
<td>pH (H3=past HT not compliant)</td>
<td>Units</td>
</tr>
<tr>
<td>30S/25E-23H01</td>
<td>12/22/14</td>
<td>1,300</td>
<td>Specific Conductance, 25 C</td>
<td>µmhos/cm</td>
</tr>
<tr>
<td>30S/25E-23H01</td>
<td>12/22/14</td>
<td>700</td>
<td>Total Dissolved Solids (TDS)</td>
<td>mg/L</td>
</tr>
<tr>
<td>30S/26E-06N01</td>
<td>1/30/12</td>
<td>20</td>
<td>Total Alpha</td>
<td>pCi/L</td>
</tr>
<tr>
<td>30S/26E-07C01</td>
<td>1/5/15</td>
<td>8.7</td>
<td>pH (H3=past HT not compliant)</td>
<td>Units</td>
</tr>
<tr>
<td>30S/26E-07R01</td>
<td>12/22/14</td>
<td>8.6</td>
<td>pH (H3=past HT not compliant)</td>
<td>Units</td>
</tr>
<tr>
<td>30S/26E-08M01</td>
<td>12/30/14</td>
<td>9.2</td>
<td>pH (H3=past HT not compliant)</td>
<td>Units</td>
</tr>
<tr>
<td>30S/26E-16R01</td>
<td>7/24/14</td>
<td>13</td>
<td>Arsenic</td>
<td>µg/L</td>
</tr>
<tr>
<td>30S/26E-19G01</td>
<td>2/6/12</td>
<td>440</td>
<td>Iron</td>
<td>µg/L</td>
</tr>
<tr>
<td>30S/26E-20N02</td>
<td>1/13/15</td>
<td>8.6</td>
<td>pH (H3=past HT not compliant)</td>
<td>Units</td>
</tr>
<tr>
<td>31S/24E-13J65</td>
<td>7/15/14</td>
<td>3,670</td>
<td>Specific Electrical Conductance</td>
<td>µmhos/cm</td>
</tr>
<tr>
<td>31S/24E-13K61</td>
<td>7/15/14</td>
<td>14,500</td>
<td>Specific Electrical Conductance</td>
<td>µmhos/cm</td>
</tr>
<tr>
<td>31S/24E-13P62</td>
<td>7/15/14</td>
<td>15,960</td>
<td>Specific Electrical Conductance</td>
<td>µmhos/cm</td>
</tr>
<tr>
<td>31S/24E-13P64</td>
<td>7/24/12</td>
<td>16,810</td>
<td>Specific Electrical Conductance</td>
<td>µmhos/cm</td>
</tr>
<tr>
<td>31S/24E-25M61</td>
<td>7/24/12</td>
<td>7,990</td>
<td>Specific Electrical Conductance</td>
<td>µmhos/cm</td>
</tr>
<tr>
<td>31S/26E-19N61</td>
<td>7/18/13</td>
<td>2,180</td>
<td>Specific Electrical Conductance</td>
<td>µmhos/cm</td>
</tr>
</tbody>
</table>

Notes:
- µg/L = micrograms per liter; µmhos/cm = micromhos per centimeter; mg/L = milligrams per liter; NTU = nephelometric turbidity units; pCi/L = picocuries per liter; Ph = potential hydrogen; Hc = Phosphostone; HT = height; ICPMS = inductively coupled plasma spectrometry; C = Celsius; ICAP/MS = Inductively Coupled Plasma Mass Spectroscopy.
- *Values are from the analysis of the most recent sample collected at each well.
- Highlighted text = production/recovery wells.

<table>
<thead>
<tr>
<th>Constituent of Concern</th>
<th>MCL</th>
<th>Unit</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Number</td>
<td>Wells</td>
<td>Sampled</td>
<td>Wells</td>
<td>Sampled</td>
<td>Wells</td>
<td>Sampled</td>
<td>Wells</td>
</tr>
<tr>
<td>TDS</td>
<td>500</td>
<td>mg/L</td>
<td>32</td>
<td>2</td>
<td>--</td>
<td>--</td>
<td>61</td>
<td>2</td>
<td>18</td>
</tr>
<tr>
<td>Chloride</td>
<td>250</td>
<td>mg/L</td>
<td>32</td>
<td>0</td>
<td>--</td>
<td>--</td>
<td>60</td>
<td>2</td>
<td>17</td>
</tr>
<tr>
<td>Nitrate (NO₃)</td>
<td>45</td>
<td>mg/L</td>
<td>32</td>
<td>0</td>
<td>--</td>
<td>--</td>
<td>20</td>
<td>0</td>
<td>50</td>
</tr>
<tr>
<td>Arsenic (Total and Dissolved)</td>
<td>10</td>
<td>µg/L</td>
<td>30</td>
<td>1</td>
<td>--</td>
<td>--</td>
<td>61</td>
<td>2</td>
<td>18</td>
</tr>
<tr>
<td>Bromide (Br)</td>
<td></td>
<td></td>
<td>21</td>
<td>0</td>
<td>50</td>
<td>0</td>
<td>60</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td>Sulfate (SO₄)</td>
<td>250</td>
<td>mg/L</td>
<td>32</td>
<td>0</td>
<td>--</td>
<td>--</td>
<td>60</td>
<td>2</td>
<td>17</td>
</tr>
<tr>
<td>Chromium (Cr)</td>
<td>50</td>
<td>µg/L</td>
<td>32</td>
<td>0</td>
<td>--</td>
<td>--</td>
<td>60</td>
<td>0</td>
<td>17</td>
</tr>
<tr>
<td>Hexavalent Chromium (Cr6+)</td>
<td>10</td>
<td>µg/L</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>60</td>
<td>0</td>
<td>17</td>
</tr>
<tr>
<td>Alpha (Total and Gross)</td>
<td>15</td>
<td>pCi/L</td>
<td>72</td>
<td>16</td>
<td>27</td>
<td>6</td>
<td>30</td>
<td>1</td>
<td>51</td>
</tr>
<tr>
<td>Uranium</td>
<td>20</td>
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<td>60</td>
<td>10</td>
<td>30</td>
<td>4</td>
<td>24</td>
<td>3</td>
<td>38</td>
</tr>
<tr>
<td>Fluoride</td>
<td>2</td>
<td>mg/L</td>
<td>31</td>
<td>0</td>
<td>--</td>
<td>--</td>
<td>60</td>
<td>0</td>
<td>17</td>
</tr>
</tbody>
</table>

Source: Data from KCWA 2015 and KWBA 2015 compiled by AECOM in 2015
# TABLE 7.3-3B

## TOTAL NUMBER OF PRODUCTION WELLS EXCEEDING CRITERIA

<table>
<thead>
<tr>
<th>Constituent of Concern</th>
<th>MCL</th>
<th>Unit</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Number of Wells Sampled</td>
<td>Number of Wells Exceeded</td>
<td>Number of Wells Sampled</td>
<td>Number of Wells Exceeded</td>
<td>Number of Wells Sampled</td>
<td>Number of Wells Exceeded</td>
<td>Number of Wells Sampled</td>
</tr>
<tr>
<td>TDS</td>
<td>500</td>
<td>mg/L</td>
<td>20</td>
<td>2</td>
<td>68</td>
<td>6</td>
<td>1</td>
<td>0</td>
<td>24</td>
</tr>
<tr>
<td>Chloride</td>
<td>250</td>
<td>mg/L</td>
<td>19</td>
<td>0</td>
<td>67</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>23</td>
</tr>
<tr>
<td>Nitrate (NO₃)</td>
<td>45</td>
<td>mg/L</td>
<td>18</td>
<td>0</td>
<td>65</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>23</td>
</tr>
<tr>
<td>Arsenic (Total and Dissolved)</td>
<td>10</td>
<td>µg/L</td>
<td>21</td>
<td>2</td>
<td>81</td>
<td>18</td>
<td>1</td>
<td>0</td>
<td>24</td>
</tr>
<tr>
<td>Bromide (Br)</td>
<td>NA</td>
<td></td>
<td>16</td>
<td>0</td>
<td>62</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>23</td>
</tr>
<tr>
<td>Sulfate (SO₄)</td>
<td>250</td>
<td>mg/L</td>
<td>20</td>
<td>0</td>
<td>66</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>23</td>
</tr>
<tr>
<td>Chromium (Cr)</td>
<td>50</td>
<td>µg/L</td>
<td>20</td>
<td>0</td>
<td>67</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>23</td>
</tr>
<tr>
<td>Hexavalent Chromium (Cr6+)</td>
<td>10</td>
<td>µg/L</td>
<td>18</td>
<td>1</td>
<td>59</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>23</td>
</tr>
<tr>
<td>Alpha (Total and Gross)</td>
<td>15</td>
<td>pCi/L</td>
<td>17</td>
<td>4</td>
<td>63</td>
<td>6</td>
<td>1</td>
<td>1</td>
<td>19</td>
</tr>
<tr>
<td>Uranium</td>
<td>20</td>
<td>pCi/L</td>
<td>5</td>
<td>4</td>
<td>59</td>
<td>9</td>
<td>1</td>
<td>1</td>
<td>23</td>
</tr>
<tr>
<td>Fluoride</td>
<td>2</td>
<td>mg/L</td>
<td>20</td>
<td>0</td>
<td>67</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>23</td>
</tr>
<tr>
<td>Total Number of Wells Operating</td>
<td>79</td>
<td></td>
<td>85</td>
<td>80</td>
<td>0</td>
<td>83</td>
<td>82</td>
<td>84</td>
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<td>Number of Wells Sampled</td>
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<td></td>
<td>81</td>
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<td>24</td>
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<td>1</td>
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</tbody>
</table>

Notes:
1. Local agencies currently use 2 pCi/L as a benchmark concentration for uranium for blending operations.

Source: Data from KCWA 2015 and KWBA 2015 compiled by AECOM in 2015
<table>
<thead>
<tr>
<th>Constituent of Concern</th>
<th>MCL</th>
<th>Unit</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
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<tbody>
<tr>
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<td>Number of Wells</td>
</tr>
<tr>
<td>TDS</td>
<td>500</td>
<td>mg/L</td>
<td>20</td>
<td>2</td>
<td>68</td>
<td>6</td>
<td>1</td>
<td>0</td>
<td>24</td>
<td>3</td>
</tr>
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<td>19</td>
<td>0</td>
<td>67</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>23</td>
<td>0</td>
</tr>
<tr>
<td>Nitrate (NO₃)</td>
<td>45</td>
<td>mg/L</td>
<td>18</td>
<td>0</td>
<td>65</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>23</td>
<td>0</td>
</tr>
<tr>
<td>Arsenic (Total and Dissolved)</td>
<td>10</td>
<td>µg/L</td>
<td>21</td>
<td>2</td>
<td>81</td>
<td>18</td>
<td>1</td>
<td>0</td>
<td>24</td>
<td>2</td>
</tr>
<tr>
<td>Bromide (Br)</td>
<td>NA</td>
<td></td>
<td>16</td>
<td>0</td>
<td>62</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>23</td>
<td>0</td>
</tr>
<tr>
<td>Sulfate (SO₄)</td>
<td>250</td>
<td>mg/L</td>
<td>20</td>
<td>0</td>
<td>66</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>23</td>
<td>0</td>
</tr>
<tr>
<td>Chromium (Cr)</td>
<td>50</td>
<td>µg/L</td>
<td>20</td>
<td>0</td>
<td>67</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>23</td>
<td>0</td>
</tr>
<tr>
<td>Hexavalent Chromium (Cr6+)</td>
<td>10</td>
<td>µg/L</td>
<td>18</td>
<td>1</td>
<td>59</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>23</td>
<td>0</td>
</tr>
<tr>
<td>Alpha (Total and Gross)</td>
<td>15</td>
<td>pCi/L</td>
<td>17</td>
<td>4</td>
<td>63</td>
<td>6</td>
<td>1</td>
<td>1</td>
<td>19</td>
<td>12</td>
</tr>
<tr>
<td>Uranium</td>
<td>20</td>
<td>pCi/L</td>
<td>5</td>
<td>4</td>
<td>59</td>
<td>9</td>
<td>1</td>
<td>1</td>
<td>23</td>
<td>11</td>
</tr>
<tr>
<td>Fluoride</td>
<td>2</td>
<td>mg/L</td>
<td>20</td>
<td>0</td>
<td>67</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>23</td>
<td>0</td>
</tr>
</tbody>
</table>

| Total Number of Wells Operating  | 79  | 85  | 80  | 0   | 83  | 82  | 84  |
| Number of Wells Sampled           | 21  | 81  | 2   | 24  | 61  | 1   | 84  | 19  |

Notes:
1 Local agencies currently use 2 pCi/L as a benchmark concentration for uranium for blending operations.

Source: Data from KCWA 2015 and KWBA 2015 compiled by AECOM in 2015
## TABLE 7.3-4

CONCENTRATION RANGE OF CONSTITUENTS OF CONCERN IN KWB PRODUCTION WELL SAMPLES

<table>
<thead>
<tr>
<th>Constituent of Concern</th>
<th>Units</th>
<th>Concentration Range for KWB Production Wells</th>
<th>Concentration Range for KWB Production Wells</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDS</td>
<td>mg/L</td>
<td>120 - 620</td>
<td>-</td>
</tr>
<tr>
<td>Chloride</td>
<td>mg/L</td>
<td>7.4 - 215</td>
<td>-</td>
</tr>
<tr>
<td>Nitrate (NO₃)</td>
<td>mg/L</td>
<td>0.44 - 26</td>
<td>1.3</td>
</tr>
<tr>
<td>Arsenic (Total and Dissolved)</td>
<td>μg/L</td>
<td>&lt;1 - 40</td>
<td>-</td>
</tr>
<tr>
<td>Bromide (Br)</td>
<td>mg/L</td>
<td>0.044 - 0.52</td>
<td>0.04 - 0.91</td>
</tr>
<tr>
<td>Sulfate (SO₄)</td>
<td>mg/L</td>
<td>12 - 100</td>
<td>-</td>
</tr>
<tr>
<td>Chromium (Cr)</td>
<td>μg/L</td>
<td>&lt;2 - 4.1</td>
<td>-</td>
</tr>
<tr>
<td>Hexavalent Chromium (Cr6+)</td>
<td>μg/L</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Alpha (Total and Gross)</td>
<td>pCi/L</td>
<td>&lt;0.61 - 44</td>
<td>0.82 - 28</td>
</tr>
<tr>
<td>Uranium</td>
<td>pCi/L</td>
<td>0.68 - 40</td>
<td>1.1 - 30</td>
</tr>
<tr>
<td>Fluoride</td>
<td>mg/L</td>
<td>&lt;0.05 - 0.48</td>
<td>&lt;0.05 - 0.5</td>
</tr>
</tbody>
</table>

Source: Data from KCWA 2015 and KWBA 2015 compiled by AECOM in 2015
FIGURE 7.3-1. Select Wells used for Impact Evaluations (Time Concentrations and Hydrographs)
FIGURE 7.3-2-1. Well 30S24E-13D Cluster

FIGURE 7.3-2-2. Well 30S25E-04J Cluster
FIGURE 7.3-2-3.  Well 30S25E-07A Cluster

FIGURE 7.3-2-4.  Well 30S25E-11P Cluster

Source: Data from KCWA 2015 and KWBA 2015 compiled by AECOM in 2015
FIGURE 7.3-2-5. Well 30S25E-12B Cluster

Source: Data from KCWA 2015 and KWBA 2015 compiled by AECOM in 2015

FIGURE 7.3-2-6. Well 30S25E-16L Cluster

Source: Data from KCWA 2015 and KWBA 2015 compiled by AECOM in 2015
FIGURE 7.3-2-7.  Well 30S25E-19N Cluster

FIGURE 7.3-2-8.  Well 30S25E-19R Cluster

Source: Data from KCWA 2015 and KWBA 2015 compiled by AECOM in 2015
FIGURE 7.3-2-9. Well 30S25E-21G Cluster

FIGURE 7.3-2-10. Well 30S25E-22R Cluster
FIGURE 7.3-2-11. 30S26E-06L Cluster

Source: Data from KCWA 2015 and KWBA 2015 compiled by AECOM in 2015

FIGURE 7.3-2-12. Well 30S26E-28J Cluster

Source: Data from KCWA 2015 and KWBA 2015 compiled by AECOM in 2015
**FIGURE 7.3-2-13.** Well 30S26E-32N Cluster

**FIGURE 7.3-2-14.** Well 30S25E-36R Cluster
FIGURE 7.3-3A. Arsenic (from 0-50 μg/L) in Shallow Monitoring Wells - KWBA

FIGURE 7.3-3B. Arsenic (50 - 400 μg/L) in Shallow Monitoring Wells - KWBA
**FIGURE 7.3-3C.** Arsenic (from 0-80 μg/L) in Deep Monitoring Wells - KWBA

**FIGURE 7.3-3D.** Arsenic (from 80-200 μg/L) in Deep Monitoring Wells - KWBA

Source: Data from KCWA 2015 and KWBA 2015 compiled by AECOM in 2015
FIGURE 7.3-4A. Nitrate in Shallow Monitoring Wells – KWBA with 30S/25E - 12B02

FIGURE 7.3-4B. Nitrate in Middle Monitoring Wells – KWBA with 30S/25E - 12B03
FIGURE 7.3-4C. Nitrate in Deep Monitoring Wells - KWBA

Source: Data from KCWA 2015 and KWBA 2015 compiled by AECOM in 2015

FIGURE 7.3-5A. Total Dissolved Solids in Shallow Monitoring Wells – KWBA with 30S/25E - 12B02

Source: Data from KCWA 2015 and KWBA 2015 compiled by AECOM in 2015
FIGURE 7.3-5B. Total Dissolved Solids in Middle Monitoring Wells – KWBA with 30S/25E - 12B03

FIGURE 7.3-5C. Total Dissolved Solids in Deep Monitoring Wells with 30S/25E-12B04- KWBA
Township 29S

Section 25E
Township 29S

Section 26E
Township 30S

Section 24E
Well 30524E-14M03

- Uranium
- Uranium - 1/2 MDL
- Uranium MCL (20 pCi/L)
- Total Alpha
- Total Alpha - 1/2 MDL
- Total Alpha MCL (pCi/L)
Township 30S

Section 25E
Well 30S25E-19R02

- Uranium
- Uranium - 1/2 MDL
- Uranium MCL (20 pCi/L)
- Total Alpha
- Total Alpha - 1/2 MDL
- Total Alpha MCL (15 pCi/L)
Township 30S

Section 26E
Well 30S26E-32N01

- Uranium
- Uranium - 1/2 MDL
- Uranium MCL (20 pCi/L)
- Total Alpha
- Total Alpha - 1/2 MDL
- Total Alpha MCL (15 pCi/L)
FIGURE 7.3-6a.
APO Particle Tracking Results (1995 – 2014) – Maximum Travel
Distance with KWB Recharge and Recovery

LEGEND
- Particle Path
  (from KWB Boundary)
- Particle Path
  (from Site of Concern)
- Kern Water Bank

2009 WQ MCLs
- TDS > 500 mg/L
- F > 1.4 mg/L
- As > 50 µg/L
- EDB > 0.02 ppb
- NO₃ > 40 mg/L
- Uranium > 20 pCi/L
- DBCP > 0.2 ppb

MILES
0 1 1.5 3

Site of Concern Designations
From Figure 7.2-10
- 1 Uhler Firefighting Facility
- 2 Grayson Site

Notes:
- Areas of Groundwater Quality Concern, 1998 to 2009
- Modeled groundwater molecule flow path to
  maximum extent
- Starting Point – Boundary of KWB
- Starting Point – At Site of Concern
- Ending Point – Maximum travel distance

NORTH
6034047 EAC GIS 104 4/16
FIGURE 7.3-6b. APO Particle Tracking Results (1995 – 2014) – Maximum Travel Distance without KWB Recharge and Recovery

LEGEND
- Particle Path (from KWB Boundary)
- Particle Path (from Site of Concern)
- Kern Water Bank

2009 WQ MCLs
- TDS > 500 mg/L
- F > 1.4 mg/L
- As > 50 µg/L
- EDB > 0.02 ppb
- NO₃ > 40 mg/L
- Uranium > 20 pCi/L
- DBCP > 0.2 ppb

0 1.5 3
MILES

Site of Concern Designations
From Figure 7.2-10
- 1 Uhler Firefighting Facility
- 2 Grayson Site

Notes:
- Areas of Groundwater Quality Concern, 1998 to 2009
- Modeled groundwater molecule flow path to maximum extent
- Starting Point – Boundary of KWB
- Starting Point – At Site of Concern
- Ending Point – Maximum travel distance

NORTH
6034047 SAG GIS 105 4/16
FIGURE 7.3-7a. AFO-EC Particle Tracking Results (2015 - 2035) – Maximum Travel Distance with KWB Recharge and Recovery

LEGEND
- Particle Path (from KWB Boundary)
- Particle Path (from Site of Concern)
- Kern Water Bank
- TDS > 500 mg/L
- F > 1.4 mg/L
- As > 50 ug/L
- EDB > 0.02 ppb
- NO₃ > 40 mg/L
- Uranium > 20 pCi/L
- DBCP > 0.2 ppb

Site of Concern Designations
From Figure 7.2-10
- 1 Uhler Firefighting Facility
- 2 Grayson Site

Notes:
- Areas of Groundwater Quality Concern, 1998 to 2009
- Modeled groundwater molecule flow path to maximum extent
- Starting Point – Boundary of KWB
- Starting Point – At Site of Concern
- Ending Point – Maximum travel distance

MILES
0 1.5 3
NORTH
60342047 SAC GIS 100 4/16
FIGURE 7.3-7b.  AFO-EC Particle Tracking Results (2015 - 2035) – Maximum Travel Distance with KWB Recharge and Recovery
FIGURE 7.3-8a. APO-BC Particle Tracking Results (2015 - 2035) – Maximum Travel Distance with KWB Recharge and Recovery
FIGURE 7.3-8b.  APO-BC Particle Tracking Results (2015 - 2035) – Maximum Travel Distance without KWB Recharge and Recovery
FIGURE 7.3-9. Model Simulated Hydrographs at Observation Points for APO

Source: RMC 2015

APO Groundwater Level

Ground Surface Elevation
FIGURE 7.3-10. Model Simulated Hydrographs at Observation Points for AFO-EC
FIGURE 7.3-11. Model Simulated Hydrographs at Observation Points for AFO-BC

Source: RMC 2015
FIGURE 7.3-12. Wells used for Hydrographs
FIGURE 7.3-13.  30S/24E-02C01
FIGURE 7.3-14..  30S/24E-14M

Source: KCWA Groundwater Data Base
FIGURE 7.3-15. 30S/24E-13D

Source: KCWA Groundwater Data Base
Source: KCWA Groundwater Data Base

FIGURE 7.3-16.  30S/25E-07A
Source: KCWA Groundwater Data Base

FIGURE 7.3-18.  30S/25E-29B
Source: KCWA Groundwater Data Base

FIGURE 7.3-19. 30S/25E-28D01
Source: KCWA Groundwater Data Base

FIGURE 7.3-20. 30S/25E-28C02
FIGURE 7.3-21.  30S/25E-21R

Source: KCWA Groundwater Data Base

Water Level Elevation (ft. amsl)

Depth to Water Level (ft.)

Date

Source: KCWA Groundwater Data Base

FIGURE 7.3-21.  30S/25E-21R
Source: KCWA Groundwater Data Base

FIGURE 7.3-22.  30S/25E-21G
FIGURE 7.3-23.  30S/25E-16L

Source: KCWA Groundwater Data Base
FIGURE 7.3-24.  30S/25E-04J

Source: KCWA Groundwater Data Base
FIGURE 7.3-25.  29S/25E-27N

Source: KCWA Groundwater Data Base
Source: KCWA Groundwater Data Base

FIGURE 7.3-26.  30S/25E-22K
FIGURE 7.3-27.  30S/25E-23M

Source: KCWA Groundwater Data Base
FIGURE 7.3-28. 30S/25E-22R

Source: KCWA Groundwater Data Base
Source: KCWA Groundwater Data Base

**FIGURE 7.3-29. 29S/25E-25M**
FIGURE 7.3-30.  30S/25E-36R

Source: KCWA Groundwater Data Base
Source: KCWA Groundwater Data Base

FIGURE 7.3-31. 30S/26E-32N
Source: KCWA Groundwater Data Base

FIGURE 7.3-32.  29S/26E-31H
FIGURE 7.3-33. 30S/26E-06L

Source: KCWA Groundwater Data Base
FIGURE 7.3-34.  30S/26E-19B

Source: KCWA Groundwater Data Base
FIGURE 7.3-35. 30S/26E-28J
FIGURE 7.3-36.  30S/26E-22P

Source: KCWA Groundwater Data Base
FIGURE 7.3-37. 30S/26E-15N

Source: KCWA Groundwater Data Base
FIGURE 7.3-38.  30S/26E-16B

Source: KCWA Groundwater Data Base
FIGURE 7.3-39. 30S/26E-04D03 - KCWB-31

Source: KCWA Groundwater Data Base
FIGURE 7.3-40. 30S/26E-04J

Source: KCWA Groundwater Data Base
Township: 29 S
Section: 25 E
Township: 29 S

Section: 26 E
Township: 30 S
Section: 24 E
Township: 30 S
Section: 25 E
Township: 30 S
Section: 26 E
Note: Extreme outlier removed. The outlier was the only sample with a result higher than MCL.
Note: Extreme outlier removed. The outlier was the only sample with a result higher than MCL.
Note: Extreme outlier removal. The outlier was the only sample with a value higher than MCL.
Township 29S

Section 25E
Township 29S
Section 26E
Township 30S
Section 24E
Township 30S
Section 25E
Well 30S25E-17M04

Uranium (μCi/L) vs. Total Alpha (μCi/L)

- Uranium
- Uranium - 1/2 MDL
- Uranium MCL (20 pCi/L)
- Total Alpha
- Total Alpha - 1/2 MDL
- Total Alpha MCL (15 pCi/L)
Township 30S
Section 26E
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