State Water Resources Control Board
Division of Drinking Water

DATE: July 30, 2014

TO: Tricia A. Wathen, P.E.
Senior Sanitary Engineer, Visalia District

FROM: Maria R. Carlson, Senior Environmental Scientist
Chad J. Fischer, P.E., Associate Sanitary Engineer

SUBJECT: City of Bakersfield
Sanitary Survey – 1510031
KERN COUNTY

I. INTRODUCTION

1.1 PURPOSE OF REPORT

On various dates during January, February, and March 2014, the Division of Drinking Water (Division) staff inspected the City of Bakersfield's (City) drinking water supply system. Ms. Maria Carlson and Mr. Chad Fischer, P.E. conducted the inspections and were accompanied by Mr. Jose Pena, Production Superintendent for California Water Service Company (CWSC); Ms. Stephanie Hearn, Water Quality Project Manager for CWSC; Mr. Steve Choate, Domestic Supervisor II for the City; and Mr. Don Richardson, Water Superintendent for the City. Mr. Dan Perez, Engineering Technician for the City; Mr. Jason Meadors, Water Resources Director for the City; and Ms. Jackie Takeda, Water Quality Program Manager for CWSC. The purpose of this report is to document the sanitary survey of the City's water system and to describe the existing water supply facilities and current operational practices. The last sanitary survey was conducted by Mr. Chad Fischer, P.E. in January 2010.

1.2 DESCRIPTION OF SYSTEM

The City is classified as a community water system which serves 42,058 metered service connections and a population of approximately 141,383 persons. The City contracts the operation and maintenance of the City's water system to CWSC, who has a fleet of appropriately certified operators.

The City's sources of supply are groundwater wells and purchased treated surface water. The groundwater supply system is comprised of fifty-three (53) active groundwater wells and six (6) standby wells. In addition to the groundwater wells, the City uses two (2) sources of purchased treated surface water: the Kern County Water Agency (KCWA) and the California Water Service Company's Northwest Surface Water Treatment Plant (CWSC-North Garden). The KCWA and CWSC-North Garden water systems are

responsible for maintaining the integrity and quality of the treated surface water purchased by the City.

The City has three (3) types of treatment facilities which are used to provide potable drinking water to the City's customers. The most prevalent form of treatment provided by the City is continuous chlorination of its groundwater wells. Chlorination equipment is provided at each of the active well sites. The second type of treatment the City uses is granular activated carbon (GAC). The City maintains ten GAC treatment plants which are used to remove hydrogen sulfide, manganese, and certain volatile organic compounds from the groundwater. The City uses two types of GAC (catalytic and absorptive) for treating the groundwater depending upon the contaminant of concern. Eight of the ten GAC treatment plants use catalytic carbon for the removal of hydrogen sulfide. Each of the eight (8) treatment sites may have more than one (1) vessel at the location, some of which are plumbed in parallel to split the flow of water into the vessels. The remaining two GAC treatment plants use both types of GAC, catalytic and absorptive, to remove hydrogen sulfide and other contaminants of concern. At these three sites, the vessels are plumbed in series. The effluent water from all GAC treatment plants is chlorinated prior to entry into the distribution system. The third type of treatment the City uses is blending treatment for arsenic mitigation. The City has an arsenic blending treatment facility in which water from four of the City's wells (CBK 22, CBK 24, Olcese 1, and Olcese 2) is blended such that blended effluent contains arsenic below the 10-microgram per liter (µg/L) maximum contaminant level (MCL). The arsenic blending treatment facility is a ten million gallon (MG) storage tank referred to as the Olcese Interface.

The City maintains six above ground storage tanks with a combined capacity of approximately 18 MG. All storage sites use booster pumps to deliver water to the distribution system. The volume of water going into and coming out of each storage tank is recorded by flow meters so that the City may monitor production and consumption during peak hour demand periods.

All active and standby wells were visited during the inspections. Inactive sources were not inspected. The City maintains 11 metered emergency interconnections to other nearby water systems in the vicinity: 3 interconnections to CWS North Garden, 3 interconnections to CWSC-Bakersfield, 2 interconnections to Vaughn Water Company and 3 connections to Kern County Water Agency (KCWA).

The City's distribution system is operated as one pressure zone. There are approximately 10 private wells in the City's service area which are equipped with backflow prevention devices. The City is sewered and maintains two wastewater treatment facilities for waste disposal.

Effluent water (reclaimed water) from the City's two wastewater treatment plants is used in land application. The first project uses secondary treated effluent water to irrigate crops (hay and grains for animal fodder) and fill non-drinking water reservoirs (ponds and lakes within the City). The second project uses tertiary treated water to irrigate the landscaping around and in the Kern County Soccer Park. The City obtains about ten percent of its total water supply from reclaimed water.

In light of current drought conditions in California, the City has identified 35 candidate wells for column extensions in 2014. The City also has an agreement with KCWA to provide up to 6,500 acre feet of water per year. However, for 2014 the KCWA has reduced the amount of water available to the City to 325 acre feet. The City owns and operates 2,800 acres (2,800 Acre Water Bank) of spreading basins in the western part of the City. A spreading basin looks like a small lake surrounded by levees. These spreading basins are used for recharging the groundwater supply. This recharge facility improves groundwater quality by recharging low salinity Kern River water into the aquifers. This dilutes the more saline irrigation water that percolates underground from adjacent farming operations. The underground reservoir can be pumped in dry years for agricultural and domestic use. In wet years, the reservoir can be built up. This is a valuable resource to the City in providing a reliable water supply during dry years.

The City uses a water conservation program through CWSC. The conservation program is designed to meet 2020 urban water use reduction requirements and increase long-term supply reliability. CWSC offers customers free water conservation kits. The kits consist of: two high-efficiency showerheads (2 gallons per minute [gpm]), one high-efficiency hose nozzle, two bathroom faucet aerators (1.0 gpm), toilet leak tablets, and one kitchen faucet aerator (1.5 gpm). CWSC also offers rebates for high-efficiency toilets and washing machines. The programs (implemented in 2011, 2012, and 2013) have saved the City approximately 158 MG of water and are expected to save 767 MG over their lifetime.

Domestic Water Supply Permit

The City operates under a Domestic Water Supply Permit No. 03-12-010P-002, issued by the Department on March 9, 2010. This permit has been amended once (03-12-10PA-008) in August 2010. The Permit Amendment contains the following sixteen (16) provisions:

1. The City of Bakersfield shall comply with all the requirements set forth in the California Safe Drinking Water Act, California Health and Safety Code and any regulations, standards or orders adopted thereunder.

2. The only approved sources of domestic water supply for use by the City are listed in the table below

Table 1- City of Bakersfield-Approved Sources

Source Name	***Status***	***Primary Station Number***
CBK 01-02 – RAW	AR	1510031-043
CBK 02-01 – RAW	AR	1510031-007
CBK 03-01 – RAW	AR	1510031-008
CBK 04-01 – RAW	AR	1510031-009
CBK 05-01 – RAW	AR	1510031-010
CBK 06-01 – RAW	AR	1510031-011

CBK 07-01 – RAW	AR	1510031-012
CBK 08-01 – RAW	AR	1510031-013
CBK 09-01 – RAW	AR	1510031-014
CBK 10-02 – RAW	AR	1510031-016
CBK 11-01 – RAW	AR	1510031-017
CBK 12-01 – RAW	AR	1510031-018
CBK 13-01 – RAW	AR	1510031-019
CBK 14-01 – RAW	AR	1510031-020
CBK 15-01 – RAW	AR	1510031-021
CBK 17-01 – RAW	AR	1510031-022
CBK 18-01 – RAW	AR	1510031-002
CBK 20-01 – RAW	AR	1510031-023
CBK 22-01 – RAW	AR	1510031-037
CBK 23-01 – RAW	AR	1510031-030
CBK 24-01 – RAW	AR	1510031-044
CBK 25-01 – RAW	AR	1510031-004
CBK 26-01 – RAW	AR	1510031-005
CBK 27-01 – RAW	AR	1510031-033
CBK 28-01 – RAW	AR	1510031-031
CBK 29-01 – RAW	STBY	1510031-032
CBK 30-01 – RAW	AR	1510031-035
CBK 31-01 – BEFORE GAC	AR	1510031-034
CBK 32-01 – BEFORE GAC	AR	1510031-038
CBK 33-01 – RAW	AR	1510031-041
CBK 34-01 – RAW	AR	1510031-042
CBK 35-01 – RAW	AR	1510031-039
CBK 36-01 – RAW	AR	1510031-045
CBK 37-01 – RAW	AR	1510031-046
CBK 38-01 – RAW	AR	1510031-047
CBK 39-01 – RAW	AR	1510031-048
CBK 43-01 – RAW	AR	1510031-117
CBK 45-01-BEFORE GAC	STBY	1510031-104
CBK 46-01 – RAW	AR	1510031-109
CBK 47-01 – RAW	AR	1510031-115
CBK 49-01 – RAW	AR	1510031-118
CBK 52-01 – RAW	AR	1510031-119
CBK 53-01 – RAW	AR	1510031-126
CBK 54-01 – RAW	PN	1510031-136
CBK 55-01 – RAW	AR	1510031-127
WELL L201-01- BEFORE GAC	STBY	1510031-028
WELL L203-01- BEFORE GAC	AR	1510031-049
WELL L204-01- RAW	STBY	1510031-036

WELL L205-01- BEFORE GAC	AR	1510031-050
WELL L206-01- BEFORE GAC	STBY	1510031-051
WELL L207-01- BEFORE GAC	AR	1510031-100
WELL L208-01- BEFORE GAC	AR	1510031-107
WELL L210-01- BEFORE GAC	AR	1510031-105
WELL L211-01- BEFORE GAC	AR	1510031-106
WELL L212-01- BEFORE GAC	AR	1510031-108
Olcese Well No. 1 – BEFORE AS BLEND	AR	1510031-102
Olcese Well No. 2 – BEFORE AS BLEND	AR	1510031-103
WELL CBK F101-01-RAW	AR	1510031-025
WELL CBK F103-01-RAW	AR	1510031-027
PURCHASED SURFACE WATER FROM KCWA	PT	1510031-128
PURCHASED SURFACE WATER FROM CWS- NORTH GARDEN	PT	1510031-129

3. The only approved treatment facilities for use by the City are provided below. These treatment facilities shall be operated in accordance with the approved operating plans and by appropriate certified operators.

Table 2 - Approved Treatment

Plant Name	*Primary Station Number*
CBK 31-01 - AFTER GAC	1510031-082
CBK 32-01 - AFTER GAC	1510031-040
CBK 45-01 - AFTER GAC-STBY	1510031-122
WELL L203-01 - AFTER GAC	1510031-094
WELL L205-01 - AFTER GAC	1510031-096
WELL L206-01 - AFTER GAC-STBY	1510031-097
WELL L207-01 - AFTER GAC	1510031-101
WELL L208-01 - AFTER GAC	1510031-123
WELL L210-01 - AFTER GAC	1510031-111
WELL L211-01 - AFTER GAC	1510031-113
WELL L212-01 - AFTER GAC	1510031-120
OLCESE BLEND	1510031-116

4. No additions, changes or modifications to the sources of water supply or water treatment processes outlined in Provisions Nos. 2 and 3 can

be made without prior receipt of an amended domestic water supply permit from the Department.

5. All treatment facilities shall be operated by personnel who have been certified in accordance with the Regulations relating to Certification of Water Treatment Facility Operation, CCR, Title 22.

6. Under the operator certification regulation, the City's water system is classified as a D4 system. The City must have a chief distribution operator who is certified, at a minimum, as a D4 distribution system operator.

7. By October 1, 2010, the City shall submit an updated operations plan for the GAC treatment plants at Wells Nos. L206 and L208. The operations plan shall consist of a description of all the treatment facilities, plant performance monitoring program, operation and maintenance procedures, continuous process monitoring and recording equipment, plant alarms, and the fail-safe features and precautionary measures that are provided to prevent treatment process failures.

8. The City shall conduct monthly monitoring of all wells for total coliform bacteria. If a positive total coliform bacteria sample is detected, the sample shall also be analyzed for fecal coliform or E. coliform bacteria. The results of the positive coliform bacteria tests shall be reported as a density (MPN/100 ml), and not solely for the presence of coliform bacteria.

9. The City shall provide continuous chlorination at each active well with exception of Olcese Wells Nos. 1 and 2 which are chlorinated effluent of the Olcese Interface Tank.

10. By October 1, 2010 the City shall collect a distribution sample from an area served by asbestos-cement pipe and Wells Nos. CBK-6 and CBK-19 to be analyzed for asbestos.

11. The City shall continue to sample in accordance with the approved Olcese blending plant operations plan. The plan dictates monthly raw water arsenic monitoring from each well and weekly arsenic monitoring from the blended effluent.

12. The City shall sample all GAC treatment plants in accordance to the approved operations plans.

13. Well Nos. CBK-48 and CBK-54 shall have all applicable initial water quality monitoring conducted before the well is allowed to be put online. Should the initial sampling show concentrations of any regulated constituent above the respective MCL, the City shall send written notification to the Department and the respective well shall not be put online until future written permission from the Department.

14. The City shall commence sampling Well No. CBK 41-01 according to the appropriate standby source water quality monitoring schedule.

15. The City shall conduct weekly raw water VOC monitoring sampling at Well No. CBK 25-01 until October 1, 2010. After October 1, 2010, the required VOC monitoring sampling frequency is reduced to monthly.

16. The City shall complete the initial four (4) quarters of synthetic organic chemical monitoring and radiological monitoring for Well No. CBK 25-01.

The City is in compliance with all sixteen permit provisions provided in Permit Amendment No. 03-12-010PA-008.

1.3 ENFORCEMENT HISTORY

The City received the following Enforcement Action from the Department since the 2010 Permit was issued:

Enforcement Letter No. 03-12-10C-008, issued May 23, 2011
The City failed to submit the required annual nitrate monitoring for Well No. CBK 22-01 in 2010. The City returned to compliance in 2011. This was a monitoring and reporting violation. It should be noted that the 2011 sample from Well No. CBK 22-01 showed nitrate at a concentration of 5.8 mg/L which is representative of the historical nitrate levels of this well.

1.4 AREA SERVED

The City is located in Kern County and is the largest metropolitan area in the County. The service area consists of single and multiple family residences, commercial businesses, retail and agricultural related establishments. The City serves approximately 141,383 persons through 42,058 service connections. All service connections are charged a metered rate. It should be noted that the Bakersfield area has an approximate total population of over 500,000 and in addition to the City's water system, several other water systems serve customers in the greater Bakersfield area.

1.5 PRODUCTION DATA

Production data from the Annual Reports to the Drinking Water Program (ARDWP), which are on file at the Division's Visalia District office, is provided below in Table 3.

Table 3: Water Production Data for the City (2003-2013)

Year	*Population*	*Active Service Connections*	*Annual Production (MG)*	*Maximum Month (MG)*	*Maximum Day (MG)*
2013	141,383	42,058	13,022	1,774/July	N/A
2012	139,498	41,769	13,471	1,784/July	229
2011	137,945	41,125	13,347	1,857/Aug	165
2010	150,380	43,736	11,637	1,455/Aug	185
2009	147,999	43,086	12,668	1,710/July	86
2008	132,736	40,223	15,657	1,961/July	98
2007	142,287	38,899	11,351	1,722/July	86
2006	-	-	12,216	1,660/unk	83
2005	105,600	38,463	11,356	1,587/unk	79
2004	93,660	32,703	11,505	1,555/Aug	78
2003	84,060	30,649	11,850	1,630/Aug	82

II. INVESTIGATION AND FINDINGS

2.1 SOURCES OF SUPPLY

Groundwater

Source Water Assessments

Source water assessments (SWA) have been completed for all of the City's active sources. Copies of the completed SWAs are on file at the Visalia District office. The City must report the SWA information each year in the Consumer Confidence Report (CCR).

General Source Information

The City is extracting groundwater from alluvial soil in an area that is not adjudicated or otherwise restricted. The City's source of domestic water supply as permitted in the Amended Domestic Water Supply Permit No. 03-12-010PA-008 is composed of fifty-three active groundwater wells, seven standby wells and two sources of purchased treated surface water.

The City's wells are housed in concrete block enclosures. The concrete pedestal contains a sounding tube, a gravel chute and a casing vent. The discharge piping includes an air relief valve, a Cla-valve, a flow meter, a pressure transducer, a gate valve, a hose bib, injection port for chlorination and sample taps. Drains for the air relief valves are piped to the outside of the building that houses each well. Most well sites also feature Rossum sand testers to measure the sand content in the pumped water. The purpose of this is to signal a problem with the well. Each well site also features a chart recorder which records flow and pressure. Most sites feature a locked slatted fence and enough room for a drill rig to be onsite in the event that a pump needs to be pulled.

All non-GAC sites are visited at least three times per week. GAC treatment sites are visited daily. Logs are present at each of the well sites which document what the operator saw and did during each visit. Only seven of the

City's wells are monitored by the SCADA system. The majority of the City's wells operate based on pressure in the distribution system.

Emergency power generators are located at several of the City's well sites. The generators are exercised monthly to ensure proper working order. Most of the generators are diesel-powered and fuel tanks are located at least 50 feet from the well head.

Active Wells:

Well CBK 01-02 – RAW (1510031-043)

Well CBK 01-02 was drilled in 1993 to a depth of 720 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 40-inch diameter steel casing to a depth of 50 feet and a 16-inch diameter steel casing to a depth of 720 feet which is screened from 360 to 700 feet. A cement annular seal is present to a depth of 340 feet. The well is gravel packed. The well is equipped with a 125-hp water-lubricated DWT which produces 900 gpm. The well meets all sanitary setback requirements.

Well CBK 02-01 – RAW (1510031-007)

Well CBK 02-01 was drilled in 1961 to a depth of 600 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 30-inch diameter steel conductor casing to a depth of 59 feet and a 16-inch diameter steel casing to a depth of 600 feet which is perforated from 350 to 600 feet. A cement annular seal is present to a depth of 60 feet. The well is gravel packed. The well is equipped with a 150-hp oil-lubricated DWT which produces 1,200 gpm. The well meets all sanitary setback requirements.

Well CBK 03-01 – RAW (1510031-008)

Well CBK 03-01 was drilled in 1970 to a depth of 600 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 30-inch diameter steel conductor casing to a depth of 59 feet and a 16-inch diameter steel casing to a depth of 600 feet which is screened from 350 to 600 feet. A cement annular seal is present to a depth of 59 feet. The well is gravel packed. The well is equipped with a 150-hp water-lubricated DWT which produces 1,000 gpm. The well meets all sanitary setback requirements.

Well CBK 04-01 – RAW (1510031-009)

Well CBK 04-01 was drilled in 1964 to a depth of 600 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 30-inch diameter steel conductor casing to a depth of 60 feet and a 16-inch diameter steel casing to a depth of 600 feet which is screened from 350 to 600 feet. A cement annular seal is present to a depth of 60 feet. The well is gravel packed. The well is equipped with a 100-hp water-lubricated DWT which produces 1,000 gpm. The well meets all sanitary setback requirements.

Well CBK 05-01 – RAW (1510031-010)

Well CBK 05-01 was drilled in 1966 to a depth of 600 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 30-inch diameter steel conductor casing to a depth of 55 feet and a 14-inch diameter steel casing to a depth of 600 feet which is screened from 350 to 600 feet. A cement annular seal is present to a depth of 55 feet. The well is gravel packed. The well is equipped with a 125-hp water-lubricated DWT which produces 900 gpm. The well meets all sanitary setback requirements.

Well CBK 06-01 – RAW (1510031-011)

Well CBK 06-01 was drilled in 1972 to a depth of 600 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 30-inch diameter steel conductor casing to a depth of 97 feet and a 16-inch diameter steel casing to a depth of 600 feet which is screened from 350 to 600 feet. A cement annular seal is present to a depth of 97 feet. The well is gravel packed. The well is equipped with a 125-hp submersible pump which produces 1,000 gpm. The well meets all sanitary setback requirements.

Well CBK 07-01 – RAW (1510031-012)

Well CBK 07-01 was drilled in 1973 to a depth of 600 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 36-inch diameter steel conductor casing to a depth of 20 feet and a 16-inch diameter steel casing to a depth of 600 feet which is screened from 350 to 600 feet. A cement annular seal is present to a depth of 60 feet. The well is gravel packed. The well is equipped with a 200-hp oil-lubricated DWT which produces 1,550 gpm. The well meets all sanitary setback requirements.

Well CBK 08-01 – RAW (1510031-013)

Well CBK 08-01 was drilled in 1973 to a depth of 600 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 36-inch diameter steel conductor casing to a depth of 10 feet and a 16-inch diameter steel casing to a depth of 600 feet which is screened from 350 to 600 feet. A cement annular seal is present to a depth of 60 feet. The well is gravel packed. The well is equipped with a 200-hp oil-lubricated DWT which produces 1,660 gpm. The well meets all sanitary setback requirements.

Well CBK 09-01 – RAW (1510031-014)

Well CBK 09-01 was drilled in 1977 to a depth of 600 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 36-inch diameter steel conductor casing to a depth of 20 feet and a 16-inch diameter steel casing to a depth of 600 feet which is screened from 350 to 600 feet. A cement annular seal is present to a depth of 75 feet. The well is gravel packed. The well is equipped with a 150-hp DWT which produces 1,250 gpm. The well meets all sanitary setback requirements.

Well CBK 10-02 – RAW (1510031-016)

Well CBK 10-02 was drilled in 1987 to a depth of 701 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 30-inch diameter steel conductor casing to a depth of 83 feet and a 16-inch diameter steel casing to a depth of 600 feet which is perforated from 340 to 700 feet. A cement annular seal is present to a depth of 310 feet. The well is gravel packed. The well is equipped with a 125-hp water-lubricated DWT which produces 1,300 gpm. The well meets all sanitary setback requirements.

Well CBK 11-01 – RAW (1510031-017)

Well CBK 11-01 was drilled in 1980 to a depth of 600 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 16-inch diameter steel casing to a depth of 600 feet which is perforated from 300 to 600 feet. A cement annular seal is present to a depth of 50 feet. The well is gravel packed. The well is equipped with a 125-hp water-lubricated DWT which produces 1,500 gpm. The well meets all sanitary setback requirements.

Well CBK 12-01 – RAW (1510031-018)

Well CBK 12-01 was drilled in 1981 to a depth of 620 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 30-inch diameter steel conductor casing to a depth of 50 feet and a 16-inch diameter steel casing to a depth of 620 feet which is perforated from 368 to 620 feet. A cement annular seal is present to a depth of 50 feet. The well is gravel packed. The well is equipped with a 75-hp oil-lubricated DWT which produces 700 gpm. The well meets all sanitary setback requirements.

Well CBK 13-01 – RAW (1510031-019)

Well CBK 13-01 was drilled in 1982 to a depth of 705 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains an 18-inch diameter steel casing to a depth of 705 feet which is perforated from 265 to 705 feet. A cement annular seal is present to a depth of 70 feet. The well is gravel packed. The well is equipped with a 200-hp oil-lubricated DWT which produces 2,200 gpm. The well meets all sanitary setback requirements.

Well CBK 14-01 – RAW (1510031-020)

Well CBK 14-01 was drilled in 1977 to a depth of 701 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 26-inch diameter steel conductor casing to a depth of 20 feet and a 16-inch diameter steel casing to a depth of 701 feet which is perforated from 250 to 701 feet. A cement annular seal is present to a depth of 55 feet. The well is gravel packed. The well is equipped with a 150-hp oil-lubricated DWT which produces 1,400 gpm. The well meets all sanitary setback requirements.

This well is currently offline due to chronic bacteriological contamination. The City is in the process of converting the oil-lubricated DWT to a water-lubricated DWT to mitigate the problem.

Well CBK 15-01 – RAW (1510031-021)

Well CBK 15-01 was drilled in 1984 to a depth of 700 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 30-inch diameter steel conductor casing to a depth of 75 feet and a 16-inch diameter steel casing to a depth of 700 feet which is perforated from 250 to 700 feet. A cement annular seal is present to a depth of 177 feet. The well is gravel packed. The well is equipped with a 100-hp oil-lubricated DWT which produces 1,025 gpm. The well meets all sanitary setback requirements.

Well CBK 17-01 – RAW (1510031-022)

Well CBK 17-01 was drilled in 1985 to a depth of 651 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 36-inch diameter steel conductor casing to a depth of 50 feet and a 16-inch diameter steel casing to a depth of 651 feet which is perforated from 352 to 632 feet. A cement annular seal is present to a depth of 300 feet. The well is gravel packed. The well is equipped with a 100-hp water-lubricated DWT which produces 1,000 gpm. The well meets all sanitary setback requirements.

Well CBK 18-01 – RAW (1510031-002)

Well CBK 18-01 was drilled in 1987 to a depth of 650 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 30-inch diameter steel conductor casing to a depth of 80 feet and a 16-inch diameter steel casing to a depth of 650 feet which is perforated from 330 to 650 feet. A cement annular seal is present to a depth of 290 feet. The well is gravel packed. The well is equipped with a 100-hp oil-lubricated DWT which produces 875 gpm. The well meets all sanitary setback requirements.

Well CBK 19-01 – RAW (1510031-003)

Well CBK 19-01 was drilled in 1989 to a depth of 760 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 30-inch diameter steel conductor casing to a depth of 76 feet and a 16-inch diameter steel casing to a depth of 760 feet which is perforated from 450 to 760 feet. A cement annular seal is present to a depth of 330 feet. The well is gravel packed. The well is equipped with a 100-hp water-lubricated DWT which produces 900 gpm. The well meets all sanitary setback requirements.

Well CBK 20-01 – RAW (1510031-023)

Well CBK 20-01 was drilled in 1987 to a depth of 740 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 30-inch diameter steel conductor casing to a depth of 80 feet and a 16-inch diameter steel casing to a depth of 740 feet which is perforated from 500 to 740 feet. A cement annular seal is present to a depth of 230 feet. The well is gravel packed. The well is equipped with a 150-hp oil-lubricated DWT which produces 1,400 gpm. The well meets all sanitary setback requirements.

Well CBK 22-01 – RAW (1510031-037)

Well CBK 22-01 was drilled in 1987 to a depth of 705 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 36-inch diameter steel conductor casing to a depth of 80 feet and a 16-inch diameter steel casing to a depth of 705 feet which is perforated from 390 to 705 feet. A cement annular seal is present to a depth of 135 feet. The well is gravel packed. The well is equipped with a 200-hp water-lubricated DWT which produces 2,500 gpm. The well meets all sanitary setback requirements.

Well CBK 23-01 – RAW (1510031-030)

Well CBK 23-01 was drilled in 1992 to a depth of 720 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 34-inch diameter steel conductor casing to a depth of 50 feet and a 16-inch diameter steel casing to a depth of 720 feet which is perforated from 450 to 720 feet. A cement annular seal is present to a depth of 430 feet. The well is gravel packed. The well is equipped with a 125-hp oil-lubricated DWT which produces 1,220 gpm. The well meets all sanitary setback requirements.

Well CBK 24-01 – RAW (1010053-044)

Well CBK 24-01 was drilled in 1988 to a depth of 680 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 36-inch diameter steel conductor casing to a depth of 80 feet and a 16-inch diameter steel casing to a depth of 680 feet which is perforated from 240 to 680 feet. A cement annular seal is present to a depth of 160 feet. The well is gravel packed. The well is equipped with a 200-hp water-lubricated DWT which produces 950 gpm. The well meets all sanitary setback requirements.

Well CBK 25-01 – RAW (1010053-004)

Well CBK 25-01 was drilled in 1989 to a depth of 720 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 30-inch diameter steel conductor casing to a depth of 70 feet and a 16-inch diameter steel casing to a depth of 720 feet which is perforated from 380 to 720 feet. A cement annular seal is present to a depth of 350 feet. The well is gravel packed. The well is equipped with a 100-hp oil-lubricated DWT which produces 745 gpm. The well meets all sanitary setback requirements.

Well CBK 26-01 – RAW (1510053-005) OFFLINE

Well CBK 26-01 was drilled in 1991 to a depth of 680 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 30-inch diameter steel conductor casing to a depth of 80 feet and a 16-inch diameter steel casing to a depth of 680 feet which is perforated from 440 to 680 feet. A cement annular seal is present to a depth of 80 feet. The well is gravel packed. The well is equipped with a 100-hp oil-lubricated DWT which produces 633 gpm. The well meets all sanitary setback requirements.

The well has been offline since August 2011 due to fluctuating arsenic levels.

Well CBK 27-01 – RAW (1510031-033)

Well CBK 27-01 was drilled in 1993 to a depth of 720 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 40-inch diameter steel conductor casing to a depth of 50 feet and a 16-inch diameter steel casing to a depth of 720 feet which is perforated from 400 to 720 feet. A cement annular seal is present to a depth of 380 feet. The well is gravel packed. The well is equipped with a 125-hp water-lubricated DWT which produces 1,000 gpm. The well meets all sanitary setback requirements.

Well CBK 28-01 – RAW (1510031-031)

Well CBK 28-01 was drilled in 1992 to a depth of 710 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 30-inch diameter steel conductor casing to a depth of 77 feet and a 16-inch diameter steel casing to a depth of 710 feet which is perforated from 450 to 710 feet. A cement annular seal is present to a depth of 400 feet. The well is gravel packed. The well is equipped with a 125-hp oil-lubricated DWT which produces 1,000 gpm. The well meets all sanitary setback requirements.

Well CBK 30-01 – RAW (1510031-035)

Well CBK 30-01 was drilled in 1993 to a depth of 720 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 30-inch diameter steel conductor casing to a depth of 73 feet and a 16-inch diameter steel casing to a depth of 720 feet which is perforated from 460 to 720 feet. A cement annular seal is present to a depth of 430 feet. The well is gravel packed. The well is equipped with a 150-hp oil-lubricated DWT which produces 1,250 gpm. The well meets all sanitary setback requirements.

Well CBK 31-01 – BEFORE GAC (1510031-034)

Well CBK 31-01 was drilled in 1993 to a depth of 720 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 40-inch diameter steel conductor casing to a depth of 50 feet and a 16-inch diameter steel casing to a depth of 720 feet which is perforated from 430 to 720 feet. A cement annular seal is present to a depth of 410 feet. The well is gravel packed. The well is equipped with a 150-hp DWT which produces 1,125 gpm. The well meets all sanitary setback requirements.

Well CBK 32-01 – BEFORE GAC (1510031-038)

Well CBK 32-01 was drilled in 1998 to a depth of 730 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 40-inch diameter steel conductor casing to a depth of 50 feet and a 16-inch diameter steel casing to a depth of 730 feet which is perforated from 400 to 730 feet. A cement annular seal is present to a depth of 380 feet. The well is gravel packed. The well is equipped with a 125-hp oil-lubricated DWT which produces 1,000 gpm. The well meets all sanitary setback requirements.

Well CBK 33-01 – RAW (1510031-041)

Well CBK 33-01 was drilled in 1994 to a depth of 700 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 40-inch diameter steel conductor casing to a depth of 50 feet and a 16-inch diameter steel casing to a depth of 700 feet which is perforated from 380 to 680 feet. A cement annular seal is present to a depth of 370 feet. The well is gravel packed. The well is equipped with a 125-hp oil-lubricated DWT which produces 1,000 gpm. The well meets all sanitary setback requirements.

Well CBK 34-01 – RAW (1510031-042)

Well CBK 34-01 was drilled in 1995 to a depth of 720 feet. A DWT Well Driller's Report is on file with the Department. The borehole contains a 40-inch diameter steel conductor casing to a depth of 50 feet and a 16-inch diameter steel casing to a depth of 720 feet which is perforated from 370 to 700 feet. A cement annular seal is present to a depth of 350 feet. The well is gravel packed. The well is equipped with a 125-hp DWT which produces 1,000 gpm. The well meets all sanitary setback requirements.

Well CBK 35-01 – RAW (1510031-039)

Well CBK 35-01 was drilled in 1995 to a depth of 720 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 40-inch diameter steel conductor casing to a depth of 50 feet and a 16-inch diameter steel casing to a depth of 720 feet which is perforated from 340 to 700 feet. A cement annular seal is present to a depth of 320 feet. The well is gravel packed. The well is equipped with a 125-hp oil-lubricated DWT which produces 1,000 gpm. The well meets all sanitary setback requirements.

Well CBK 36-01 – RAW (1510031-045)

Well CBK 36-01 was drilled in 1997 to a depth of 718 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 40-inch diameter steel conductor casing to a depth of 50 feet and an 18-inch diameter steel casing to a depth of 718 feet which is perforated from 366 to 698 feet. A cement annular seal is present to a depth of 350 feet. The well is gravel packed. The well is equipped with a 150-hp water lubricated DWT which produces 1,250 gpm. The well meets all sanitary setback requirements.

Well CBK 37-01 – RAW (1510031-046)

Well CBK 37-01 was drilled in 1998 to a depth of 720 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 40-inch diameter steel conductor casing to a depth of 50 feet and a 16-inch diameter steel casing to a depth of 720 feet which is perforated from 390 to 700 feet. A cement annular seal is present to a depth of 370 feet. The well is gravel packed. The well is equipped with a 125-hp oil-lubricated DWT which produces 1,000 gpm. The well meets all sanitary setback requirements.

This well is currently offline due to chronic bacteriological contamination. The City plans to convert the oil-lubricated pump to a water-lubricated pump in 2015.

Well CBK 38-01 – RAW (1510031-047)

Well CBK 38-01 was drilled in 1998 to a depth of 670 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 40-inch diameter steel conductor casing to a depth of 50 feet and a 16-inch diameter steel casing to a depth of 670 feet which is perforated from 360 to 650 feet. A cement annular seal is present to a depth of 340 feet. The well is gravel packed. The well is equipped with a 125-hp oil-lubricated DWT which produces 1,000 gpm. The well meets all sanitary setback requirements.

Well CBK 43-01 – RAW (1510031-117)

Well CBK 43-01 was drilled in 2007 to a depth of 660 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 16-inch diameter steel casing to a depth of 660 feet which is perforated from 410 to 520 feet. A cement annular seal is present to a depth of 385 feet. The well is gravel packed. The well is equipped with a 200-hp water-lubricated DWT which produces 1,200 gpm. The well meets all sanitary setback requirements.

Well CBK 46-01 – RAW (1510031-109)

Well CBK 46-01 was drilled in 2005 to a depth of 560 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 30-inch diameter steel conductor casing to a depth of 50 feet and a 16-inch diameter steel casing to a depth of 560 feet which is perforated from 360 to 540 feet. A cement annular seal is present to a depth of 325 feet. The well is gravel packed. The well is equipped with a 200-hp water-lubricated DWT which produces 1,105 gpm. The well meets all sanitary setback requirements.

Well CBK 47-01 – RAW (1510031-115)

Well CBK 47-01 was drilled in 2006 to a depth of 750 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 30-inch diameter steel conductor casing to a depth of 50 feet and a 16-inch diameter steel casing to a depth of 750 feet which is perforated from 475 to 730 feet. A cement annular seal is present to a depth of 440 feet. A bentonite plug is present from 440 to 445 feet. The well is gravel packed. The well is equipped with a 150-hp water-lubricated DWT which produces 1,230 gpm. The well meets all sanitary setback requirements.

Well CBK 49-01 – RAW (1510031-118)

Well CBK 49-01 was drilled in 2007 to a depth of 750 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 30-inch diameter steel conductor casing to a depth of 50 feet and a 16-inch diameter steel casing to a depth of 750 feet which is perforated from 630 to 730 feet. A cement annular seal is present to a depth of 605 feet. A bentonite plug is present from 605 to 610 feet. The well is gravel packed. The well is

equipped with a 150-hp water-lubricated DWT which produces 1,200 gpm. The well meets all sanitary setback requirements.

Well CBK 52-01 – RAW (1510031-119)

Well CBK 52-01 was drilled in 2007 to a depth of 720 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 30-inch diameter steel conductor casing to a depth of 50 feet and a 16-inch diameter steel casing to a depth of 720 feet which is perforated from 450 to 700 feet. A cement annular seal is present to a depth of 425 feet. A bentonite plug is present from 425 to 430 feet. The well is gravel packed. The well is equipped with a 200-hp water-lubricated DWT which produces 1,370 gpm. The well meets all sanitary setback requirements.

Well CBK 53-01 – RAW (1510031-126)

Well CBK 53-01 was drilled in 2008 to a depth of 750 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 16-inch diameter steel casing to a depth of 750 feet which is perforated from 545 to 670 feet. A cement annular seal is present to a depth of 520 feet. A bentonite plug is present from 605 to 610 feet. The well is gravel packed. The well is equipped with a 200-hp water lubricated DWT which produces 1,100 gpm. The well meets all sanitary setback requirements.

Well CBK 54-01 – RAW (1510031-136) PENDING – Under Construction

Well CBK 54-01 was drilled in 2007 to a depth of 750 feet. A Well Driller's Report is on file with the Department. The borehole contains a 30-inch diameter steel conductor casing to a depth of 50 feet and a 16-inch diameter steel casing to a depth of 750 feet which is perforated from 630 to 730 feet. A cement annular seal is present to a depth of 605 feet. A bentonite plug is present from 605 to 610 feet. The well is gravel packed. The well is currently capped and not equipped with a pump.

This is not an approved source of supply. The City must notify the Department when the well development process begins and must have Department approval prior to bringing the well online. The well site is located very close to a railroad supply line.

Well CBK 55-01 – RAW (1510031-127)

Well CBK 55-01 was drilled in 2008 to a depth of 710 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 30-inch diameter steel conductor casing to a depth of 50 feet and a 16-inch diameter steel casing to a depth of 750 feet which is perforated from 630 to 730 feet. A cement annular seal is present to a depth of 520 feet. A bentonite plug is present from 605 to 610 feet. The well is gravel packed. The well is equipped with a 200-hp water-lubricated DWT which produces 1,500 gpm. The well meets all sanitary setback requirements.

Well CBK F101-01 – RAW (1510031-025)

Well CBK F101-01 was drilled in 1981 to a depth of 600 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 30-inch diameter steel conductor casing to a depth of 50 feet and a 16-inch diameter steel casing to a depth of 600 feet which is perforated from 270 to 450 feet and from 480 to 600 feet. A cement annular seal is present to a depth of 50 feet. The well is gravel packed. The well is equipped with a 100-hp DWT which produces 1,100 gpm. The well meets all sanitary setback requirements.

Well CBK F103-01 – RAW (1510031-027)

Well CBK F103-01 was drilled in 1986 to a depth of 710 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 30-inch diameter steel conductor casing to a depth of 45 feet and a 16-inch diameter steel casing to a depth of 710 feet which is perforated from 410 to 710 feet. A cement annular seal is present to a depth of 340 feet. The well is gravel packed. The well is equipped with a 100-hp DWT which produces 800 gpm. The well meets all sanitary setback requirements.

Well L203-01 – BEFORE GAC (1510031-049)

Well L203-01 was drilled in 1997 to a depth of 700 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 40-inch diameter steel conductor casing to a depth of 50 feet and a 16-inch diameter steel casing to a depth of 700 feet which is perforated from 420 to 680 feet. A cement annular seal is present to a depth of 400 feet. The well is gravel packed. The well is equipped with a 125-hp oil-lubricated DWT which produces 800 gpm. The well meets all sanitary setback requirements.

Well L205-01 – BEFORE GAC (1510031-050)

Well L205-01 was drilled in 1997 to a depth of 690 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 40-inch diameter steel conductor casing to a depth of 50 feet and a 16-inch diameter steel casing to a depth of 690 feet which is perforated from 410 to 670 feet. A cement annular seal is present to a depth of 390 feet. The well is gravel packed. The well is equipped with a 125-hp oil-lubricated DWT which produces 875 gpm. The well meets all sanitary setback requirements.

Well L207-01 – BEFORE GAC (1510031-100)

Well L207-01 was drilled in 1999 to a depth of 720 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 40-inch diameter steel conductor casing to a depth of 50 feet and a 16-inch diameter steel casing to a depth of 720 feet which is perforated from 420 to 700 feet. A cement annular seal is present to a depth of 400 feet. The well is gravel packed. The well is equipped with a 125-hp DWT which produces 750 gpm. The well meets all sanitary setback requirements.

Well L208-01 – BEFORE GAC (1510031-107)

Well L208-01 was drilled in 1999 to a depth of 720 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 40-inch diameter steel conductor casing to a depth of 50 feet and a 16-inch diameter steel casing to a depth of 720 feet which is perforated from 420 to 700 feet. A cement annular seal is present to a depth of 400 feet. The well is gravel packed. The well is equipped with a 150-hp water-lubricated DWT which produces 750 gpm. The well meets all sanitary setback requirements.

Well L210-01 – BEFORE GAC (1510031-105)

Well L210-01 was drilled in 2003 to a depth of 721 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 40-inch diameter steel conductor casing to a depth of 50 feet and a 16-inch diameter steel casing to a depth of 721 feet which is perforated from 390 to 700 feet. A cement annular seal is present to a depth of 370 feet. The well is gravel packed. The well is equipped with a 125-hp water-lubricated DWT which produces 800 gpm. The well meets all sanitary setback requirements.

Well L211-01 – BEFORE GAC (1510031-106)

Well L211-01 was drilled in 2003 to a depth of 720 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 40-inch diameter steel conductor casing to a depth of 50 feet and a 16-inch diameter steel casing to a depth of 720 feet which is perforated from 450 to 700 feet. A cement annular seal is present to a depth of 430 feet. The well is gravel packed. The well is equipped with a 125-hp water-lubricated DWT which produces 650 gpm. The well meets all sanitary setback requirements.

Well L212-01 – BEFORE GAC (1510031-108)

Well L212-01 was drilled in 2005 to a depth of 1,215 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 40-inch diameter steel conductor casing to a depth of 50 feet and a 16-inch diameter steel casing to a depth of 720 feet which is perforated from 730 to 1,170 feet. A cement annular seal is present to a depth of 680 feet. Two bentonite plugs are present between 680 and 690 feet and between 1,185 and 1,215 feet. The well is gravel packed. The well is equipped with a 200-hp water-lubricated DWT which produces 1,800 gpm. The well meets all sanitary setback requirements.

Well CBK Olcese Well No. 1 – BEFORE As BLEND (1010031-102)

Well CBK Olcese Well No. 1was drilled in 1988 to a depth of 700 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 34-inch diameter steel conductor casing to a depth of 50 feet and an 18-inch diameter steel casing to a depth of 700 feet which is perforated from 280 to 680 feet. A cement annular seal is present to a depth of 200 feet. The well is gravel packed. The well is equipped with a 250-hp oil-lubricated DWT which produces 2,100 gpm. The well meets all sanitary setback requirements.

Well CBK Olcese Well No. 2 – BEFORE As BLEND (1010031-103)

Well CBK Olcese Well No. 2 was drilled in 1981 to a depth of 722 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 34-inch diameter steel conductor casing to a depth of 50 feet and an 18-inch diameter steel casing to a depth of 722 feet which is perforated from 300 to 722 feet. A cement annular seal is present to a depth of 220 feet. The well is gravel packed. The well is equipped with a 250-hp oil-lubricated DWT which produces 1,300 gpm. The well meets all sanitary setback requirements.

Standby Sources:

Well CBK 29-01 – RAW (1510031-032) STANDBY

Well CBK 29-01 was drilled in 1992 to a depth of 720 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 36-inch diameter steel conductor casing to a depth of 50 feet and a 16-inch diameter steel casing to a depth of 720 feet which is perforated from 430 to 720 feet. A cement annular seal is present to a depth of 400 feet. The well is gravel packed. The well is equipped with a 125-hp oil-lubricated DWT which produces 1,000 gpm. The well meets all sanitary setback requirements.

The well is classified as standby due to arsenic levels. The current running annual average (RAA) is 10.49 ppb. Cal Water does not allow any well which has any contaminant greater than 70 percent of the MCL to be online.

Well CBK 39-01 – RAW (1510031-048) STANDBY

Well CBK 39-01 was drilled in 1998 to a depth of 710 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 40-inch diameter steel conductor casing to a depth of 50 feet and a 16-inch diameter steel casing to a depth of 710 feet which is perforated from 500 to 690 feet. A cement annular seal is present to a depth of 480 feet. The well is gravel packed. The well is equipped with a 125-hp oil-lubricated DWT which produces 1,000 gpm. The nearest sanitary sewer line is more than 75 feet away from this well.

The well is classified as standby due to high arsenic levels. The current running annual average (RAA) is 9.8 ppb. Cal Water does not allow any well which has any contaminant greater than 70 percent of the MCL to be online.

Well CBK 41-01 – RAW (1510031-098) STANDBY

Well CBK 41-01 was drilled in 2000 to a depth of 720 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 16-inch diameter steel casing to a depth of 720 feet which is perforated from 400 to 700 feet. A cement annular seal is present to a depth of 380 feet. The well is gravel packed. The well is equipped with a 125-hp water-lubricated DWT which produces 900 gpm. The nearest sanitary sewer line is more than 75 feet away from this well.

The well is classified as standby due to high arsenic levels. An arsenic treatment plant is currently being designed for this well. The current running annual average (RAA) is 8.0 ppb. Cal Water does not allow any well which has any contaminant greater than 70 percent of the MCL to be online.

Well CBK 45-01 – BEFORE GAC (1510031-104) STANDBY

Well CBK 45-01 was drilled in 2005 to a depth of 1,290 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 30-inch diameter steel conductor casing to a depth of 50 feet and 16-inch diameter steel casing to a depth of 1,290 feet which is perforated from 970 to 1,270 feet. A cement annular seal is present to a depth of 920 feet. A bentonite plug is provided from 920 to 930 feet. The well is gravel packed. The well is equipped with a 200-hp water-lubricated DWT which produces 1,250 gpm.

The well is classified as standby due to high arsenic levels. The current running annual average (RAA) is 12.0 ppb. Cal Water does not allow any well which has any contaminant greater than 70 percent of the MCL to be online.

Well L201-01 – BEFORE GAC (1510031-028) STANDBY

Well L201-01 was drilled in 1976 to a depth of 800 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 30-inch diameter steel conductor casing to a depth of 50 feet and a 16-inch diameter steel casing to a depth of 800 feet which is perforated from 244 to 800 feet. A cement annular seal is present to a depth of 50 feet. The well is gravel packed. The well is equipped with a 125-hp oil-lubricated DWT which produces 1175 gpm.

The well is classified as standby due to elevated ethylene dibromide (EDB) levels. The well was taken offline in 2006. The last sample collected in January 2007 was 0.05 ug/L, which is right at the MCL level for EDB. Cal Water does not allow any well which has any contaminant greater than 70 percent of the MCL to be online.

Well L204-01 – BEFORE GAC (1510031-036) STANDBY

Well L204-01 was drilled in 1993 to a depth of 590 feet. A DWR Well Driller's Report is on file with the Department. The borehole contains a 36-inch diameter steel conductor casing to a depth of 50 feet and a 16-inch diameter steel casing to a depth of 590 feet which is perforated from 400 to 470 feet and from 510 to 580 feet. A cement annular seal is present to a depth of 370 feet. The well is gravel packed. The well is equipped with a 125-hp oil-lubricated DWT which produces 1,100 gpm.

The well is classified as standby due to mercury levels above the MCL of 2 ug/L. A cycle test was performed on the well in February 2012 and yielded the following results: 11 ug/L, 2 ug/L, 1.84 ug/L, 1.97 ug/L, 1.94 ug/L, and 2.08 ug/L. Cal Water does not allow any well which has any contaminant greater than 70 percent of the MCL to be online.

Inactive Sources:

Well No. 16-01 (Inactive)

Well No. 16-01 was drilled in 1987 to a depth of 740 feet. A Well Driller's Report is on file with the Department. The borehole contains a 30-inch diameter steel conductor casing to a depth of 80 feet and a 16-inch diameter steel casing to a depth of 740 feet which is perforated from 360 to 740 feet. There is a 260 foot annular seal provided. The well is inactive because it produces water with levels of trichloropropane (TCP) above the response level. The electrical leads were disconnected in September 2009.

Well No. 21-01 (Inactive)

Well No. 21-01 was drilled in 1986 to a depth of 710 feet. A Well Driller's Report is on file with the Department. The borehole contains a 30-inch diameter steel conductor casing to a depth of 75 feet and a 16-inch diameter steel casing to a depth of 710 feet which is perforated from 370 to 710 feet. There is a 260 foot annular seal provided. The well is inactive because it produces water with levels of trichloropropane (TCP) above the response level. The electrical leads were disconnected in September 2009.

Well No. 40-01 (Inactive)

Well No. 40-01 was drilled in 1999 to a depth of 690 feet. A Well Driller's Report is on file with the Department. The borehole contains a 40-inch diameter steel conductor casing to a depth of 72 feet and a 16-inch diameter steel casing to a depth of 690 feet which is perforated from 430 to 670 feet. There is a 400 foot annual seal provided. The well is inactive due to high pH levels. The well was sold back to KCWA.

Well L202-01 – BEFORE GAC (Inactive)

Well L202-01 was drilled in 1988 to a depth of 700 feet. A Well Driller's Report is on file with the Department. The borehole contains a 40-inch diameter steel conductor casing to a depth of 50 feet and a 16-inch diameter steel casing to a depth of 695 feet which is perforated from 375 to 675 feet. A cement annular seal is present to a depth of 360 feet. The well is gravel packed. The well is inactive due to high nitrate levels.

Well L206-01 – BEFORE GAC (Inactive)

Well L206-01 was drilled in 1999 to a depth of 720 feet. A Well Driller's Report is on file with the Department. The borehole contains a 40-inch diameter steel conductor casing to a depth of 50 feet and a 16-inch diameter steel casing to a depth of 720 feet which is perforated from 470 to 700 feet. A cement annular seal is present to a depth of 430 feet. The well is gravel packed. The well is inactive due to electric conductivity levels above the upper acceptance limit. The GAC vessels will be relocated to the CBK 41-01 site.

Purchased Treated Surface Water:

CWS-North Garden (1510031-128)

The CWS-North Garden (CWS-NG) water system is located in the northern portion of Bakersfield and serves a population of approximately 18,000 through 5,162 service connections. The CWS-NG water system owns and operates an 8-MGD surface water treatment plant (SWTP) and sells a portion of this treated surface water to the City of Bakersfield. The main processes include chemical addition and membrane filtration followed by disinfection (sodium hypochlorite). The approved sources of supply for the CWS-North Garden treatment plant are surface water from the State Project (via the California Aqueduct and Cross Valley Canal) and the Kern River (via the Beardsley Canal). The CWS-NG SWTP is equipped to discharge directly from the on-site clearwell into the City of Bakersfield distribution system.

Kern County Water Agency (1510031-129)

The Kern County Water Agency (KCWA) is a wholesale water distributor which sells treated surface water to the City of Bakersfield, as well as five (5) other water systems in the Bakersfield area. The KCWA owns and operates a 100-million gallons per day (MGD) conventional surface water treatment plant located in the northern portion of Bakersfield. The main processes include chemical addition, rapid mixing, flocculation, sedimentation and conventional filtration followed by disinfection (sodium hypochlorite) and corrosion control (zinc orthophosphate and pH adjustment with sodium hydroxide). The approved sources of supply for the KCWA treatment plant are surface water from the State Project (via the California Aqueduct and Cross Valley Canal), Kern River, Central Valley Project (via the Friant-Kern Canal), and groundwater. Treated surface water from the KCWA SWTP is delivered several miles through a transmission line, referred to as the Northwest feeder, which largely runs through and delivers water to the northern portion of the City's distribution system.

2.2 ADEQUACY OF SUPPLY

Table 4 displays the average day, maximum day and peak hour demands during the last ten years for the City. The values provided for average day and maximum day demand are sourced from measured values provided by CWSC while the peak hour demand was calculated using the maximum day demand and a peaking factor of 1.5. The combined source capacity of the City's active wells is approximately 62,480 gpm (90 MGD). Additionally, the City reports the ability to source up to an additional max day demand of 10/MGD from surface water sources; thus, the City's total active production capacity is approximately 100-MGD. Additionally, the City maintains five standby wells with a combined source capacity of approximately 6,425 gpm (9.3 MGD).

Table 4: Average Day, Maximum Day and Peak Hour Demand

Year	*Average Day Demand (MGD)*	*Maximum Day Demand (MGD)*	*Peak Hour Demand (MGD)*
2013	36	86 (est)	129
2012	37	229	344
2011	37	165	248
2010	32	185	278
2009	35	86	129
2008	43	98	147
2007	31	86	129
2006	34	83	125
2005	31	79	119
2004	32	78	117
2003	33	82	123

According to California Waterworks Standards, systems serving 1,000/service connections or more should maintain enough capacity including active and standby sources, storage and any emergency connections to provide at least 4-hours PHD. The City maintains (including active and standby groundwater sources, purchased surface water and storage capacity) a 4-hour peak production capacity of approximately 119 MG. This total is adequate to satisfy the aforementioned capacity requirement in only four of the last ten years. However, upon inspection of the data provided in Table 4, it should be noted that data from 2010, 2011 and 2012 is significantly higher than other years with no apparent reasoning or justification for such an increase. It appears this data may have been either a recording error or error in communication of this data to the Department. Even taking into account the likely error in data from 2010, 2011 and 2012, the City's ability to meet PHD remains questionable for prolonged periods of time. The City should ensure accurate production records are maintained in an effort to better document ability to continually meet demand.

The preceding adequacy of supply discussion shows that the City could be subject to water shortages in times of the highest demands; however, the City does not currently experience significant water shortage or outages. The City and CWSC maintain a proactive general water plan and work to ensure that demand can be met and will be met in the future. The City maintains good working relationships with the two utilities from which treated surface water is purchased; purchased surface water often provides the additional increased capacity in times of peak demand. However, in drought years surface water availability could be limited. Thus, the City should continue to work with the KCWA and CWSC-NG to ensure treated surface water remains available for purchase by the City.

2.3 TREATMENT

Disinfection Treatment

The City provides disinfection via continuous chlorination at the well head for all but two of the City's active wells. Chlorination is provided using NSF/ANSI standard 60 certified 12.5% sodium hypochlorite which is injected neat into the distribution system. There are two wells not provided with disinfection at the

well head. These two wells are Olcese Nos. 1 & 2, which both discharge directly to the Olcese Interface tank at which chlorine is injected prior to entering the distribution system. Wells which require GAC treatment are chlorinated effluent of the GAC treatment vessels. Sodium hypochlorite solution is stored in 220-gallon polyethylene tanks with secondary containment at each well site and is injected using LMI metering pumps. The metering pumps are manually adjusted to deliver a free chlorine dosage such that a 1.0-mg/L residual is maintained throughout the distribution system. Stroke and speed settings range between 30 and 90 percent depending on the flow output from each well. A few of the well sites feature online chlorine residual analyzers (Hach CL17). Well sites that are in use are visited by CWSC staff every day; while well sites which are not is use are visited at least weekly.

Granular Activated Carbon (GAC) Treatment

The City currently provides Granular Activated Carbon Treatment (GAC) at ten well sites: nine (9) active sources (CBK-31, CBK-32, L203, L205, L207, L208, L210, L211 and L212) and one standby source (CBK-45). These wells are treated to reduce levels of hydrogen sulfide and various organic compounds.

Table 5: GAC Treatment

Well Number	Treated Water PS Code	Source Status	Contaminant(s) Removed
CBK-31	1510031-082	Active	Hydrogen Sulfide (H2S)
CBK-32	1510031-040	Active	TCP, DBCP
CBK-45	1510031-122	Standby	H2S
L203	1510031-094	Active	H2S
L205	1510031-096	Active	H2S
L207	1510031-101	Active	H2S
L208	1510031-123	Active	H2S
L210	1510031-111	Active	TCP, DCP, H2S, Mn
L211	1510031-113	Active	H2S
L212	1510031-120	Active	H2S

Granular Activated Carbon Treatment for Hydrogen Sulfide

A total of nine wells are currently provided with GAC treatment for removal of hydrogen sulfide. For eight of these wells, the hydrogen sulfide treatment is the only treatment provided, but at one of the wells, Well No. L210, additional GAC treatment is provided to remove organic compounds and manganese. Hydrogen sulfide is removed primarily for the purpose of improving taste and odor and secondarily for possible corrosion reduction as elevated levels of hydrogen sulfide often contribute to corrosion. The specific GAC treatment provided is NSF/ANSI 61 certified catalytic GAC with the commercial name Centaur Carbon produced by Calgon Carbon Corporation. The Centaur Carbon GAC catalyzes an oxidation-reduction reaction of hydrogen sulfide and dissolved oxygen. The product of this oxidation-reduction reaction is elemental sulfur. A small amount of sulfur remains dissolved in the treated effluent, but the majority precipitates out of solution and remains in the GAC vessels or moves into the distribution system.

There is no primary maximum contaminant level (MCL) MCL for hydrogen sulfide, however hydrogen sulfide contributes to odor which has a secondary MCL of 3.0-threshold odor numbers (TON). Thus, odor reduction is the

treatment goal of the City's hydrogen sulfide removal GAC plants. The most recent raw water odor sample results for each of the wells are provided in Table 6 below.

Table 6: Most Recent Odor Sampling Results

Well Number	Raw Water Samples		Treated Water Samples	
	Sample Date	Result (TON)	Date	Result (TON)
CBK-31	7/21/2011	2.0	7/21/2011	ND
CBK-45	11/18/2008	5.0	11/18/2008	5.0
L203	6/12/2012	17.0	6/12/2012	17.0
L205	8/01/2012	2.0	7/25/2012	ND
L207	4/08/2014	ND	4/08/2014	ND
L208	5/11/2011	50.0	1/23/2012	ND
L210	1/06/2009	ND	4/16/2012	1.0
L211	9/19/2012	2.0	9/19/2012	2.0
L212	7/19/2011	1.0	7/25/2012	ND

Based on inspection of raw and treated water odor sampling, including the results catalogued in Table 6 above, it appears the effectiveness in odor reduction provided by the GAC treatment plants is somewhat varied. A possible explanation for the inconclusive odor sampling results is that the GAC at several of the treatment plants may be reaching the end of its useful life. There could additionally be other unknown raw water constituents that may interfere with the effectiveness of the specific GAC used. **In an effort to document the odor reduction of the aforementioned GAC treatment plants, the City should conduct raw water and treated water odor sampling, on the same day, for two consecutive quarters.** Even though the Centaur GAC should not be exhausted due to hydrogen sulfide treatment as the GAC is catalytic rather than absorptive, the two quarters of raw and treated water paired sampling should aid to better understand the GAC performance and likewise aid in operational optimization.

Required total coliform, HPC and nitrate monitoring for raw and treated water for each GAC hydrogen sulfide treatment plant is provided in the tables below. Table 7 provides required monitoring for normal plant operation and Table 8 provides required monitoring if the GAC plant has been offline more than five consecutive days.

Table 7: Required Monitoring for GAC plants (Normal operation)

Sampling Location	Total Coliform	HPC	Nitrate
Raw Water	Monthly	Monthly	Annually
Post Filter (pre-chlorine)	Monthly	Monthly	Quarterly
Plant Effluent	Monthly	Monthly	--

Table 8: Required Monitoring for GAC plants (First month if plant is offline more than five consecutive days)

Sampling Location	Total Coliform	HPC	Nitrate
Raw Water	Weekly	Weekly	Weekly
Post Filter (pre-chlorine)	Weekly	Weekly	Weekly
Plant Effluent	Weekly	Weekly	--

Because of the potential interaction between the installed GAC media and nitrate present in the raw water, it should be noted that all of the wells for which GAC plants are provided produce raw water with nitrate concentrations below half of the nitrate MCL. The most recent nitrate sampling results for the aforementioned wells is provided in Table 9. Because of the relatively low nitrate concentrations, quarterly routine nitrate sampling effluent of the GAC vessels is required. Should raw water nitrate concentrations increase to above half of the MCL, GAC effluent nitrate sampling frequency requirements will be revisited.

Table 9: Raw Water Nitrate Sampling Results

Well Number	Sample Date	Sample result (mg/L)
CBK-31	7/15/2013	16.4
CBK-32	1/06/2014	13.6
CBK-45	11/18/2008*	ND
L203	5/22/2013	ND
L205	7/23/2013	ND
L207	1/06/2014	13.5
L208	5/14/2013	ND
L210	6/13/2013	9.6
L211	8/26/2013	ND
L212	7/24/2013	ND

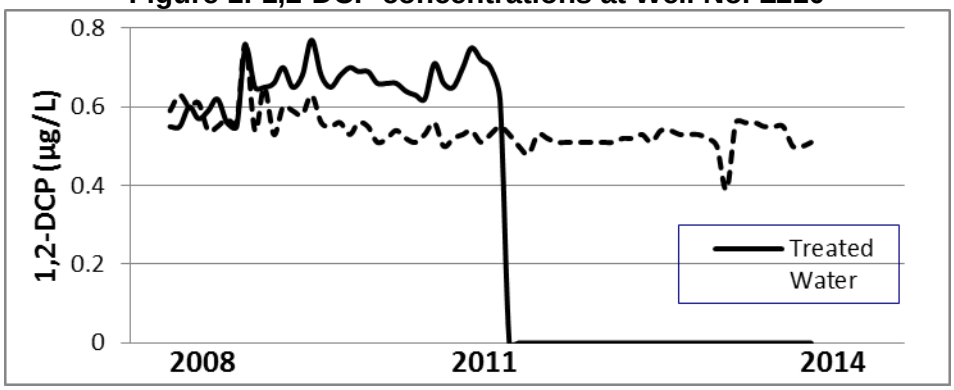
*Well No. CBK-45 has not been used since 2008 and therefore annual nitrate samples have not been required since 2008.

Granular Activated Carbon Treatment at Well No. L210

Well No. L210 is provided with GAC treatment to reduce concentrations 1,2-Dichloropropane (1,2-DCP), manganese and 1,2,3-Tricholoropropane (1,2,3-TCP). A discussion of the removal of each of the aforementioned constituents and the GAC treatment is provided below. It should again be noted that hydrogen sulfide removal treatment, using catalytic GAC, is also provided at Well No. L210 and is discussed in a previous section of this report.

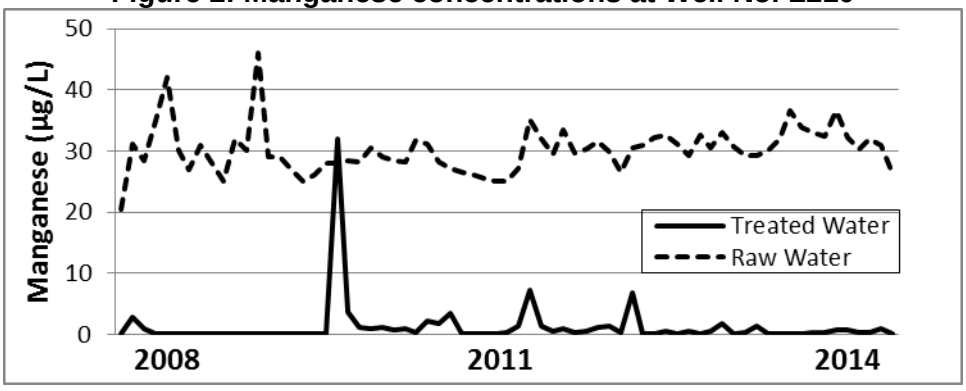
Well No. L210 produces raw water with 1,2-DCP concentrations above the 0.5-µg/L detection limit but below the 5.0-µg/L maximum contaminant level (MCL). 1,2-DCP concentrations produced by Well No. L210 are typically between 0.5 and 0.8-µg/L. The media utilized for 1,2-DCP removal NSF/ANSI 61 certified is Coconut Shell GAC manufactured by Calgon Carbon Corporation. Figure No. 1 below provides 1,2-DCP water quality data for both the raw and treated water produced by Well No. L210. It should be noted that analysis of water quality data shows that the treatment prior to 2011 was ineffective in reducing concentrations of 1,2-DCP and furthermore that concentrations appeared to be increasing after treatment. This issue was discussed in the City's 2010 permit and accompanying engineering report. Shortly after the permit and report were issued, the City scheduled GAC replacement based on the data presented in the report and the suggestion to further explore the operation of the GAC plant. The City replaced the bituminous coal GAC with a coconut shell GAC which appears to be effective removing 1,2-DCP.

Figure 1: 1,2-DCP concentrations at Well No. L210



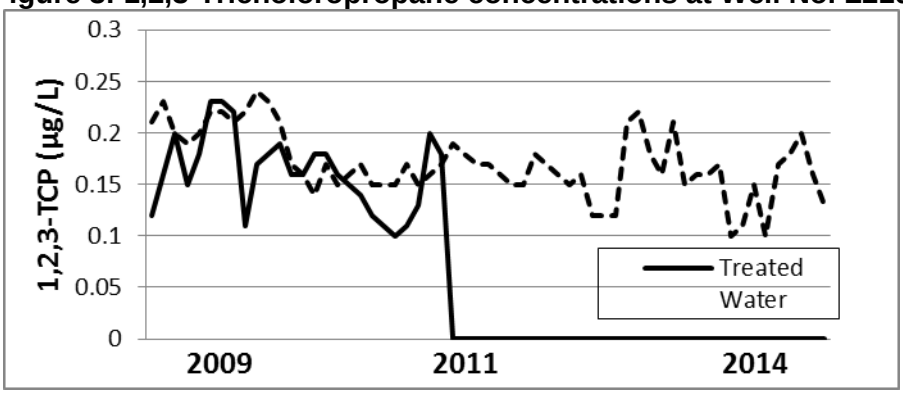
Well No. L210 also produces raw water with manganese concentrations above the detection limit but below the 50.0-µg/L MCL. Figure 2 provides raw and treated manganese concentrations for Well No. L210. The figure shows that the GAC treatment is extremely effective and reduces manganese concentrations to mostly non-detectable levels. The media utilized for manganese removal is NSF/ANSI 61 certified Centaur Carbon GAC manufactured by Calgon Carbon Corporation. The removal of manganese is accomplished in largely the same way as hydrogen sulfide is via a catalyzed oxidation reduction reaction which transforms the dissolved manganese to an insoluble state.

Figure 2: Manganese concentrations at Well No. L210



Finally, Well No. L210 produces raw water with 1,2,3-TCP concentrations above the 0.005-µg/L notification level. Although there is currently no MCL for 1,2,3-TCP, an MCL is likely to be adopted in the next several years. Thus, the City chooses to treat Well No. L210 to remove 1,2,3-TCP and is not required to for compliance with drinking water regulations. The GAC used is the same Calgon coconut shell product used to remove 1,2-DCP. As experienced in removal of 1,2-DCP, bituminous coal GAC was ineffective in removing 1,2,3-TCP. As evidenced by the data provided in Table 6, the treatment has been highly effective since the 2011 change to coconut shell GAC.

Figure 3: 1,2,3-Tricholoropropane concentrations at Well No. L210



In addition to the required bacteriological and nitrate sampling provided in Tables 7 and 8, Well No. L210 requires increased sampling for 1,2-DCP and Manganese. The additional sampling is provided in Tables Nos. 10 and 11.

Table 10: Required Monitoring for Well No. L210
(First month if plant is offline more than five consecutive days)

Sampling Location	PS Code	Manganese	1,2-DCP
Raw Water	1510031-105	Weekly	Weekly
Intermediate Port	1510031-110	Weekly	Weekly
Plant Effluent	1510031-111	Weekly	Weekly

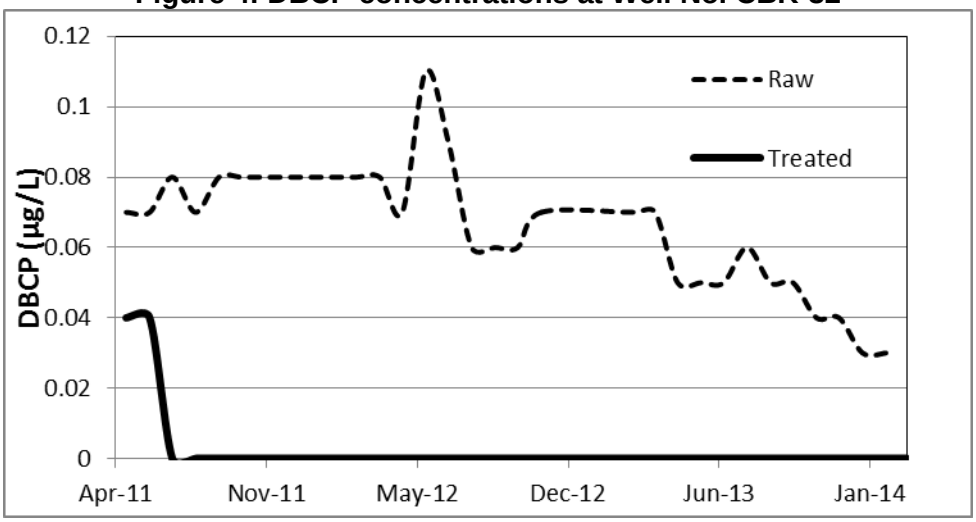
Table 11: Required Monitoring for Well No. L210 (Normal operation)

Sampling Location	PS Code	Manganese	1,2-DCP
Raw Water	1510031-105	Monthly	Monthly
Intermediate Port	1510031-110	Monthly	Monthly
Plant Effluent	1510031-111	Monthly	Monthly

Granular Activated Carbon Treatment at Well No. CBK-32

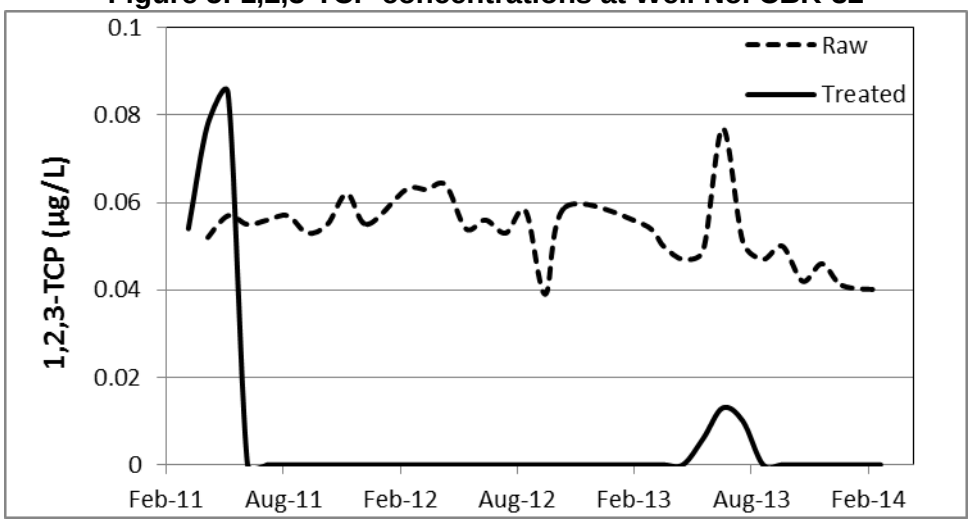
Well No. CBK-32 produces raw water with dibromochloropropane (DBCP) concentrations above the 0.01-µg/L detection limit but below the 0.2-µg/L maximum contaminant level (MCL). Raw water DBCP concentrations produced by Well No. CBK-32 are typically near 0.07 µg/L but in recent years have trended downward to less than 0.04 µg/L. The media utilized for DBCP removal is NSF/ANSI 61 certified Coconut Shell GAC manufactured by Calgon Carbon Corporation. Figure No. 4 below provides DBCP water quality data for both the raw and treated water produced by Well No. CBK-32.

Figure 4: DBCP concentrations at Well No. CBK-32



Well No. CBK-32 also produces raw water with 1,2,3-TCP concentrations above the 0.005-µg/L notification level. As mentioned previously in this report, there is currently no MCL for 1,2,3-TCP and as such, treatment for 1,2,3-TCP removal is not required at Well No. CBK-32 for compliance with drinking water regulations. The GAC used is the same Calgon coconut shell product used to remove DBCP. Figure 5 provides raw and treated water 1,2,3-TCP sampling results for Well No. CBK-32.

Figure 5: 1,2,3-TCP concentrations at Well No. CBK-32



In addition to the required bacteriological and nitrate sampling provided previously in Tables 7 and 8, Well No. CBK-32 requires increased sampling for DBCP. The additional sampling is provided in Tables 12 and 13 below.

Table 12: Required Monitoring for Well No. CBK-32
(First month if plant is offline more than five consecutive days)

Sampling Location	PS Code	DBCP
Raw Water	1510031-105	Weekly
Intermediate Port	1510031-110	Weekly
Plant Effluent	1510031-111	Weekly

Table 13: Required Monitoring for Well No. CBK-32 (Normal operation)

Sampling Location	PS Code	DBCP
Raw Water	1510031-105	Monthly
Intermediate Port	1510031-110	Monthly
Plant Effluent	1510031-111	Monthly

Arsenic Blending

Raw water produced by Olcese Wells No. 1 and 2 often exceeds the 10-µg/L arsenic MCL. Water quality sampling results show that arsenic levels vary seasonally, but to reliably supply water below the arsenic MCL from these two wells, blending treatment must be provided. Blending treatment includes Olcese Wells Nos. 1 and 2 as well as Well Nos. CBK-22 and CBK-24. Raw water from Wells Nos. CBK-22 and CBK-24 produce raw water which does not exceed the arsenic MCL and thus provide for reduction of blended water arsenic levels. Blending is provided at the 10 MG Olcese Interface Tank. Each of the four wells used for blending are discharged into the tank before entering the distribution system. Delivery of blended water effluent of the tank is accomplished using the provided thirteen booster pumps; each booster pump is 75 horsepower and has an approximate capacity of 700 gpm. Discharge from the tank using the provided booster pumps is controlled based on pressure in the distribution system. Figure 6 below provides raw water arsenic concentrations for the four wells while Table 14 provides the respective well production capacities.

Figure 6: Olcese Blend Raw Water Arsenic Concentrations

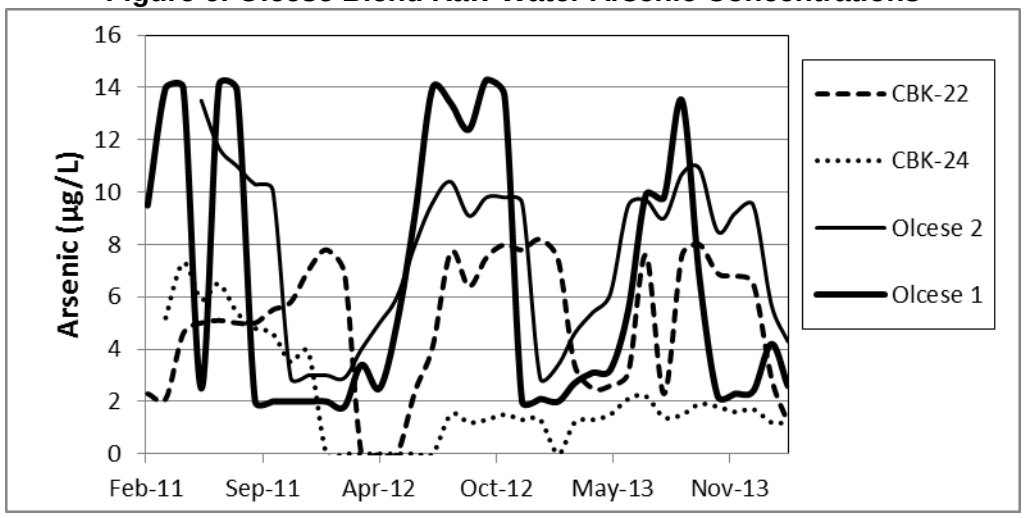


Table 14: Well Production Capacities

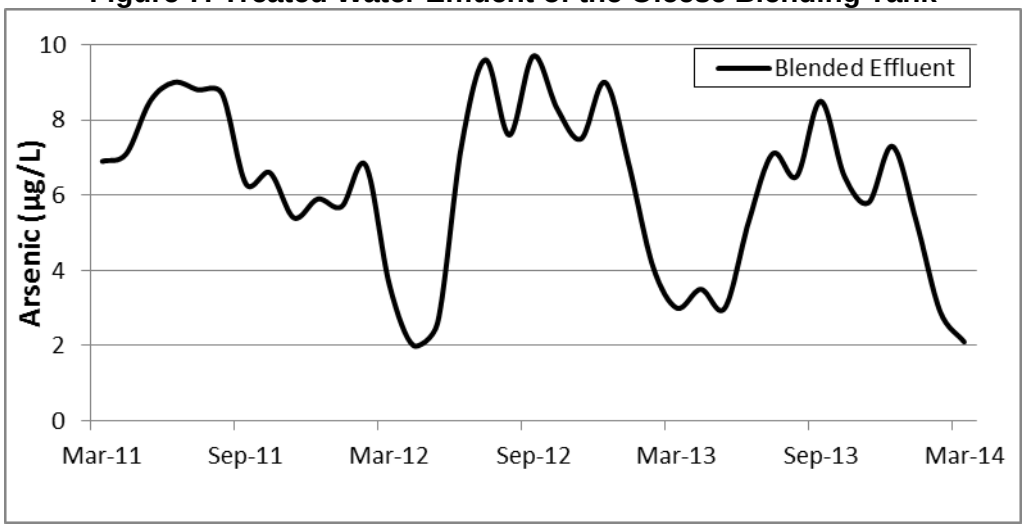
Well Number	Production Capacity (gpm)
Well No. CBK-22	2500
Well No. CBK-24	2500
Olcese Well No. 1	3500
Olcese Well No. 2	3500

The City submitted an operations plan, dated April 2007, for the Olcese Blending Treatment Plant. The operations plan includes explanation of how

the blend ensures production of water below the arsenic MCL. The operations plan outlines a theoretical blend (mass balance) calculation which will be used to calculate a theoretical arsenic concentration for the blended effluent from which well operation will be stipulated. The operations plan proposes a goal of producing blended water with an arsenic concentration less than 8 µg/L which is 80% of the 10-µg/L arsenic MCL. Operators use the SCADA system to control the appropriate daily well production along with recent arsenic sampling data to control the blend.

The submitted operations plan proposes sampling raw water from each of the blended wells monthly for arsenic while the blended water is sampled weekly. Additionally, blended water will be sampled monthly for chloride, conductivity and total dissolved solids. The Olcese blending treatment has been in operation since 2007 and has consistently produced blended water under the arsenic MCL. However, in recent years blended water arsenic levels have trended upward and are often above the approved 8-µg/L treatment goal, but remain below the 10-µg/L MCL. Blended water arsenic data is provided in Figure 7 below.

Figure 7: Treated Water Effluent of the Olcese Blending Tank



With the rising raw water arsenic levels in Olcese Wells Nos. 1 and 2 and to a lesser degree Wells No. CBK-22 and the rising blended water arsenic levels, the City should review and revise the 2007 Olcese Blending Operations Plan. The revision should be submitted to CDPH for review, comment and approval. Of primary concern is how the City can revise operation to ensure blended effluent is consistently below the 8-ppb treatment goal. This should include a method to reliably forecast blended water quality and base well operation and control off of this forecast. This may include increased raw and/or treated water sampling and must include operational parameters, controls and safeguards.

2.4 STORAGE

The City maintains six storage tanks which provide a total storage capacity of 17.5 million gallons. The Olcese blending tank is filled solely by Well Nos. CBK-22, CBK-24 and Olcese Well Nos. 1 and 2 while the remaining tanks can

be filled by the distribution system and/or the accompanying well. Table 15 below provides a list of the storage tanks used by the City as well as respective capacities, year installed, date of last inspection and date of last cleaning. The Department recommends all storage tanks be inspected at least every five years and cleaned based on the findings of the inspection.

Table 15: Storage Tank Information

Name	*Capacity (MG)*	*Year Installed*	*Last Inspection*	*Last Cleaning*
Station 11	1	1981	1/13/2011	1/13/2011
Station 12	0.125	1982	2/7/2012	2/7/2012
Station 13	1.25	1983	1/26/2011	1/26/2011
Olcese Interface	10	1997	1997	1997
Station F101	2	1976	5/22/2013	5/22/2013
Station L208	3	2004	2/15/2007	2/15/2007

2.5 DISTRIBUTION SYSTEM

Distribution lines consist of steel, asbestos-cement and PVC pipelines ranging from 0.75 inch to 42 inch in diameter. Normal system pressure is maintained between 60 and 85 pounds per square inch (psi). The system has little elevation change and therefore is operated as a single pressure zone. New distribution lines are primarily C900 PVC and are installed in conformance with all applicable California Waterworks Standards. Water and sewer line separation in the distribution system is adequate.

The system contains 1,443 dead ends, of which all are provided with blow-off valves and are flushed as needed. The City reports that approximately ten percent of the dead ends are flushed annually. No low pressure lines exist in the distribution system. Each year, the City experiences a number of breaks and leaks in the distribution system as well as a few main breaks and leaks. All of the breaks and leaks are repaired and/or replaced as discovered. The 2013 EAR reports 501 service connection and 8 main breaks or leaks occurred and were repaired in 2013.

2.6 OPERATION AND MAINTENANCE

The operation and maintenance of the City's water system are contracted to California Water Service Company (CWSC). All operations of the system are under the supervision of CWSC District Manager, Rudy Valles Jr. CWSC employs several appropriately certified distribution and treatment operators who operate the system on a day to day basis. CWSC staff visits each site that is currently in use daily. In low demand seasons, several of the wells are not operated and winterized. These sites are visited once a week while offline. Standby and inactive sources are visited monthly. The chief operator of the system is Mr. Todd Potter (D4/T2).

The City's distribution system is classified as a D4 system, and thus requires a chief operator to be at a minimum certified as a D4 distribution operator and shift operators to be at a minimum certified as a D3. All of the GAC treatment

facilities utilized by the City and the Olcese blending tank are classified as T2 treatment facilities and therefore require a chief and shift operators with T2 and T1 certifications, respectively.

Cross Connection Control Program

CWSC administers a cross-connection control program for the City which is coordinated by Mr. Raul Marquez (AWWA Certification No. 02311). According to the 2013 electronic annual report (EAR), there are 2,804 backflow prevention assemblies in the distribution system, of which 79 were installed in 2013. In 2013, only 2,595 backflow prevention devices were tested and 111 were replaced or repaired. The reason for the discrepancy is due to the backflow devices being incorrectly coded by Kern County. There are a large number of swimming pools which are coded as requiring back flow devices which is included in the total number of backflow devices for the City. CWSC is working with Kern County to resolve these issues.

Complaint Program

As reported in the 2013 EAR, the City received 106 complaints. The City records all complaints and follows up to resolve complaints usually within one hour. In general, the City is proactive with repair and maintenance and prompts should any problems or complaints arise.

Emergency Response Plan (ERP)

The City submitted the current revision of the ERP in May 2008. As reviewed by the Department, the submitted ERP appears to adequately address emergency response for the water system. The ERP was last exercised with a tabletop activity in October 2010. The City reports that all emergency back-up power devices are exercised monthly and that using back-up power, the system can maintain pressure for power outages lasting less than two (2) hours.

Consumer Confidence Report (CCR)

The Consumer Confidence Report (CCR) is required to be delivered to all customers within the City's water system by July 1st of the following year, and a copy of the CCR and certification of publication is due to the Department by October 1st of each year. The City submitted the 2012 Consumer Confidence Report (CCR) to the Department on November 19, 2013. The signed certification was received by the Department on August 26, 2013.

Emergency Notification Plan (ENP)

The City's Emergency Notification Plan (ENP), dated May 8, 2013, lists Art Chianello, Rudy Valles, and Stephanie Hearn as the primary, secondary, and tertiary contacts in the event of a water quality emergency. The City has specified the use of local television stations, local radio stations, and a local newspaper as the modes of communication in a water quality emergency. The plan appears to be comprehensive and complete with one exception. The

City is in process of revising the ENP to update emergency contact information.

2.7 SOURCE WATER QUALITY MONITORING

Surface Water

Surface water delivered to the City's customers is purchased from the KCWA and the CWSC-North Garden water systems. Because the City purchases surface water from these two utilities, the City is not required to maintain source water quality monitoring for these sources as it is the responsibility of the KCWA and CWSC-North Garden systems. It should be noted that both the purchased surface water from the KCWA as well as CWSC-North Garden meet all applicable primary and secondary drinking water standards.

Groundwater

All of the City's wells are classified as source class community-large-groundwater-agricultural (CLGA). The appropriate water quality monitoring schedule for existing sources is attached as Appendix B. The City should continue to monitor in accordance with these applicable schedules.

General Mineral and General Physical

The City is required to sample each active well for general mineral, physical and inorganic chemicals once every three years. With the exception of two wells, the City's wells are current on all general mineral, general physical and inorganic chemical monitoring. **The City's Olcese Well No. 2 and Well L210 are currently delinquent for general mineral, general physical and inorganic chemical monitoring. By July 31, 2014, the City must sample Olcese Well No. 2 and L210 for general mineral, general physical and inorganic chemicals as specified by the water quality monitoring schedule provided in Appendix B.**

A summary of the City's most recent water quality monitoring results and next due dates is provided in Appendix F.

Inorganic Chemicals

The City is required to sample each active well for inorganic chemicals every three years. All active wells are being sampled for inorganic chemicals at the appropriate frequency. Inorganic chemicals arsenic and nitrate are discussed in separate sections below, due to the incidence of water quality problems associated with these chemicals in Kern County and the surrounding areas. With the exception of arsenic and nitrate, all of the City's sources, at the time of last sampling, deliver water with inorganic chemicals present below the respective trigger levels. The City's wells produce water with detectable levels of fluoride below the MCL of 2.0 mg/L, which range between non-detect (ND) and 0.7 mg/L.

A summary of the City's most recent water quality monitoring results and next due dates is provided in Appendix F.

Arsenic

Arsenic monitoring is required once every three years as part of the inorganic chemical monitoring. Three of the City's active wells (CBK 27, CBK 32, and CBK 53) produce water with arsenic levels above 80 percent of the MCL of 10 ug/L. The last sample results were 8.6 ug/L, 9.91 ug/L, and 8.53 ug/L, respectively. These three wells are monitored for arsenic on a quarterly basis. With the exception of the three aforementioned wells, the City's wells currently produce water with arsenic concentrations which range from non-detect (ND) to 7.9 ug/L. Additionally, and as discussed in the arsenic blending section of this report, the City conducts quarterly raw water for the following wells: Olcese Well No. 1, Olcese Well No. 2, Wells No. CBK 22 and Well No. CBK 24.
A summary of the City's most recent water quality monitoring results and next due dates is provided in Appendix F.

Nitrate

Public water systems are required to monitor active groundwater sources for nitrate (NO_3) annually if initial monitoring data indicates nitrate concentrations of less 23 mg/L, and quarterly if the concentrations are greater than or equal to 23 mg/L. The City's wells produce water with concentrations of nitrate that range between 2.4 mg/L and 16.7 mg/L. Since the City's wells produce water with nitrate less than ½ the MCL, they are sampled on an annual basis for nitrates.

A summary of the City's most recent water quality monitoring results and next due dates is provided in Appendix F.

Nitrite

Public water systems are required to monitor groundwater active sources for nitrite (NO_2) triennially for sources which produce raw water with nitrite concentration less than half of the 500-µg/L MCL. All of the City's sources produce raw water with nitrite concentrations below half of the MCL, therefore all sources require nitrite sampling triennially. All of the City's last sampling results were non-detect (ND) for nitrite.

A summary of the City's most recent water quality monitoring results and next due dates is provided in Appendix F.

Volatile Organic Chemicals

Volatile Organic Chemical (VOC) monitoring is required for groundwater sources once every three years after the initial monitoring requirements for new sources is complete. With the exception of CBK Well Nos. 13, 35, and L210, the City's wells produce water that does not have detectable levels of any regulated VOCs. CBK Well Nos. 13 and 35 produce water with detectable levels of tetrachloroethylene (PCE). The last sample results collected (during the first quarter of 2014) were 0.65 ug/L and 0.81 ug/L, respectively. These results are below the MCL of 5 ug/L for PCE. CBK Well No. L210 produces

water with a detectable level of 1,2-dichloropropane (1,2-DCP) which has an MCL of 5 ug/L. The last sample result collected in March 2014 shows 1,2-DCP at 0.51 ug/L. CBK Well Nos. 13, 35, and L210 are sampled on a quarterly basis for these constituents.

A summary of the City's most recent water quality monitoring results and next due dates is provided in Appendix F.

Synthetic Organic Chemicals

All new groundwater sources are required to conduct initial and then ongoing raw water monitoring for synthetic organic chemicals (SOCs). The initial monitoring consists of two consecutive quarters of sampling for all 24 regulated SOCs. Based on results of the initial monitoring, continued sampling for up to 19 of the 24 SOCs may be waived. The remaining five SOCs are not eligible for waiver and require routine monitoring.

Initial SOC monitoring has not been completed for the majority of the City's active groundwater wells. Appendix F provides the most recent water quality sampling results and date of next due sampling for all regulated constituents, including SOCs. Referencing the data provided in Appendix F, the City should develop a plan to complete the now delinquent initial SOC monitoring. The plan should be submitted to the Visalia District Office for review and approval. Once the initial monitoring is complete, the City can request waiver of ongoing SOC monitoring.

Routine triennial sampling is required for five SOCs regardless of the initial sampling results. No waivers are permitted. Table 16 provides the five SOCs which require routine sampling for all of the City's active groundwater wells.

Table 16: Routine Synthetic Organic Chemical Sampling

SOC	***Frequency***
Alachlor	3 years
Atrazine	3 years
DBCP	3 years
EDB	3 years
Simazine	3 years

Finally, at the time of last sampling all of the City's active groundwater wells produce water with non-detectable levels of SOCs, with the exception of five wells which produce water with detectable DBCP levels. While these wells (Well Nos. 23, 32, 36, L210 and L212) produce water with detectable results, none of the results are above one half of the MCL. While these wells do show low level detections, this level of DBCP results do not trigger increased monitoring.

Radiological

Four quarters of initial monitoring for radiological constituents are required for groundwater sources. The City has completed the initial monitoring requirements for radiological constituents. The City's active wells are either on a 6-year or 9-year monitoring frequency for gross alpha. Currently only two

of the City's wells (CBK Well Nos. 14 & 28) are on the 6-year monitoring frequency for gross alpha monitoring. CBK Well No. 14 was last sampled for gross alpha particles in June 2012 and the result was 6.5 pCi/L. CBK Well No. 28 was last sampled for gross alpha particles in September 2013 and the result was 5.7 pCi/L. The balance of the City's wells are on a 9-year monitoring frequency for gross alpha.

The City has completed the initial monitoring requirements for Radium-228 for the wells specified in the current permit amendment. No further radium-228 monitoring of these wells is required.

A summary of the City's most recent water quality monitoring results and next due dates is provided in Appendix F.

Bacteriological – Raw Source Monitoring

The City is currently conducting monthly raw water bacteriological sampling per the 2010 permit amendment. Should a well not operate for an entire calendar month, the well is exempted from bacteriological sampling for that month. Monthly bacteriological sampling consists of analysis for total coliform with results reported as MPN/100-ml. A review of the results since 2008, show that some of the City's wells are prone to sporadic total coliform contamination. CBK Well Nos. 19, 28, and 30 all have more than 10 total coliform positive samples collected since 2008. All of these wells have oil-lubricated pumps which is most likely the reason for the chronic total coliform bacteria contamination. The City is currently in the process of converting CBK Well No. 19 to a water-lubricated pump to try to mitigate the total coliform bacteria contamination.

Raw water bacteriological sampling results are provided as Appendix C to this report.

California Ground Water Rule Monitoring

The California Ground Water Rule (GWR) requires public water systems to conduct triggered source monitoring whenever a routine distribution system sample is positive for total coliform bacteria. The City has specified that they will conduct representative monitoring when a routine distribution system sample shows the presence of total coliform bacteria. The City's approved triggered source water monitoring plan, dated December 1, 2009, is on file with the Department.

2.8 DISTRIBUTION SYSTEM MONITORING

Bacteriological Water Quality

The City serves approximately 141,383 persons through 42,058 service connections. Based on population and number of service connections, the City is required to collect 30 bacteriological samples each week. The samples are analyzed for total coliform and E. Coli. bacteria, results are sent to the Department by the 10th day of the month following sampling. The current bacteriological siting plan (BSSP), dated January 2008, states thirty (30)

samples will be collected weekly. The weekly samples are collected from the approved locations and chlorine residuals are measured and recorded. Chlorine residuals range between 0.3 and 2.0 mg/L. Should the population, number of service connections or other significant characteristic of the water system further change, the BSSP should be reviewed and revised as needed.

Since January 2008, the City has had a total of three total coliform positive samples collected. The samples were negative for E. coli bacteria. All repeat samples were negative for total coliform bacteria. A summary of the distribution bacteriological results for City is included as Appendix D.

Lead and Copper Rule Monitoring

The City completed initial lead and copper monitoring requirements and is now allowed to collect the reduced number of fifty (50) triennial samples. The 90th percentile for lead and copper should be less than the respective action levels (0.015 mg/L and 1.3 mg/L, respectively). Lead and copper monitoring is required during the months of June, July, August or September. The last lead and copper samples were collected in August 2013, with results below the action level for lead and copper. The next lead and copper sampling is due by September 30, 2016. The City's lead and copper monitoring history is provided in Appendix E.

Disinfection By-Products Rule (DBPR)

Stage 2 DBPR

The City began Stage 2 DBPR monitoring on April 1, 2012. Stage 2 DBPR monitoring, requires all public water systems to collect TTHM and HAA5 samples from specified points in the distribution system. The Stage 2 DBPR standard monitoring plan (dated 1/23/12) outlines the collection of quarterly sampling at eight sample sites within the distribution system. Compliance is based on a locational (each site) running annual average for the respective MCL's. The City's most recent (4/21/14) Stage 2 monitoring results are listed below:

Table 17: Stage 2 Monitoring Results

Sample Location	*TTHM Qtrly Result*	*TTHM LRAA*	*HAA5 Qtrly Result*	*HAA5 LRAA*
2013 Haggin Oaks Blvd	2.5	6.2	0	2.7
4001 Rosedale Hwy	2	4.5	5.4	3.3
309 Newburg St	0.4	0.3	0	0.0
701 Harvest Creek Rd.	2.7	11.9	0	6.5
1024 Huntington Downs	3.6	20.9	0	11.0
1511 Clarion Run Ave	1.6	1.5	0	0.0
5815 Ashuintully Ave	2.3	1.4	0	0.0
11005 Mayacamas Dr	3.1	3.9	0	0.0

The City is in compliance with all of the requirements for Stage 2 DBPR monitoring.

III. APPRAISAL OF SANITARY HAZARDS & PUBLIC HEALTH SAFEGUARDS

The City's source of supply is of adequate quantity. The City's active source capacity is approximately 110 MGD while standby sources can produce approximately 9 MGD. Furthermore, the City maintains nearly 18-MG of storage. Using active and standby sources as well as storage the City should be able to meet 4-hours peak demand as required by waterworks standards. In practice, the City is largely able to keep up with demand but at times the City receives complaints of low pressure. It should also be noted that in the case of emergency or severely increased demand, the City's sources of purchased treated surface water could provide increased capacity. With the current drought and with potential for prolonged and additional drought in the future, the City should work to ensure the ability to meet demand. The City should maintain relationships with KCWA and CWSC-NG to ensure these vital sources of purchased surface water remain viable sources of supply for the City. The City should continually analyze current groundwater well production and water quality to ensure the groundwater sources remain viable. Should the City lose groundwater wells due to water quality or quantity, the City should explore rehabilitation and/or bringing new sources online.

The City's active sources of supply meet all primary and secondary drinking water standards. Several of the active sources are treated using GAC to reduce concentration of hydrogen sulfide and thus mitigate taste and odor concerns. Additionally, two active wells, Well Nos. L210 and CBK-32, are treated using GAC to reduce concentrations of 1,2-DCP, DBCP, manganese and 1,2,3-TCP. The City also utilizes blending treatment to mitigate arsenic levels from Olcese Well Nos. 1 and 2. Blending is accomplished using four active wells which are discharged directly to the 10-MG Olcese Interface Tank. It should again be noted that even before treatment, none of the City's active sources contain raw water concentrations which currently exceed any primary or secondary drinking water standard. However, the City has communicated concern that lower water table levels are currently changing water quality at several of the City's wells; an example of this changing water quality is increasing arsenic levels in many of the City's wells. The City, and CWSC, maintains a proactive approach to water quality by keeping extraordinary water quality records and proposing treatment when trends indicate future MCL exceedence.

The City is under contract with CWSC for operation of the water system. It should be noted that CWS owns and operates two other large water systems in the Bakersfield area, the CWS-North Garden and CWS-Bakersfield systems. The combined service area of these two water systems and the City's water system comprises service connections for a population of over 350,000 people. CWSC employs a highly skilled and appropriately certified staff who operate the water system in a highly competent manner. The water system's general good condition and overall reliability is in large part due to the outstanding operational practices employed by both CWSC and the City.

The following is a list of items which need to be addressed by the City:

1. By October 1, 2014, the City needs to conduct the delinquent general mineral, general physical and inorganic chemical monitoring for CBK Well Nos. 2 and L210.

2. The Department recommends that all storage tanks be cleaned and inspected at least once every 5 years.

3. In an effort to document the odor reduction of the GAC treatment plants, the City should conduct raw water and treated water odor sampling, on the same day, for two consecutive quarters from the following wells: CBK-31, CBK-45, L203, L205, L207, L208, L210, L211, and L212.

4. The City should develop a plan to address the delinquent initial SOC monitoring. By October 1, 2014, the plan should be submitted to the Visalia District Office for review and approval.

Appendices:

Appendix A: System Photographs
Appendix B: Water Quality Monitoring Schedule (CLGA)
Appendix C: Source Bacteriological Monitoring Report
Appendix D: Distribution System Bacteriological Monitoring Report
Appendix E: Lead and Copper Rule System Report
Appendix F: Last Sample Date and Monitoring Schedule