

Mokelumne River Watershed Sanitary Survey 2020 Update



Pardee Dam

East Bay Municipal Utility District
December 2021

Mokelumne River Watershed Sanitary Survey 2020 Update

East Bay Municipal Utility District

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- Pardee Reservoir Recreation Area, Limited Threat General Waste Discharge Requirements Order
- Best Management Practices, Water Treatment Plant, Pardee Recreation Area
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Executive Summary

Background

The California State Water Resources Control Board – Division of Drinking Water (SWRCB-DDW, previously part of the California Department of Public Health) requires that all surface water systems conduct a watershed sanitary survey and then update that study every five years thereafter. The purpose of this Mokelumne River Watershed Sanitary Survey 2020 Update (MRWSS 2020 Update) is to assess the source and treated water quality data and the watershed conditions during the update period 2015-2019 and confirm that each water system meets drinking water regulatory requirements. Potential contaminating activities and sources are evaluated, and watershed control and management practices are reviewed. Recommendations are made to strengthen source water protection.

The East Bay Municipal Utility District (District) submitted the first Mokelumne River Watershed Sanitary Survey (MRWSS) to SWRCB-DDW in December 1995, followed by five-year updates in 2000, 2005, 2010, and 2015 (MRWSS Update 2000, etc.). The document herein is the District's fifth five-year update of the original MRWSS.

The MRWSS 2020 Update covers the lands that drain to the District's Pardee and Camanche Reservoirs. The Upper Mokelumne River Watershed is defined as portions of the Mokelumne River Watershed that drain to Pardee Reservoir from the North Fork, Middle Fork, South Fork, and Main Stem of the Mokelumne River. The Camanche Watershed consists of the lands between Pardee and Camanche Dams that drain to Camanche Reservoir. Together, these two watersheds cover 627 square miles located along the Upper Mokelumne River in the Sierra Nevada foothill counties of Alpine, Amador, Calaveras, and San Joaquin.

Water Supply, Conveyance, and Treatment

The District has water rights for up to 325 million gallons per day (MGD) from the 577 square-mile (approximately 370,000 acres) Upper Mokelumne River Watershed. In addition, there are five agencies upstream that have diversion structures and/or powerhouses along the Mokelumne River within the Upper Mokelumne River Watershed: Amador Water Agency (AWA), Jackson Valley Irrigation District (JVID), Calaveras Public Utility District (CPUD), Calaveras County Water District (CCWD), and Pacific Gas and Electric (PG&E).

Relatively unchanged during the MRWSS 2020 Update period, the vast majority of the Upper Mokelumne River Watershed consists of open-space and forest land with large tracts of designated wilderness and small concentrations of residential development. Including the District, six major institutional landowners and approximately 81 major private landowners have been identified in the Upper Mokelumne River Watershed.

Approximate landowner holdings are as follows: District - 3 percent, Sierra Pacific Industries (SPI) - 24 percent, Bureau of Land Management (BLM) - 3 percent, PG&E - 1 percent, United States Forest Service (USFS) - 54 percent, and others - 5 percent. The Camanche Watershed is approximately 42 square miles, draining lands to the north and south of the lower Mokelumne River and immediately to the west of Pardee Reservoir. It is bounded on the west by Camanche Dam.

The Mokelumne River is the District's major source of raw water supply. The Mokelumne Aqueducts transport Mokelumne River water from Pardee Reservoir to the East Bay for either direct use at the WTPs or for storage in the East Bay terminal reservoirs – Briones, San Pablo, and Upper San Leandro (USL). The District operates Pardee and Camanche Reservoirs as an integrated system to achieve multiple objectives: providing high quality water supply; releasing flows downstream of Camanche Reservoir for fisheries and other downstream water uses; managing operations for flood control mitigation and power generation; and maintaining sufficient carryover storage for droughts, facility maintenance or emergencies.

Water Supply and Conveyance 2015-2019

Four years of drought conditions ended in 2015. The average annual precipitation during the 2015-2019 period was above average, in large part due to precipitation in 2017 and 2019, which were much higher than average. The lowest end-of-month water storage in both Camanche and Pardee Reservoirs during this update period occurred in 2015, at the end of the drought. Camanche Reservoir dropped to a low of 171.7 feet, or approximately twenty percent of the storage capacity.

The five years inflows to Pardee Reservoir can be described as well below average in 2015, near-average in 2016 and 2018, and above average in 2017 and 2019. Water overtopped the Pardee Reservoir spillway (elevation 568 feet) in winter and spring of 2017, spring 2018, and spring 2019. For Camanche Reservoir, the water elevation did not overtop its spillway (elevation 235.5 feet) during this update period and has only done so twice in the past 25 years. Due to the above average releases from Pardee Reservoir in 2017 and 2019 into Camanche Reservoir, above average releases were made from Camanche Reservoir during the same time period. Releases met Joint Settlement Agreement (JSA)-required flows for all months during the update period.

The five-year annual average Mokelumne Aqueduct draft from Pardee Reservoir dropped from 163 MGD (2010-2014) to 132 MGD (2015-2019). This change was due to several operational activities during the 2020 update period. In 2015, the District utilized its supplemental supply from the Folsom South Canal due to drought conditions and to reduce further depletion of Pardee Reservoir. From November 2016 to April 2017, one or more of the three Mokelumne Aqueducts were out of service due to (1) high winter turbidity at Pardee Reservoir, (2) inspection of the liner in the San Joaquin Delta area segment of Mokelumne Aqueduct No. 2, (3) capital improvements at ORWTP that required the plant to be temporarily removed from service, and (4) reaching capacity at San Pablo Reservoir, which temporarily stores Pardee Reservoir supply. In 2019, the annual average Mokelumne aqueduct draft was 160 MGD.

Water Treatment Plant Improvements 2015-2019

The District operates six water treatment plants (WTPs) that treat surface water from Pardee or Camanche Reservoirs, three WTPs in the District's East Bay service area and three small upcountry WTPs. The three large East Bay WTPs are all in-line filter plants: Walnut Creek, Orinda, and Lafayette WTPs. General improvements were completed at all three plants, such as upgrades to the programmable logic controller systems, and replacements of valves, pumps, and components of the chemical feed systems. In addition, Lafayette WTP completed installing an aeration system for disinfection-by-products (DBP) removal in July 2017. At Orinda WTP, all filter under drains were replaced and an air scour system is under construction. Also at Orinda WTP, the electrical system was upgraded, and the standby fuel system upsized.

The three small upcountry systems treating surface water from Pardee and/or Camanche Reservoirs are: Pardee Recreation Area (PARA) WTP, Pardee Center (PACT) WTP, and Camanche South Shore (CASS) WTP. Several improvements were made to PARA and CASS WTPs during MRWSS update period. The District is currently working with a consultant to design replacements for both PARA and PACT WTPs, which are aging membrane systems near the end of their useful lives with membranes that do not meet SWRCB DDW's current requirement for pressure based direct-integrity testing.

PARA WTP, an ultrafiltration membrane plant, had its water system classification changed to a non-transient, non-community water system in 2016. A new soda ash metering system was added to the plant effluent to raise the pH for corrosion control. Also, a GAC adsorber system was installed post-filtration at PARA WTP to remove disinfection byproduct precursor material.

The anthracite in Camanche South Shore WTP (CASS WTP) filters was replaced with granular activated carbon (GAC) in 2016 to control disinfection byproducts. Later, the entire in-line filter plant at CASS WTP was replaced with a new UF membrane treatment plant. New pipelines were installed to allow the plant influent to take water from Pardee Reservoir as well as Camanche Reservoir. Finally, a GAC adsorber system was added to the UF plant in 2019.

In addition, approximately 6,000 feet of 10-inch HDPE pipeline was installed across Camanche Reservoir in 2015 when the water level was low. This will eventually enable surface water from CASS WTP to serve the Camanche North Shore area, currently served by groundwater from Camanche North Shore (CANS) WTP.

Water Quality Conditions

Pardee Reservoir raw water quality is generally excellent and Camanche Reservoir raw water quality is very good. However, the raw water turbidity did rise above 20 nephelometric turbidity units (NTU) with heavy storm events in early 2017 at both Pardee Reservoir and Camanche Reservoirs, and Camanche Reservoir turbidity also exceeded 10 NTU due to storms in early 2016. The raw water turbidity and coliform levels were above the treated water MCLs, as is typical. The raw waters met all the primary treated water

MCLs for inorganic chemicals, radioactivity, and organic chemicals. During the MRWSS 2020 Update period, raw water aluminum exceeded the secondary MCL standards at Pardee and Camanche Reservoirs and manganese results at Pardee Reservoir exceeded secondary MCL standards. However, these constituents are efficiently removed through treatment at all District WTPs and both aluminum and manganese were below secondary MCLs in all WTP effluent samples.

The District's WTPs were effective and reliable at removing particulates and microorganisms. However, the high raw water turbidity in early 2017 prompted the District to preemptively shut down the Mokelumne Aqueducts and use Briones Reservoir water to supply the in-line filter plants in the East Bay. This was the longest recorded shutdown duration for a water quality event in Pardee Reservoir, and the fourth since 1982. While optimization of coagulants can maintain low filter effluent turbidities during high raw water turbidity events, this typically results in shorter filter run times that cannot be maintained for extended periods of time without straining the waste-stream processes. Thus, the flexibility in source waters is an important factor contributing to the reliability of the large East Bay System.

The small systems of PACT, PARA, and CASS WTPs have significant treated water storage capacity, thus only operate a fraction of each day. They have the flexibility to cease operation for a day or more if the raw water turbidity is extremely high, especially in winter when water demands are low and when high raw water turbidity events are likely to occur. All three small systems were able to maintain low effluent turbidities despite the high raw water turbidity events that occurred during this update period.

The monthly WTP reports submitted to SWRCB-DDW and annual Consumer Confidence Reports (CCRs) indicate that the treated waters from these six WTPs met all water quality regulations, except for HAA5 in the CASS distribution system in 2016. CASS returned to full compliance in 2017, and all other Stage 2 – Disinfectant/Disinfection By-Product Rule (S2DBPR) monitoring results were below the MCL. Disinfection residual and heterotrophic plate count (HPC) data from the distribution systems showed that the District had no problems meeting the detectable disinfectant residual criteria. Completion of the second round of Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) monitoring this update period confirmed the assignment of Bin 1 classification for all the District's WTP. Thus, no additional treatment is required to reduce *Cryptosporidium* risk.

Potential Contaminant Sources

Relatively unchanged during the MRWSS 2020 update period, contaminant sources in the watershed with the highest potential impact on water quality have been identified as the following: fire and fuels management, geologic hazards, grazing, District facilities, recreation, mines, and logging. Three contaminant sources (transportation corridors, illegal dumping, and agriculture) are considered to have insignificant to low potential impact on water quality. Two of the three leaking underground storage tanks were remediated, and the final tank is undergoing site assessment and interim remedial action.

The potential threats and water quality parameters impacted for all 14 contaminant source categories are summarized in Section 5.

The District owns and manages lands around its reservoirs that make up approximately 3 percent of the Pardee watershed and 50 percent of the Camanche Watershed. District facilities and activities that have the potential to impact water quality include wastewater collection and treatment systems, recreation, and grazing. Recreation continues to be popular on District lands, at the Pardee and Camanche Reservoir Recreation Areas. Recreation is also popular upstream of Pardee Reservoir at reservoirs and along some sections of the Mokelumne River and tributaries, particularly camping, boating and off-highway vehicle (OHV) use.

In the non-District watershed lands above Pardee Reservoir, new development slowed in both incorporated and unincorporated parts of Amador and Calaveras counties. Logging and grazing continue to be major activities. Erosion from OHV use continues to be a concern on both public and private lands. Changes in USFS and BLM policies have restricted OHV travel to identified roads, but enforcement of OHV restrictions remains challenging due to the large area involved. The USFS has increased signage and added a campground host at the Moore Creek Campground below Salt Springs Reservoir to help with monitoring and enforcement.

Watershed Management and Control

There are many agencies that play a role in the watershed management and control of the Mokelumne watershed, including EBMUD, local counties (Alpine, Amador, Calaveras, and San Joaquin), Sierra-Pacific Industries (timber industry), PG&E, AWA, CPUD, CCWD, JVID, various California state agencies, and various federal agencies. Combined, these agencies have jurisdiction over land use planning, access control, erosion control, pest management, logging practices, grazing and livestock management, mining, stormwater management, waste management, emergency response, public education, and fire and fuels management. These topics are discussed at Section 6 of the report. Some notable watershed management accomplishments over the 2015-2019 reporting period include: (1) gaining California Wild and Scenic River designation for 37-miles of the Mokelumne River, (2) improving the small wastewater treatment system in the watershed, and (3) completing a remediation project at Poison Lake.

As part of SB 854, thirty-seven miles of the North Fork and main stem of the Mokelumne River became a California Wild and Scenic River on June 27, 2018. As a Wild and Scenic River, the Mokelumne River is protected from new dams and diversions that may harm the waterway's free-flowing character and natural condition for the benefit and enjoyment of the people of the state. This designation does not affect District's existing water rights or the ability to operate, maintain, or replace existing facilities, so as long as it is within the capacity of existing water rights. This designation also provides additional requirements and protections related to logging.

During the MRWSS 2020 Update period, the Mokelumne Hill Sanitation District (MHSD), a small wastewater treatment agency with spray irrigation fields adjacent to the Mokelumne River, just upstream of Pardee Reservoir, was awarded funds from the Clean Water State Revolving Fund to build four key projects: (1) replace 10% of the collection system pipelines that had exceeded their useful service life, (2) automate spray field operation to reduce labor costs and increasing treatment efficiency, (3) replace two lift stations by reestablishing a gravity feed collection system, and (4) expand office and laboratory spaces.

The Poison Lake remediation project was completed during this reporting period, which involved scraping and capping surface mine waste and armoring the drainage channels with boulders and re-seeding bare areas which have not filled in with grasses. Further, the leachate removal and bi-annual groundwater monitoring for Penn Mine was conducted and the report delivered to the California RWQCB.

Conclusions and Recommendations

Raw water quality in Pardee Reservoir is generally excellent. Camanche Reservoir raw water quality is very good. All District WTPs are capable of reliably meeting all primary drinking water regulations, treating or removing particulates, pathogens, and other water quality contaminants. Although no new potential corrective actions were added in this MRWSS 2020 Update, watershed source protection is an integral part of water quality management as reflected in the recommended ongoing actions listed in Table ES-1.

Table ES-1: Summary of Recommendations

Recommendation	Responsible Agency	Description/Explanation
Continue water quality monitoring	The District	Continue water quality monitoring to protect source water and treated water quality. Implement regulatory monitoring as required by SWCRB and EPA, and operational monitoring as needed to optimize water treatment and distribution. Includes the second round of LT2ESWTR sampling, S2DBP monitoring, and reservoir limnological profiling.
Consider implementing a nutrient and algae study in Pardee Reservoir	The District	A new nutrient and algae study would investigate the role and source of nutrients affecting algae taste and odor events.
Continue event-specific follow-up water quality monitoring	The District, Caltrans	Monitor known spills or accidents entering reservoir or tributary, or with the potential to enter, that may significantly impact influent water quality.

Table ES-1. Summary of Recommendations (*continued*)

Recommendation	Responsible Agency	Description/Explanation
Continue to implement 'No Wake Zone' along the reservoir shoreline	The District	Enforce 5-mph speed limit along the shoreline to reduce shoreline erosion.
Maintain outlet tower exclusion zone	The District	Provide additional protection for outlet towers against accidents (e.g., structural damage) and direct water quality impact (e.g., fuel leak from a boat).
Continue invasive species monitoring and vessel inspection program	The District	Prevent importation of invasive species that can negatively impact water quality and system infrastructure.
Maintain the no body contact policy in Pardee Reservoir and tributaries on District property	The District	Reduce potential for contamination.
Continue to provide floating restrooms on Pardee Reservoir	The District	Reduce potential for contamination.
Maintain horse and dog restrictions	The District	Dogs are not allowed in or on Pardee Reservoir. Dogs are not allowed on trails outside the developed recreation areas. Horses are not allowed to enter or drink from waters other than developed drinking stations (applies to Pardee and Camanche Reservoirs and their tributaries on District property).
Continue trail maintenance and ground cover plantings	The District	Reduce erosion
Continue inspecting reservoir shoreline for erosion	The District	This is especially important when water level is lower than normal
Continue Penn Mine and Mine Tailing Ponds work, Camanche Watershed	The District	Continue ongoing compliance monitoring of the Penn Mine groundwater. Inspect conditions to ensure adequate storm water control measures are implemented. Continue working with BLM to finalize and implement remediation plans at the Mining Tailings Ponds.
Install and maintain in-stream sediment control as needed	The District	Control sediment loading from runoff

Table ES-1: Summary of Recommendations (*continued*)

Recommendation	Responsible Agency	Description/Explanation
Continue coordination with CAL FIRE and USFS when wildfires occur	The District	Especially if wildfire may impact source water
Continue surveillance and emergency response program	The District	The District rangers patrol and work with County Sheriffs for routine law enforcement within the District owned watershed lands. The District has an EOP that is written and administered in accordance with the NRF, NIMS and California SEMS guidelines.
Continue participation in watershed educational programs	The District	Stewardship through Education Program, Mokelumne Volunteer Program (MVP), Ranger Led Environmental Education Program (RLEEP) and Ranger-led tours.
Continue participating in relevant agencies and stakeholder groups	The District	CAL FIRE, USFS, Calaveras and Amador Counties, BLM, UMRWA. Topics of interest include water quality, stormwater runoff, future development, fire and fuel management, surveillance and emergency response, and public education/outreach.
Continue monitoring HABs in District water bodies	The District	Monitor and track HABs through visual reservoir inspections, reservoir water quality profiles, and water treatment plant sampling. Take necessary actions to report and mitigate harmful HAB effects.
Continue investing in emergency response, investigation and/or remediation, and technical consulting and report/plan preparation	The District	Improve environmental programs such as point source wastewater discharges, potable water discharges, hazardous air pollutants, hazardous materials, and hazardous waste management (including fuel tanks), due diligence compliance and audits, storm water management, soil and groundwater management.

Section 1. Introduction

Sanitary Survey Requirements

As the primacy agency for the implementation of the Surface Water Treatment Rule (SWTR), the SWRCB-DDW specified that all surface water utilities shall prepare a Watershed Sanitary Survey (WSS) of their water supply watersheds by January 1, 1996, and update it every five years thereafter. Title 22 of the California Code of Regulations requires that the WSS include the following:

- a physical and hydrological description of the watershed
- an evaluation of raw and finished water quality data
- a description of activities and sources of potential contamination
- a description of watershed control and management practices
- an evaluation of the system's ability to meet requirements of Title 22 - Chapter 17: Surface Water Filtration and Disinfection Treatment
- recommendations for corrective actions

In December 1995, the District submitted the first MRWSS to SWRCB-DDW (formerly CDPH) to comply with these regulatory requirements. The 1995 MRWSS focused on lands that drain into Pardee Reservoir. In December 2000, the District submitted the first five-year update of the MRWSS to CDPH. The MRWSS Update 2000 expanded the scope of the original 1995 MRWSS by adding an assessment of the Camanche Watershed, defined as lands that lie between Pardee Dam and Camanche Dam that drain into Camanche Reservoir. Additional updates were submitted in January 2006, January 2010, and January 2015.

MRWSS Update 2020 is the fifth five-year update of the 1995 MRWSS, and meets all requirements for preparation as described in Title 22. The major emphasis in MRWSS Update 2020 continues to be the identification of potential contaminant sources and their corresponding water quality concerns. While all regulated water quality parameters are addressed, microbiological parameters serve as the primary focus. Of particular interest are the potential sources of *Giardia* and *Cryptosporidium*, in part due to the treatment challenges associated with these pathogens.

Objectives

The main objectives of MRWSS Update 2020 parallel those from the first update in 2000:

- Satisfy all SWTR requirements for a WSS.
- Document changes that have taken place in the Pardee and Camanche watersheds during the MRWSS 2020 Update period.
- Produce a report that updates the 1995 MRWSS and its updates, while retaining pertinent information from these previous documents.

Section 1. Introduction

- Evaluate the water quality concerns pertaining to District's Pardee and Camanche Reservoirs.
- Develop a document that complements the District's Year 2020 Update of the East Bay Watershed Sanitary Survey (EBWSS Update 2020).

Additional objectives were established for MRWSS Update 2005 and carried forward to the MRWSS 2010, 2015, and 2020 updates. The first additional objective was to identify trends in water quality and contaminant sources. With the proliferation of Geographic Information Systems (GIS) in public and private agencies within the watersheds, an effort was made to collect as much GIS data as possible from outside agencies, with the objective of expanding the District's GIS database for evaluating contaminant sources. Finally, a few specific events that had potential to affect water quality were described in greater detail than in previous updates. This was done to more thoroughly document specific water quality impacts and agency (District and others) responses to these events, which can be studied to form the basis for future recommendations.

Survey Methods

MRWSS Update 2020 was conducted by District staff in the Water Operations Department (WOD). The MRWSS Update 2015 was reviewed and all text, tables, and figures that required updating were identified. Information was gathered from internal and external sources, and then compiled. As part of this effort, documents were reviewed, water quality data were analyzed, hydrologic data were updated, and the necessary field survey conducted.

Report Organization

The document is organized into seven sections.

Section 1: Introduction gives an overview of WSS requirements, objectives, and methods.

Section 2: Water Supply, Conveyance, and Treatment Systems is an overview of the District's facilities and operations. As the District is a minor landowner within the Camanche and Upper Mokelumne River Watersheds, agencies with water supply facilities or whose activities directly impact water quality and quantity are also highlighted in Section 2.

Section 3: Watershed Description contains a description of watershed characteristics (location, geology and soils, vegetation and wildlife, drainage basins, precipitation and evaporation, local runoff and diversions). Section 3 also documents the land uses, land ownership and jurisdictional authority within watershed lands.

Section 4: Water Quality includes a discussion of drinking water regulations, water quality monitoring that is conducted by the District, analysis of raw and finished water

Section 1. Introduction

quality data, and evaluation of the District's water treatment facilities' ability to meet the requirements of the SWTR and LT2ESWTR.

Section 5: Potential Contaminant Sources in the Watersheds documents the locations and quantities of potential contaminant sources in the watersheds and identifies the key water quality parameters of concern associated with each contaminant source. In addition, the relationships between the water quality parameters of concern and the significance of the potential corresponding contaminant sources identified are discussed.

Section 6: Watershed Control and Management provides an overview of the District's management practices pertaining to the watersheds and to the protection of source water. Also, the management practices of other agencies with jurisdiction over the watershed lands are discussed in this section.

Section 7: Recommendations lists recommended actions.

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Section 2. Water Supply, Conveyance, and Treatment Systems

Overview

The District supplies water to approximately 1.4 million people within twenty incorporated cities and fifteen unincorporated communities in Alameda and Contra Costa Counties, located in the East Bay of the San Francisco Bay Area. In the East Bay, the water system provides water to a 331-square-mile service area from Crockett to San Lorenzo, the San Ramon Valley, and from Walnut Creek to the San Francisco Bay. In addition, the District operates four small water systems adjacent to Pardee and Camanche Reservoirs.

During typical years, approximately ninety percent of the District's water supply originates from Pardee Reservoir on the Mokelumne River as shown on Figure 2-1. From Pardee Reservoir, Mokelumne River water is diverted and transported to the District's service area in the East Bay via the three ninety-mile long pipelines which comprise the Mokelumne Aqueducts. The District operates six large system water treatment plants (WTPs) in the East Bay. Three of these treat Mokelumne River water directly from the aqueducts: Orinda, Lafayette, and Walnut Creek WTPs. The District's other East Bay WTPs (Sobrante, Upper San Leandro and San Pablo WTPs) are supplied by local reservoirs and are discussed at length in the East Bay Watershed Sanitary Survey (EBWSS) and its updates. The local reservoirs receive imported water from the Mokelumne Aqueduct system in addition to local runoff.

In addition to the large East Bay water system, the District operates four small water systems near Pardee Reservoir. The District's Pardee Center (PACT) and Pardee Recreation Area (PARA) facilities treat water from Pardee Reservoir. Camanche Reservoir, located just downstream of Pardee Reservoir, serves as the source of supply for the District's Camanche South Shore (CASS) Recreation Area (Figure 2-2). The District's Camanche North Shore (CANS) Recreation Area is located along the northern shoreline of Camanche Reservoir, but is supplied by groundwater, thus is not discussed in this document.

The focus of this document is the Upper Mokelumne River watershed lands in association with the District's water supply facilities at Pardee and Camanche Reservoirs. The District has water rights up to 325 million gallons per day (MGD) to the 577-square-mile Upper Mokelumne River watershed on the west slopes of the Sierra Nevada Mountains. The Mokelumne River represents the District's major source of supply and has supplied the District with a 2015 through 2019 average annual draft of 132 MGD. Only the water systems supplied directly by the Upper Mokelumne River Watershed are discussed in this document (Orinda, Lafayette, Walnut Creek, PARA, PACT, and CASS, WTPs).

Figure 2-1. Pardee Watershed Facilities

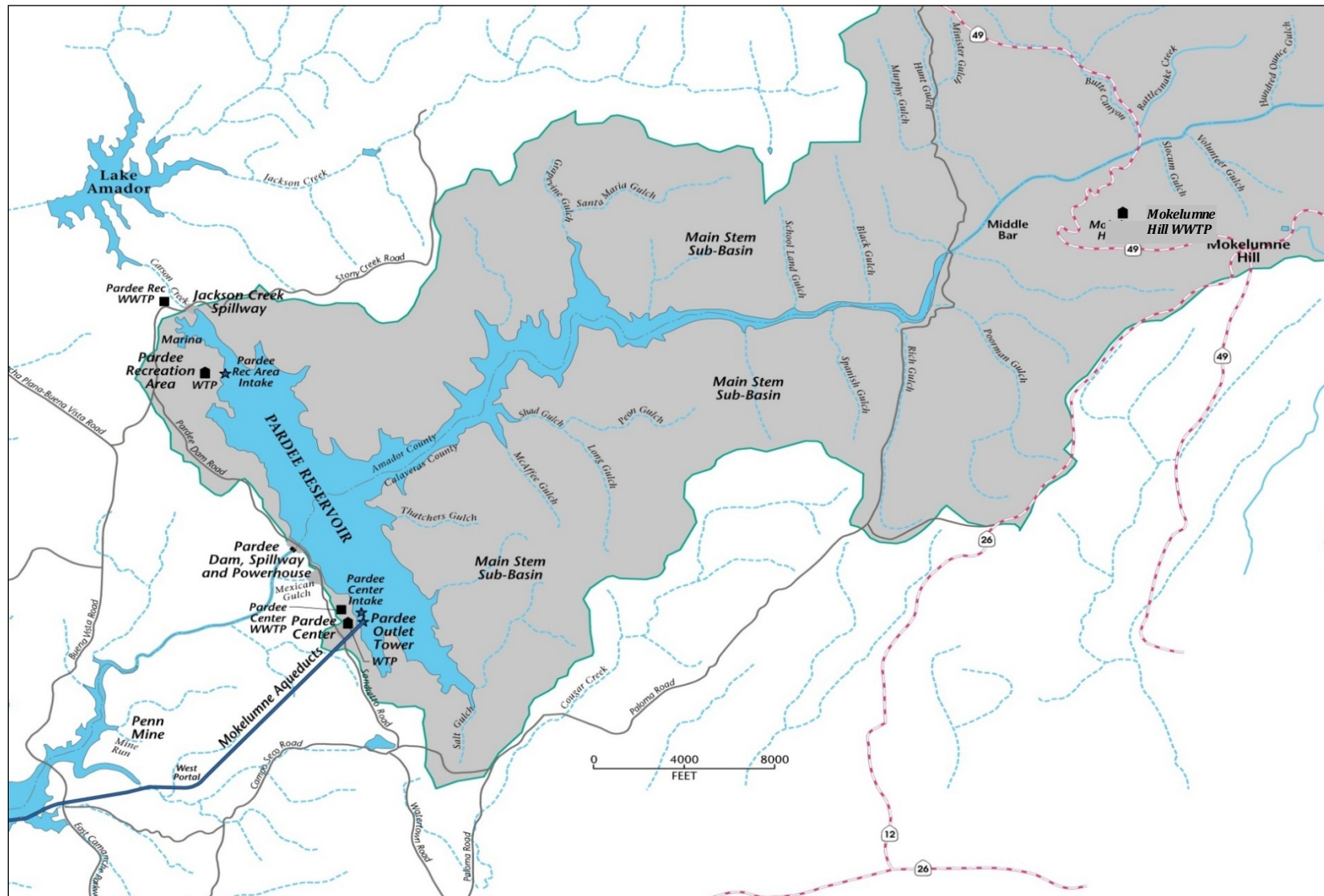
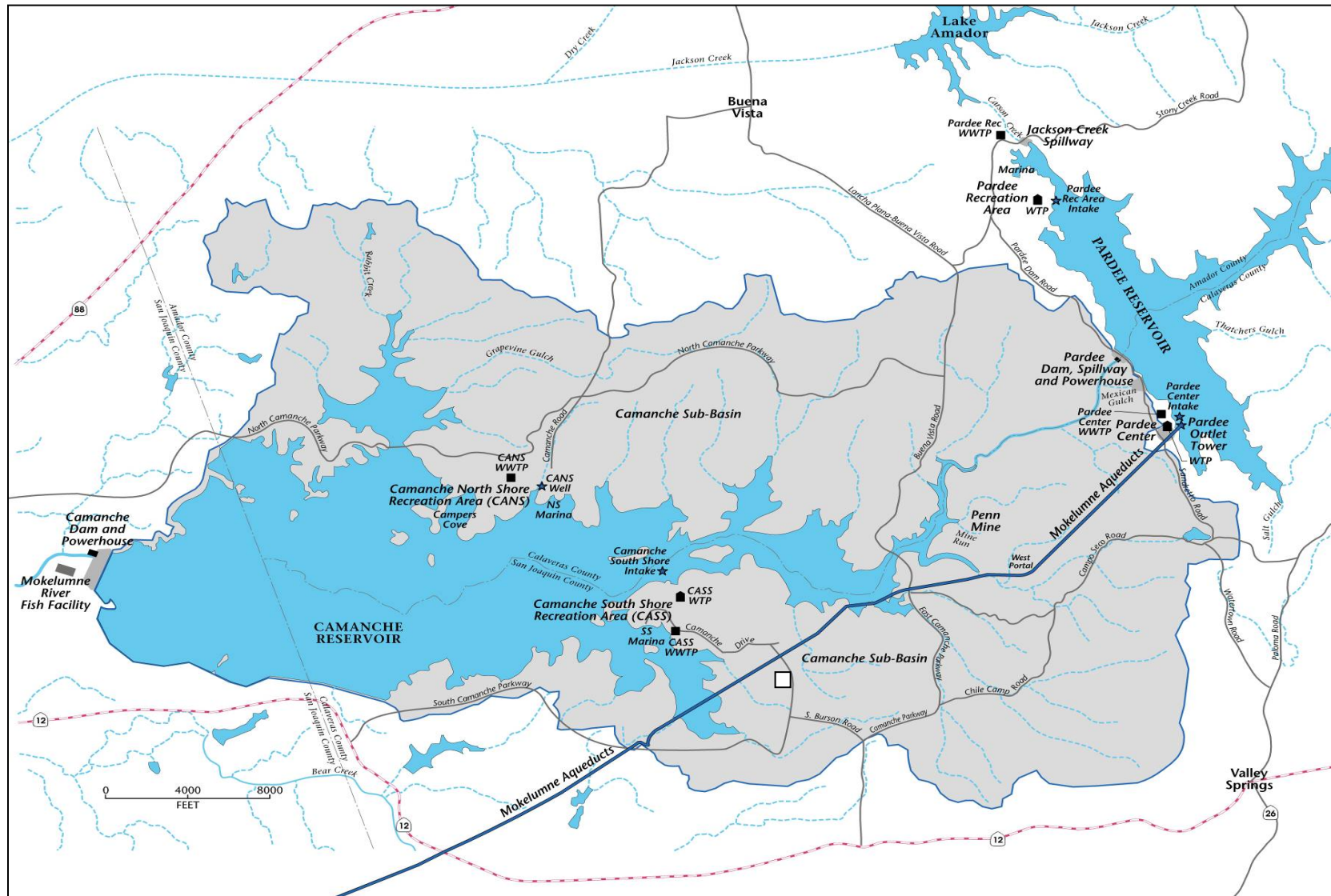


Figure 2-2. Camanche Watershed



Section 2. Water Supply, Conveyance, and Treatment Systems

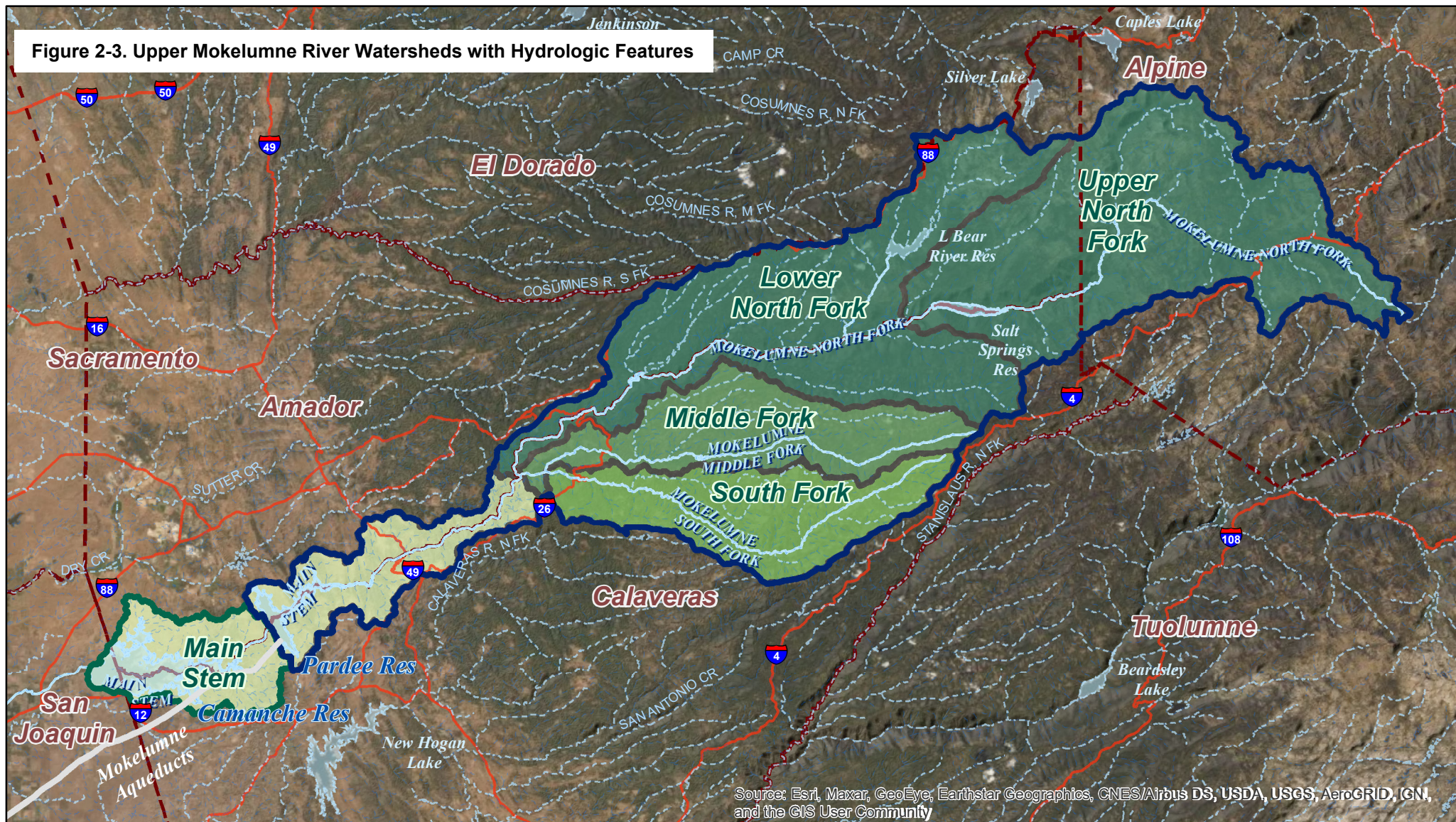
The 5-year annual average Mokelumne aqueduct draft from Pardee Reservoir decreased from 163 MGD (2010 through 2014) to 132 MGD (2015 through 2019). This change was due to several operational activities during the 2020 update period. In 2015, the District utilized its supplementary supply from the Sacramento River due to drought conditions and to reduce further depletion of Pardee Reservoir. From November 2016 to April 2017, one or more of the three Mokelumne Aqueducts were out of service due to (1) inspection of the lining of Mokelumne Aqueduct No. 2, (2) capital improvements at Orinda WTP that required the plant to be temporarily removed from service, (3) high winter turbidity at Pardee Reservoir, and (4) reaching capacity at San Pablo Reservoir, which temporarily stores Pardee Reservoir supply. In 2019, the annual average Mokelumne aqueduct draft was 160 MGD.

Upper Mokelumne Watershed Area Facilities

The Upper Mokelumne Watershed is defined as the watershed lands that contribute flow to the North Fork, Middle Fork, South Fork, and Main Stem of the Mokelumne River, which then drain to Pardee Reservoir, as shown in Figure 2-3. Pardee Watershed Facilities are shown on Figure 2-1. Mokelumne River water is diverted from Pardee Reservoir at the District's Pardee Outlet Tower. The water is conveyed through the Pardee Tunnel to the Campo Seco facility where it trifurcates to the three Mokelumne Aqueducts. The water then typically flows by gravity 91.5 miles to the District's service area in the San Francisco Bay Area. Occasionally raw water pumps in Walnut Creek are used to increase the aqueduct flow capacity. In Walnut Creek, the Mokelumne Aqueducts connect with the east terminus of the two Lafayette Aqueducts where water is conveyed directly to three in-line WTPs (Orinda, Lafayette, and Walnut Creek) and/or stored in the District's Briones, San Pablo, and Upper San Leandro Reservoirs.

Pardee Reservoir has thirty-seven miles of shoreline, a maximum storage capacity of 203,795 acre-feet at its spillway crest (elevation 567.65 feet) and a surface area of 2,260 acres. It is used for municipal water supply and for power generation. In addition, EBMUD operates Pardee Reservoir in conjunction with Camanche Reservoir (and considering available storage in upstream reservoirs) to provide flood control protection for the Lower Mokelumne River area. Water for downstream use is released through the Pardee hydroelectric power plant, through sluice valves at the base of Pardee Dam, or released over the Pardee Dam spillway. The Pardee Outlet Tower is located in the southern part of the reservoir near the dam site (Figure 2-1).

Figure 2-3. Upper Mokelumne River Watersheds with Hydrologic Features



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- Mokelumne Watershed
- Camanche Watershed
- Waterbody

- Named Streams
- Rivers and Creeks
- County

Watershed (HUC-10)

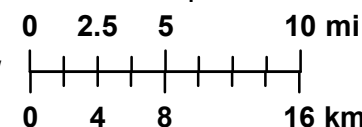
- Main Stem and Camanche
- Middle Fork
- South Fork
- Lower North Fork
- Upper North Fork

Data sources:

EBMUD GIS Database
30m National Elevation Dataset
U.S. Geological Survey &
EROS Data Center
March 2014

Watershed Boundary Dataset
U.S. Geological Survey &
U.S. Department of Agriculture
2013
<https://datagateway.nrcs.usda.gov/>

File Location:
\\omd\wo\EVERYONE\Process Engineering\WSS 2020\Chapter 3 -
Watershed Description\Graphics
Last Updated: Oct. 2020



Section 2. Water Supply, Conveyance, and Treatment Systems

The District has water rights and facilities to divert up to 325 MGD from the Mokelumne River, subject to the availability of Mokelumne River runoff and the prior water rights of other users. Figure 2-4 provides an overview of the Mokelumne River diversions and flows including the District's water rights. The District's position in the hierarchy of Mokelumne water users is determined by a variety of agreements between Mokelumne water right holders, the appropriative water rights permits and licenses which have been issued by the state, pre-1914 rights, and riparian rights, as shown in Figure 2-5. Factors that affect the District's ability to use its full entitlement include variability in rainfall and runoff, use by other senior water right holders, flood control requirements and in-stream flow requirements to protect fish.

In addition to the District's Pardee Reservoir facilities, there are five upstream agencies that have diversion structures and/or powerhouses along the Mokelumne River that can impact the availability of the District's Mokelumne River supplies – Amador Water Agency (AWA), Jackson Valley Irrigation District (JVID), Calaveras Public Utility District (CPUD), Calaveras County Water District (CCWD), and Pacific Gas and Electric Company (PG&E). Table 2-1 summarizes the projected water demands for these agencies. PG&E is not included in Table 2-1, because their water use is non-consumptive. The storage reservoir capacities and associated engineering data for storage facilities on the Upper Mokelumne River are listed in Table 2-2. Further descriptions of these agencies' facilities and operations are described in the succeeding sections.

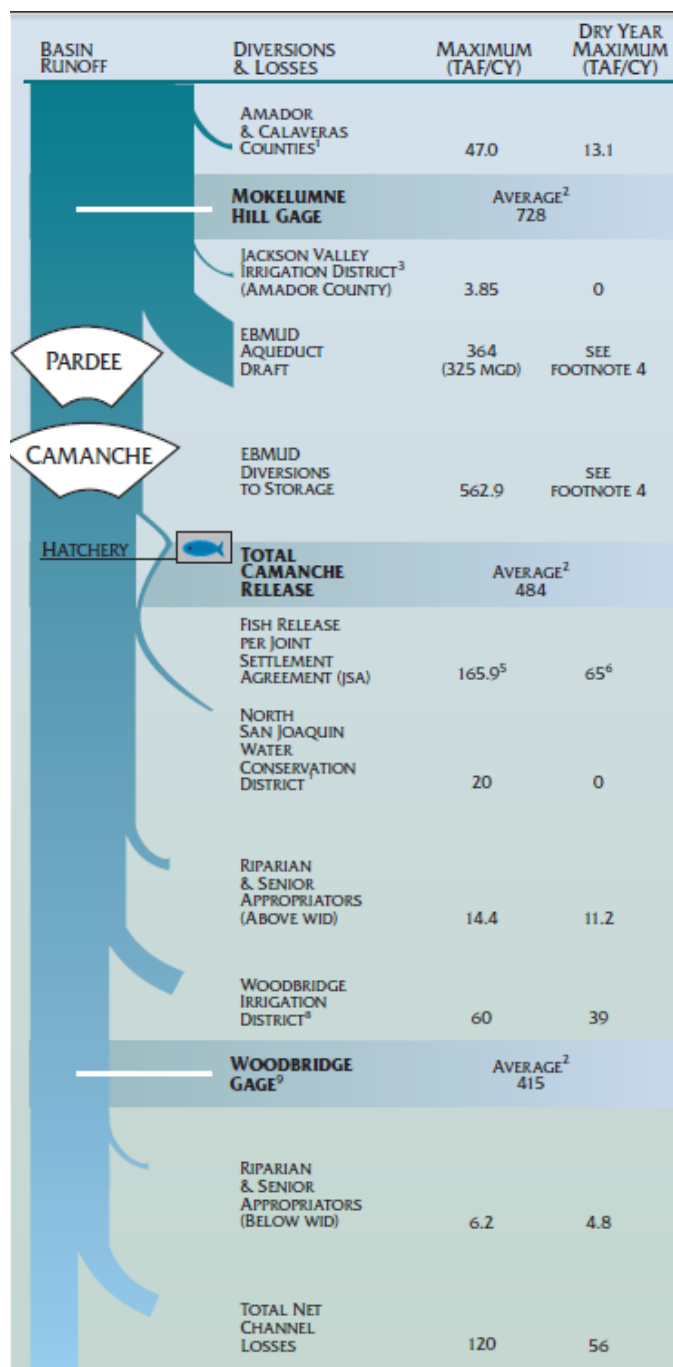
Table 2-1. Projected Demands of Agencies other than the District^a

Agency	2010	2040
Amador Water Agency	8,155	13,925
Jackson Valley Irrigation District	3,850	2,800
Calaveras County Water District	2,030	2,030
Calaveras Public Utility District	1,299	2,542

^a. Source: Mokelumne Watershed Interregional Sustainability Evaluation (MokeWISE) Program, Final Report, June 2015 <http://mokewise.org/docs/MokeWISE%20Final%20Report%20June%202015.pdf>

Section 2. Water Supply, Conveyance, and Treatment Systems

Figure 2-4. Upper Mokelumne River Diversions and Flow^a

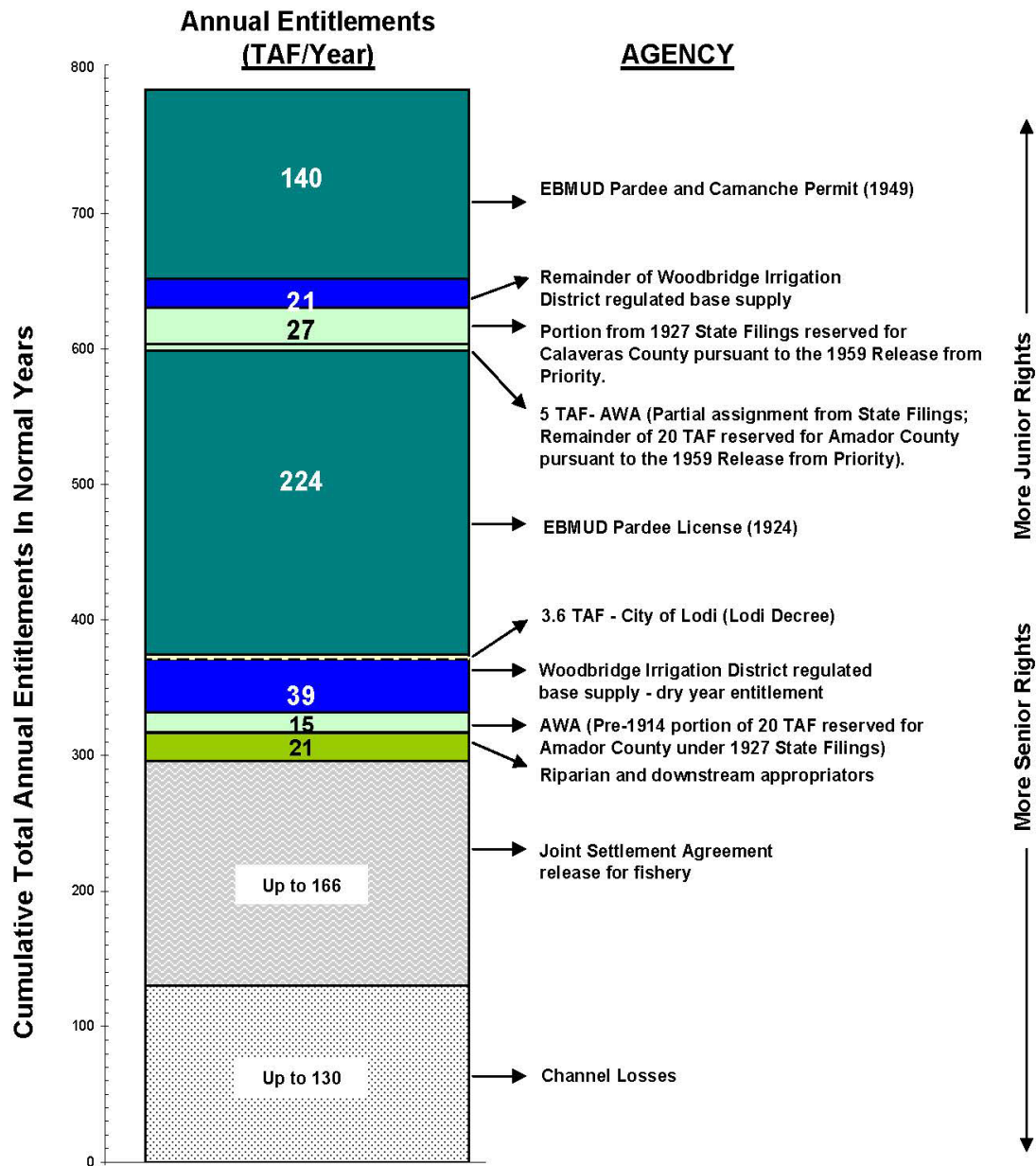


Notes

1. Amador County has 15 thousand acre feet (TAF) of pre-14 rights, which could be exercised in dry years if there is insufficient runoff.
2. Average data provided for the various periods of historical record.
3. May be "0" if no water is available under JVID priority or Pardee elevation is below 550 ft.
4. Varies with runoff and storage conditions.
5. Water releases committed by EBMUD to protect fishery per "Normal and Above" water year type under JSA criteria.
6. Water releases committed by EBMUD to protect fishery per "Dry" water year type under JSA criteria. In critically dry years, the minimum releases could be as low as 22.5 TAF.
7. May be "0" if no water is available surplus to EBMUD needs.
8. EBMUD's obligation to release water to the Woodbridge Irrigation District is governed by a series of water rights settlement agreements to a maximum of 60 TAF/yr when infow to pardee is greater than 375 TAF.
9. Includes local runoff between Camanche and WID.

^a. Source: EBMUD's Urban Water Management Plan 2015.

Figure 2-5. Hierarchy of Upper Mokelumne River Water Rights & Other Flow Commitments ^{a, b}



- a. Source: EBMUD's Water System Revenue Bonds, Series 2015B (Green Bonds) and Series 2015C (June 2, 2015).
b. Total does not include storage rights or power rights which are non-consumptive (e.g., PG&E).

Table 2-2. Upper Mokelumne River and Camanche Watershed Storage Reservoir Summary

Storage Reservoir	Operating Agency	Max Capacity (AF)	Dam Crest Length (ft.)	Type of Structure	Year Storage Began	Drainage Area (sq. mi.)
Upper Blue Lake	PG&E	7,300	837	Earth & Rock Fill	1881	2.7
Lower Blue Lake	PG&E	5,091	1,063	Earth & Rock Fill	1885	4.6
Twin Lake	PG&E	1,207	1,520	Earth & Rock Fill	1898	0.8
Meadow Lake	PG&E	5,656	775	Rock Fill/Gunite Face	1903	5.5
Upper Bear River	PG&E	7,306	1,212	Rock Fill/Gunite Face	1900	28
Lower Bear River	PG&E	52,025	979/865	Rock Fill/Concrete Face	1952	37
Salt Springs	PG&E	141,857	1,257	Rock Fill/Concrete Face	1931	169
Tiger Creek Forebay	PG&E	42	900	Earth Fill	1931	NA
Tiger Creek Regulator	PG&E	533	486	Concrete Slab & Buttress	1931	9
Tiger Creek Afterbay	PG&E	2,607	448	Concrete Arch	1931	357
Lake Tabeaud	PG&E	1,259	636	Earth Fill	1901	0.75
Electra Afterbay	PG&E	40	319	Concrete Gravity	1948	NA
Electra Diversion	PG&E	36	188	Concrete Gravity	1931	NA
Middle Fork (Schaad's)	CPUD	1,700	900	Earth Fill	1939	28.5
Pardee	EBMUD	203,795	1,377	Concrete Arch	1929	578
Camanche	EBMUD	417,120	2,640	Earth & Rock Fill	1963	621

North Fork of the Mokelumne River

PG&E and AWA operate facilities on the North Fork of the Mokelumne River, discussed below.

PG&E

The North Fork of the Mokelumne has been extensively developed by PG&E through the Mokelumne Hydroelectric Project (Project 137). Project 137 is located in Amador County and consists of a complex system of hydroelectric infrastructure, which includes dams, reservoirs, tunnels, and powerhouses. The project includes seven storage reservoirs and four hydropower developments: Salt Springs (43.5 MW), Tiger Creek (54.4 MW), West Point (14 MW), and Electra (98.9 MW). Water from the North Fork is impounded in Upper Blue, Lower Blue, Twin, and Meadow Lakes, as well as Upper and Lower Bear River Reservoirs and Salt Springs Reservoir. Additional information about PG&E's system can be found in the following paragraphs, as well as the Evaluation of Three Potential Pumped-Storage Sites, Mokelumne River Basin, California (USGS, 1979) and Mokelumne River Wild and Scenic River Study Report, Chapter 3 (GEI Consultants, 2018).

Project 137 is operated in accordance with judgments and decrees associated with the City of Lodi and the District. These decrees, commonly known as the "Lodi Decree" define the relative rights of Lodi, PG&E, the District, and areas around Jackson and Sutter Creek. The Lodi Decree addresses the timing and quantity of PG&E discharges of water into the

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Mokelumne River. The releases from PG&E's Mokelumne hydroelectric system can have impacts upon the District's exercise of its Pardee and Camanche water rights, in particular during the late summer and fall months.

PG&E Facilities

PG&E's Mokelumne Hydroelectric Project consists of seven storage reservoirs (having a combined capacity of about 220,000 ac-ft), various tunnels (sixteen miles in total length), stream diversions, conduits, regulating reservoirs, and four powerhouses (with a total capacity of 215 megawatts). The four powerhouses include: Salt Springs, Tiger Creek, West Point, and Electra. Electric power generated from these facilities is used to serve the California power grid.

Salt Springs Powerhouse contains two generating units which operate on releases from Salt Springs Reservoir and from Lower Bear Reservoir. Water flowing from the "Old Reservoirs" -- Upper and Lower Blue Lakes, Meadow Lake, and Twin Lakes -- on the North Fork is stored at Salt Springs Reservoir. Water is then diverted from Salt Springs Reservoir through a 945-foot long tunnel. A 475-foot long penstock then conveys water to Salt Springs Powerhouse Unit 1. Water diverted from Bear River and Cole Creek is stored in Upper and Lower Bear River Reservoirs and is conveyed by 13,214 feet of tunnel and 4,679 feet of penstock to the Salt Springs Powerhouse Unit 2. After passing through the two turbines, a maximum of 550 cfs is diverted to Tiger Creek conduit; the remainder is returned to the North Fork of the Mokelumne River.

Tiger Creek Powerhouse receives water directly from the tailrace of the Salt Springs Powerhouse through the 20.3-mile long Tiger Creek conduit. The upper section of the conduit discharges to the Tiger Creek Regulator. The lower section extends from the regulating reservoir to the Tiger Creek Forebay. The Tiger Creek conduit is a rectangular concrete bench flume, except for short tunnels and siphon sections. Facilities along the conduit divert waters from Bear River and four small creeks. Maximum capacity is 550 cubic feet per second in the upper section. The lower section can convey a maximum of 625 cfs. The Tiger Creek Afterbay is located on the North Fork and receives water directly from the Tiger Creek tailrace.

An agreement between the District and PG&E enables PG&E to take the Tiger Creek conduit out of service for periods of up to 15 consecutive days, on the condition that at least 50 percent of any shortfall in required PG&E flows is provided to the District prior to the start of the canal outage, and the remainder of the shortfall made up after the canal is returned to service. The primary activity requiring outage of the Tiger Creek conduit is to perform annual mechanical cleaning of the canal.

The West Point Powerhouse receives water directly from the Tiger Creek Afterbay by means of a 14,200-foot tunnel -- the West Point Tunnel. A 623-foot long penstock conveys water from the tunnel and from the North Fork Mokelumne River to the powerhouse. Water exiting the West Point Powerhouse flows from the tailrace to a 35 acre-foot pond created by

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the Electra Diversion Dam which, in turn, provides water for the Electra Powerhouse. Additional water from the North Fork can also be diverted to the Electra Tunnel.

Water travels 43,200 feet through the Electra Tunnel and is discharged into Lake Tabeaud which serves as a forebay to the Electra Powerhouse. Note that Lake Tabeaud is located within the Main Stem, rather than the North Fork, of the Mokelumne River. However, its discussion is included in the section for completion. Some water is diverted from Lake Tabeaud into the Amador Canal and the Amador Transmission Pipeline (ATP) for domestic and irrigation uses within Amador County. Water that is not diverted from Lake Tabeaud by the Amador Canal or ATP is conveyed to the powerhouse through about 4,000 feet of penstock. Electra Powerhouse has three turbine generator units each having a capacity of 350 cfs. Water discharged from Electra Powerhouse returns to the main stem of the Mokelumne River and then flows about five miles downstream into Pardee Reservoir.

In October 11, 2001, the Federal Energy Regulatory Commission (FERC) issued an order approving a new operating license for Project 137, valid until October 11, 2031. The new license included provisions to comply with the Federal Power Act Section (4e) requirements. Among the modifications to the operations were new minimum stream-flows, pulse flow requirements, short-term power generation constraints, new ramping rates, and summer releases for river recreation. Many of the in-stream flows and resource management measures had been in place since PG&E's 1996 Fish and Wildlife Agreement with California Department of Fish and Game (CDFG). Lodi Decree rules still govern PG&E releases downstream of Project 137 into the Mokelumne River, but the new license requirements may seasonally change the timing of flows.

Amador Water Agency (AWA)

Amador Water Agency serves approximately 10,000 customers in Amador County, and sells water to the cities of Ione, Jackson, Plymouth, Sutter Creek, Amador, and other special districts. AWA has four general service areas: Amador Water System (AWS) and Central Amador Water Project (CAWP), which are supplied by the Mokelumne River, and La Mel Heights and Lake Camanche Village, which are supplied by groundwater. CAWP is further discussed below, and AWS is discussed in the *Main Stem of the Mokelumne River* section.

Since 1985, the Central Amador Water Project (CAWP) has been owned and operated by AWA. The CAWP surface water diversion is limited to a firm yield of 1,150 acre-feet per year (AFY). AWA is working to obtain additional surface water rights for the CAWP system that would expand the surface water diversions to 2,200 AFY. This reversion of an additional 1,050 AFY from the Bear River and North Fork Mokelumne River will cause a subtraction from the amount JVID may divert, occur incrementally year-by-year based on CAWP demand, and result in no net increase in direct diversion from the Mokelumne River. AWA completed their Environmental Impact Report for the water right application in September 2017.

Currently, the water source for the CAWP is rainfall and snowmelt from the North Fork Mokelumne River and Bear River stored in PG&E's Tiger Creek Regulator Reservoir. Raw water is pumped via the Gravity Supply Line (GSL) and treated at the Buckhorn WTP to

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supply domestic water to small communities (Jackson Pines, Pine Acres, Pioneer, Ridgeway Pines, Ranch House, Silver Lake Pines, the Sunset Heights area, Buckhorn, Red Coral, River View, Pine Park east, Gayla Manor, Toma Lane, and Sierra Highlands) and retail water purveyors (First Mace Meadows Water Association, Pine Grove CSD, and Rabb Park CSD). The GSL, a 6.6 mile 20-inch and 24-inch pipeline, was completed in 2015. The Tiger Creek Afterbay, the historical diversion point, is now standby for use when AWA cannot divert from the Tiger Creek Regular Reservoir. AWA also has facilities on the Main Stem of the Mokelumne River, discussed below.

Middle and South Forks of the Mokelumne River

Two agencies that divert water along the Middle and South Forks of the Mokelumne River include CPUD and CCWD. Table 2-1 documents the projected water demands of these agencies and Table 2-2 summarizes the storage reservoir capacities and associated engineering data for these facilities.

Calaveras Public Utility District (CPUD)

CPUD serves approximately 2,000 water connections in the Mokelumne Hill, San Andreas, and Paloma communities. CPUD diverts water at the diversion dam, located downstream of the confluence of the Licking Fork and South Fork of the Mokelumne River, via a 3,300 gpm pump station and three-mile pipeline to Jeff-Davis Reservoir. Jeff-Davis Reservoir has a storage capacity of 2,000 acre-feet (AF) and supplies the Jeff Davis Water Treatment Plant (6 MGD capacity). A rarely used back-up raw water supply is diverted from Schaad's Reservoir, a small 1,800 AF impoundment on the Middle Fork located upstream from the take-out for the diversion canal to the Licking Fork. The diversion canal is in poor condition and is not currently hydraulically connected to the CPUD treated water system.

In addition to its pre-1914 rights, CPUD currently has an appropriative right of 2,130 AF. CPUD pumps over 450 million gallons of water annually to its customers. The Mokelumne Hill Ditch, owned and operated by CPUD, on the South Fork of the Mokelumne River has been out of service since 1974 and is not anticipated to be used in the future due to excessive leakage. Additional information on CPUD's facilities can be found in CCWD/CPUD's Upper Mokelumne River Sanitary Survey (Tetra Tech, 2000 and MicroGeo, 2005) and Calaveras County General Plan, Public Facilities Section (Calaveras County, 2019).

Calaveras County Water District (CCWD)

CCWD serves approximately 13,000 municipal, residential, and commercial customers in Calaveras County through six independent water systems, Jenny Lind, Copperopolis, Ebbetts Pass, West Point, Sheep Ranch, and Wallace Service Area. CCWD diverts water primarily through a gravity diversion on Bear Creek, approximately six miles above the confluence with the Middle Fork. CCWD currently has an appropriative right of 1,830 AF and can divert year-round from Bear Creek up to a maximum rate of 4 cfs. However, flows in Bear Creek cannot support CCWD's demand during seasonal dry periods. To supplement its raw water supply, CCWD maintains a contract with CPUD to purchase additional water from the Middle Fork through Schaad's Reservoir. Water is treated at the 1-MGD West Point WTP, which serves CCWD's West Point water system and Wilseyville service area.

Additional information on CCWD's facilities can be found in CCWD/CPUD's Upper Mokelumne River Sanitary Survey (Tetra Tech, 2000 and MicroGeo, 2005) and Calaveras County Urban Water Management Plan (RMC, 2016).

Main Stem of the Mokelumne River

The three agencies that divert water along the Main Stem of the Mokelumne River include JVID, AWA, and PG&E. Table 2-1 documents the projected water demands of these agencies and Table 2-2 summarizes the storage reservoir capacities and associated engineering data for these facilities.

Jackson Valley Irrigation District (JVID)

JVID provides wholesale water supply and distribution of raw water to agricultural, fish farm, industrial, and domestic users in the lower elevations of Amador County. Water for use by JVID is diverted to Lake Amador from Jackson Creek or from the Mokelumne River via a pipeline at the Jackson Creek Spillway Dam on the north arm of Pardee Reservoir. JVID treats water from Pardee Reservoir in the Lake Amador Resort Area (LARA) treatment plant (175 gpm capacity), constructed in 2013, to serve LARA. JVID intends to extend this service to the Oaks Mobile Home Park that currently relies on its own treatment system. Funding for this extension has not yet been identified. In addition, Lake Amador water provides domestic water to 60-62 homes, but the water is not suitable for drinking because it contains treated wastewater effluent and is not treated to drinking water standards. JVID provides bottled water to customers who are not connected to private wells at a cost.

JVID has rights to divert up to 3,850 AF annually from Pardee Reservoir under an assignment of the 1927 State Department of Finance filing; however, JVID does not hold the rights to store this water. JVID's Mokelumne River water rights are appropriative, and therefore subject to reversion to upstream needs. AWA's application for the reversion of 1,050 AF, subject to SWRCB approval, will subtract from JVID's diversion rights. AWA has proposed to substitute recycled water for a portion of JVID's water right. JVID also maintains water rights to divert and store up to 36,000 AFY from Jackson Creek, and typically uses approximately 10,000 AF of this right due to capacity constraints at Lake Amador. Water quality from this source has declined due to decreased leakage from Amador Canal, which has increased the portion contributed by treated wastewater effluent.

Amador Water Agency (AWA)

The Amador Water System (AWS) serves approximately 3,750 connections and is one of four general service areas maintained by AWA. AWS receives water from the North Fork of the Mokelumne River and the Bear River via a complex series of PG&E reservoirs, conduits, and powerhouses that comprise the Mokelumne River Hydroelectric Project (Project 137). In brief, Bear River is impounded at the Bear River Reservoir and Lower Bear Reservoir conveys water to the Salt Springs Development, where it combines with flow from the North Fork of the Mokelumne River in the Salt Springs Reservoir. Water is then conveyed to the Tiger Creek Development through the Tiger Creek Conduit, and then into the West Point Tunnel to the West Point Development. Water travels through the

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Electra Tunnel into Lake Tabeaud, as a part of the Electra Development. Water is diverted from Lake Tabeaud through the Amador Canal and ATP to Tanner Reservoir for use by raw water customers along the canal and treatment by AWA. AWA treats the water in Tanner WTP in Sutter Creek and Ione WTP in Ione. Treated water is supplied to retail customers in Amador City, Ione, Sutter Creek, Sutter Hill, Martell, and their vicinities, as well as portions of Ridge Road and New York Ranch Road, and wholesale customers in Jackson, Plymouth, and Drytown. Infrastructure and a drawing of Project 137 can be found in the Hydropower Project Summary for the Mokelumne River Hydroelectric Project (Hydropower Reform Coalition and River Management Society, 2015), a summary of hydroelectric development can be found in the Mokelumne River Wild and Scenic River Study Report, Chapter 3 (GEI Consultants, 2018), and additional information about the AWS system can be found in AWA's Urban Water Management System (RMC, 2016).

Although the Amador Canal was purchased by AWA from PG&E in 1985, PG&E continues to retain ownership of the water rights. AWA's contract with PG&E allows 15,000 AF to be diverted into the canal and ATP during normal and wet years. The diversion is subject to a 25 percent reduction in dry years. AWA's entitlements are subject to 1977 and 1978 agreements among AWA, the District, Amador County, and Pioneer Community Services District.

In June 2007, the 8.8 mile, 30-inch Amador Transmission Pipeline became operational, connecting Lake Tabeaud to Tanner Reservoir. However, Amador Canal is still in service and supplies raw water to customers along the canal. The second planned phase of this project involves replacing an additional eighteen miles of earthen, unlined canal from New York Ranch Reservoir to Lake Tabeaud with 6- to 12-inch pipe to further reduce water losses. After this pipe is installed, AWA can abandon use of the canal.

PG&E

As previously mentioned, PG&E owns and operates Lake Tabeaud, which serves as the forebay for the Electra Powerhouse, located about five miles upstream of Pardee Reservoir. Water travels 43,200 feet through the Electra Tunnel prior to discharge into Lake Tabeaud. Some water is diverted from Lake Tabeaud into the Amador Canal for domestic and irrigation uses within Amador County. Water that is not diverted from Lake Tabeaud by the Amador Canal is conveyed to the powerhouse through about 4,000 feet of penstock. Electra Powerhouse has three turbine-generator units each having a capacity of 350 cfs. Water discharged from Electra Powerhouse returns to the main stem of the Mokelumne River and then flows about five miles downstream into Pardee Reservoir.

Camanche Watershed Area Facilities

Figure 2-2 depicts the Camanche Watershed, Camanche Reservoir, and its corresponding facilities. Camanche Reservoir is located ten miles downstream of Pardee Reservoir. It has sixty-three miles of shoreline, a maximum storage capacity of 417,120 acre-feet, and a maximum water surface area of 7,470 acres. Camanche Dam is a gravel and earthfill structure that rises 171 feet above the Mokelumne River riverbed. The main dam has a crest length of 2,640 feet and there are approximately 4 miles of earthen dikes.

Camanche Reservoir is operated in tandem with Pardee Reservoir to provide water for downstream fisheries and environmental needs, irrigation and stream flow regulations, recreation, flood control, water supply, downstream water rights holders, and hydroelectric power generation. A 10.7-megawatt power plant at the dam generates approximately 46 million kilowatt hours of energy during a median runoff year. While stored water is released to meet obligations to downstream water rights holders, storage withdrawals are also made to supply the Camanche South Shore recreation facilities and community. Additional downstream releases are made to supply the California Department of Fish and Wildlife (CDFW) operated fish hatchery and to satisfy Mokelumne River instream fish flow requirements.

Terms in the District's water rights permit for its Camanche Reservoir project required the District to reach agreement with the CDFW regarding releases for the protection of fish in the lower Mokelumne River and to provide the opportunity for local or federal participation in flood control. Accordingly, in 1961, the District entered into an agreement with CDFW that required the District to build a fish hatchery at the toe of Camanche Dam and to release from Camanche Reservoir 13,000 acre-feet annually for fishery protection, in addition to the releases for the Woodbridge Irrigation District, riparian and senior appropriators, and channel losses. The District also reached agreement, in 1962, with the U.S. Army Corps of Engineers for the operation of the proposed Camanche Reservoir to accommodate the reservation of up to 200,000 acre-feet of flood control space for the protection of downstream areas in San Joaquin County. Management of the Mokelumne River Fish Facility, including the timing and amounts of water to be released downstream for fishery benefits, was further defined in a Joint Settlement Agreement (JSA), effective November 27, 1998 between the U.S. Fish and Wildlife Service, CDFW, and the District.

Reservoir Operations

The District operates Pardee and Camanche Reservoirs as an integrated system to achieve multiple objectives: providing high quality water supply for the District's customers; releasing flows downstream of Camanche Reservoir for fisheries and other downstream water uses; and managing operations for flood control mitigation downstream of Camanche Reservoir, while maintaining sufficient carryover storage for emergencies such as droughts or facility outages. Pardee and Camanche Reservoirs operations are constrained by water rights, water quality, flood control, storage, water supply, and power generation criteria

Pardee Reservoir Operations 2015 - 2019

Figure 2-6 shows a summary of Pardee Reservoir operations for the 2020 update period compared to historical operations. The reservoir has a capacity of 203,795 acre-feet (AF) at the spillway overflow elevation of 567.65 feet. The reservoir volume dropped to nearly half the volume capacity in fall 2015, to a surface elevation of 518.7 feet, after five consecutive years of below normal inflow. Conversely, in winter and spring of 2017, spring 2018, and spring 2019, water overtopped the spillway during periods of high inflow. Overall, the annual inflow can be described as well below average in 2015, near-average in 2016 and 2018, and above average in 2017 and 2019. More on hydrology can be found in Section 3 of this report. Above average inflow in 2017 and 2019 resulted in above average releases to Camanche Reservoir during the spring of these years. Similarly, below average inflow in 2015 resulted in lower releases into Camanche Reservoir.

Camanche Reservoir Operations 2015 – 2019

Camanche Reservoir operations for the update period are shown in Figure 2-7. The reservoir has a capacity of 417,120 AF at the spillway overflow elevation of 235.5 feet. Camanche reservoir water elevation did not overtop its spillway during this period and has only done so twice in the past twenty-five years (February 1986 and January 1997). The lowest end-of-month elevation during this period occurred in August 2015, when the reservoir water elevation was at 171.7 feet or approximately twenty percent of the volume capacity. Five consecutive years of below normal inflow resulted in relatively few releases for flood control until 2017. Releases met JSA-required flows for all months during the update period. Due to the above average releases from Pardee Reservoir in 2017 and 2019, shown as inflow to Camanche Reservoir, above average releases were made from Camanche Reservoir during the same time period.

Outlet Tower Locations and Protection Features

The locations of the District's outlet towers are shown in Figure 2-1 for Pardee Reservoir and Figure 2-2 for Camanche Reservoir. The District's outlet towers are protected by exclusion zones with warning signs posted on the reservoirs and shorelines.

The Pardee Outlet Tower has gates at elevations 550 feet, 520 feet, 490 feet, and 460 feet. They are operated to obtain the best quality water available at the outlet tower for diversion to the District's service area. Reservoir turbidity and plankton data are used to select the optimum outlet gates.

Figure 2-6. Pardee Reservoir Operations Summary 2015-2019

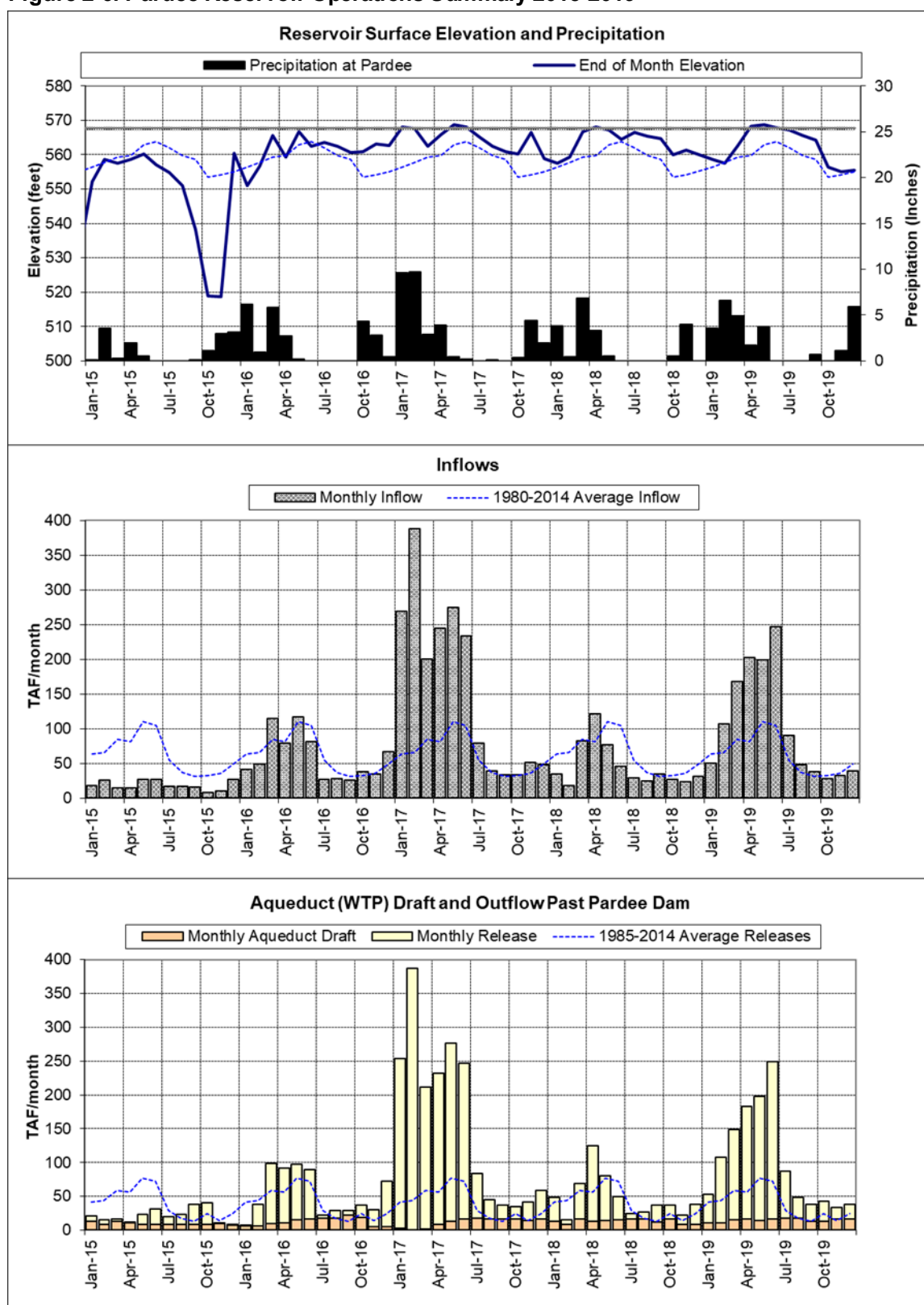
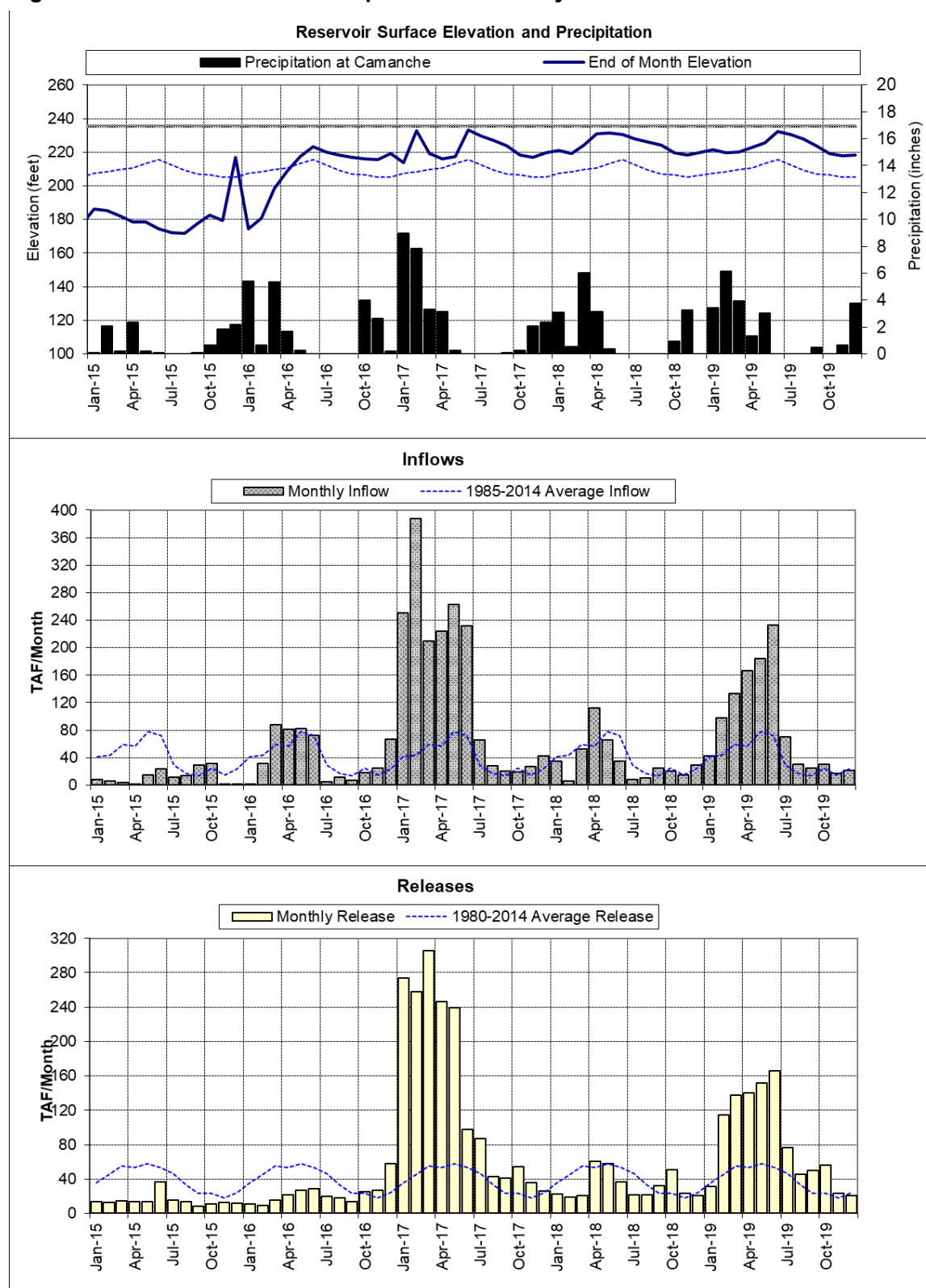


Figure 2-7. Camanche Reservoir Operations Summary 2015-2019



Mokelumne Aqueducts

Mokelumne River water is diverted from Pardee Reservoir at the District's Pardee Outlet Tower. The water is conveyed through the 2.2-mile, 8-foot wide, horseshoe-shaped Pardee Tunnel constructed in 1923, to the Campo Seco facility where it trifurcates to the three Mokelumne Aqueducts. The water then flows by gravity 91.5 miles to the District's service area in the East Bay. In Walnut Creek, the Mokelumne Aqueducts connect with the east terminus of the two Lafayette Aqueducts where Mokelumne River water is conveyed directly to several WTPs or stored in the District's Briones, San Pablo, and Upper San Leandro (USL) Reservoirs, as shown in Figure 2-8.

In February 2011 the Freeport Regional Water Project (FRWP) became operational, able to deliver supplemental supply from the Sacramento River to the Mokelumne Aqueducts for delivery to two of the District's terminal reservoirs located in the East Bay – San Pablo and USL Reservoirs. EBMUD signed a Repayment Contract with the USBR in 2020, which provides for up to 133,000 AF in a single dry-year, not to exceed a total of 165,000 AF in three consecutive dry-years. Under the Repayment Contract, the CVP supply is available to EBMUD only in dry years when EBMUD's total stored water supply is forecast to be below 500 TAF on September 30 of each year. For additional details, see the EBWSS Update 2015.

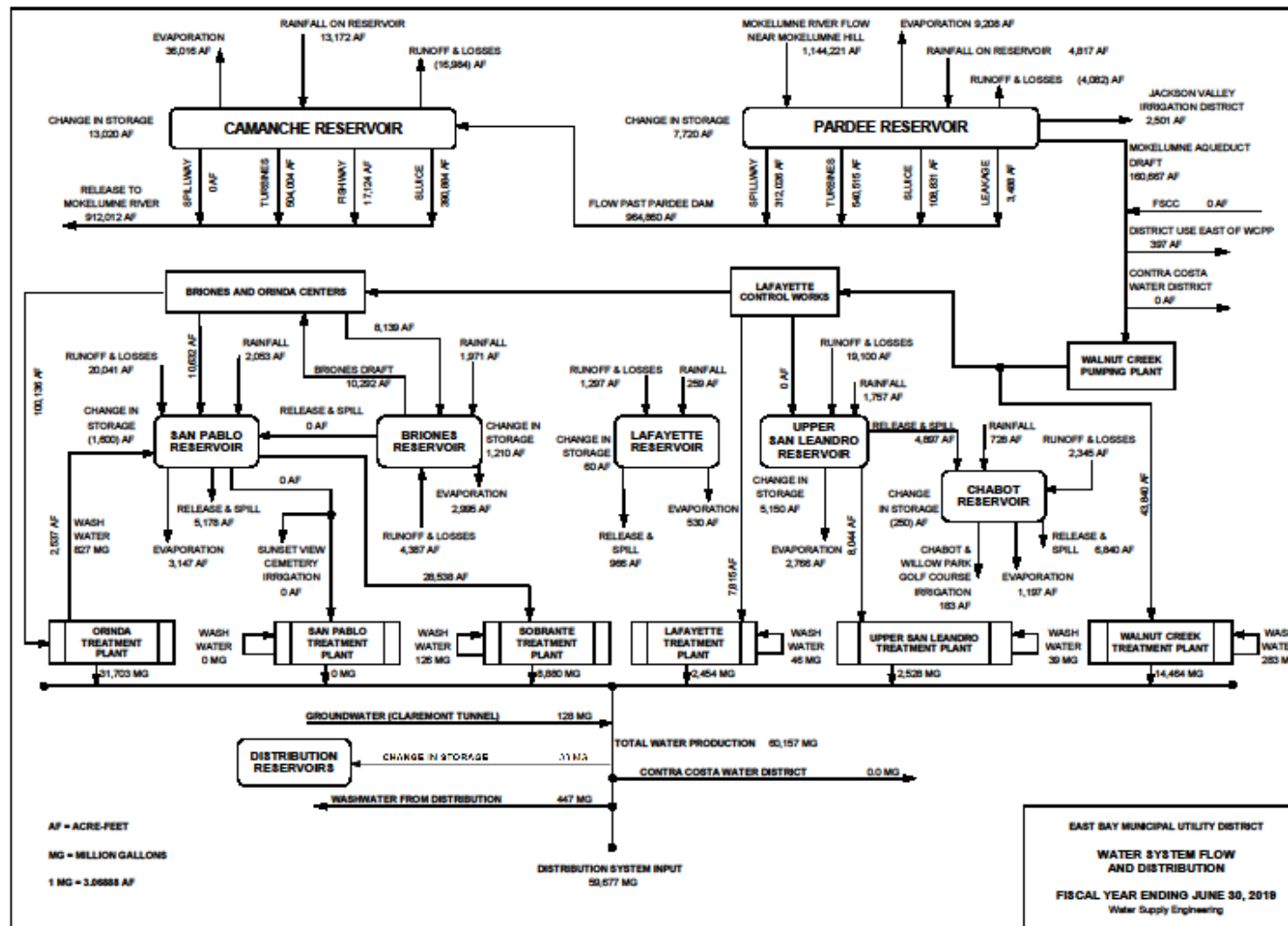
Chemical Additions to Raw Water

The Pardee Chemical Building located at Pardee Center has historically been operated to maintain pH and disinfection levels in the water being conveyed through the Mokelumne Aqueducts. Liquid lime is added at Pardee Center to maintain a target pH of 8 to 8.7. This chemical addition is required to protect the aqueduct lining from corrosion and to add alkalinity to facilitate coagulation in WTPs that treat water directly from the Mokelumne Aqueducts.

Prior to June 2012, the District added liquid chlorine in the form of 12.5 percent sodium hypochlorite solution to the Mokelumne Aqueducts to control biological growth and meet the disinfection (Concentration-Time or CT) requirement of the SWTR. In 2012, because of concerns over DBPs and accessibility to chlorine monitoring stations, the aqueduct sodium hypochlorite addition point was moved downstream adjacent to Walnut Creek WTP. Hypochlorite facilities at WCWTP add hypochlorite to the aqueducts just downstream of the WCWTP intake.

The existing Pardee Chemical Building will be replaced by the Pardee Chemical Center. To protect the mortar and cementitious lining of the District's pipelines and maintain Pardee raw water treatability, the District has designed a lime system and carbon dioxide system to moderate the raw water pH and increase the raw water alkalinity. Other improvements in conjunction with this work include a 1,000-foot treated water line, a 2,200-foot sewer line, an electrical building, an operations building, and site improvements. As of September 2020, two new sixteen-inch steel chemical injection shafts, 280-foot deep, are under construction.

Figure 2-8. Flow and Distribution Diagram, Year Ending June 30, 2019^a



a. Source: Water Supply Statistical Engineering Report, Fiscal Year ending June 30, 2019.

Water Treatment Plant Facilities and Operations

The District currently operates a total of six WTPs that treat water directly from either the Pardee or Camanche Reservoirs – three WTPs that are part of the East Bay large system and three WTPs that are part of the small upcountry systems. The three small systems, serving less than 10,000 people each, are the PARA, PACT, and CASS WTPs. PARA and PACT WTPs treat Pardee Reservoir water; CASS WTP treats Camanche Reservoir water. Each of these WTP's has been subject to several upgrades during this update period. A summary of the work is detailed under the respective WTP's below.

The three large system WTPs located in the District's East Bay service area are Walnut Creek, Orinda, and Lafayette WTPs. These WTPs treat Mokelumne River water transported from Pardee Reservoir through the Mokelumne Aqueducts, as shown in Figure 2-8. Mokelumne water is also diverted and stored in Briones Reservoir, which typically contains around seventy-five percent Mokelumne water and twenty-five percent local runoff. Briones Reservoir frequently supplements Mokelumne Aqueduct supply to Orinda WTP during high demand periods. Briones Reservoir can also supply Walnut Creek and Lafayette WTPs during an outage of the Mokelumne Aqueducts. Briones Reservoir is part of the District's East Bay facilities, which are discussed at length in the EBWSS and its updates.

Pardee Recreation Area (PARA) WTP

PARA WTP serves a non-transient, non-community small water system located on the north shore of Pardee Reservoir. The service area is limited to the recreation area in the northern section of the west shore of Pardee Reservoir, which includes ninety-three connections (seven permanent structures, three mobile homes, and eighty-three RV/camping sites). The WTP intake is located south of the Recreation Area marina, as shown in Figure 2-1. The maximum capacity of the plant is 100 gallons per minute (gpm) or 0.144 MG. Raw water is pumped through about 200 feet of three-inch flexible and 850 feet of 6-inch PVC pipeline from the reservoir by one of two submersible pumps (100 gpm and 160 gpm) mounted on a floating platform. The intake depth is suspended approximately 40 feet below the water surface. An exclusion zone restricts recreation in proximity to the intake both from the shore and from the reservoir. PARA WTP employs ultrafiltration (UF) membranes; treatment is achieved by running the raw water, also referred to as the feed water, into the lumen or inner cavity of the 0.01 micron (μm) cellulose acetate (CA) hollow fibers and through the membrane walls, separating the water from larger solutes. Following treatment, sodium hypochlorite is used for disinfection. The sodium hypochlorite is stored in sixteen-gallon containers within a spill containment area inside the chemical feed room. Treatment plant effluent is also treated with soda ash to increase pH for corrosion control before the treated water is pumped into the 97,000 gallon bolted-steel storage tank adjacent to the plant.

Historical Background

The PARA system has been in operation since around 1958. Historically, the PARA WTP utilized 3-foot diameter and 5-foot diameter dual-media pressure vessels for water

treatment. The different sizes of the filters presented operational challenges; for example, different flow rates across both filters necessitated different chemical feed rates. As a result, PARA WTP was upgraded in 1994. The floating platform water intake system was installed, along with a new UF system that includes four Infilco Degremont (IDI) Aquasource L1B35.55 ultrafiltration modules, feed pump, pre-filter, circulation pump, backwash pump, cleaning tank, compressor, sodium hypochlorite and sodium carbonate (soda ash) tanks, and particle counter. The new ultrafiltration plant was fully permitted in October 1995 and is still currently in service to this date.

2020 Update Period System Changes

Upgrades and changes to PARA WTP during this update period are as follows. In 2016, the water system classification was changed from a transient non-community water system to a non-transient, non-community water system. Consequently, the treatment plant has since been subject to requirements of the Lead and Copper Rule (LCR) and the Stage 2 Disinfection By-Products Rule (S2DBPR). To comply with the LCR corrosion control requirements, in 2016, the District installed a new soda ash metering system to raise the pH of the plant effluent to between 8.2 and 8.8 for corrosion control. To comply with the S2DBPR, in 2017, the District constructed a new GAC adsorber system that was in service from August 2018 to November 2019. The GAC system has since been removed from service due to increased effluent turbidity caused by carbon fines. The District replaced the media in 2019 and has begun increasing the capacity of the existing GAC system backwash supply to accommodate a more thorough backwash routine to flush the carbon fines. Once the backwash system has been upgraded and fines adequately removed, the GAC system can be returned to service to support the removal of DBP precursors

The existing UF membrane system at PARA WTP is over twenty-five years old and nearing the end of its useful life. Replacements of the CA hollow-fiber UF membranes are no longer available. Further, direct integrity testing (DIT) is now required by SWRCB DDW for all membrane filtration processes used to comply with the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR, see Section 4) regulation. However, when the PARA WTP membrane system was installed in 1994, a pressure-based DIT system was not available nor was it a permit requirement. The aging system is not equipped for such testing, nor can it be modified for additional treatment processes to meet LT2ESWTR without substantial infrastructure changes. The District is working with a consultant to design an upgraded water treatment process train for PARA WTP to be in operation in or before 2023. In the interim, in accordance with SWRCB DDW direction, the plant currently employs the use of a continuous online particle counter to verify the existing membranes continue to work properly until the replacement project is completed.

Pardee Center (PACT) WTP

PACT WTP is a non-transient, non-community small water system located on the west shore of Pardee Reservoir. The WTP intake is located adjacent to the Pardee Outlet Tower along the southwestern arm of Pardee Reservoir, as shown in Figure 2-1. The maximum capacity of the plant is 12 gpm. Raw water is pumped either from the reservoir by two 100-gpm pumps that are mounted on a floating platform next to the Pardee Outlet Tower

through a six-inch pipeline, or by two (one 270-gpm and another 195-gpm) shaft pumps from the outlet tunnel at the chemical building. Water pumped from the outlet tunnel can be stored in an elevated 25,000-gallon tank prior to treatment. An exclusion zone restricts recreation in proximity to the intake both from the shore and from the reservoir. Pardee Center WTP employs two nanofiltration (NF) membrane units, each with a design capacity of 8,640 gal/day. Sodium hypochlorite is used for disinfection. The sodium hypochlorite is stored in eight-gallon containers within the spill containment. Soda ash is also used for corrosion control. The treatment plant effluent is stored in a 14,000-gallon bolted-steel storage tank adjacent to WTP building prior to distribution via a pressure-tank system.

Historical Background

Previously, water treatment at the Pardee Center was achieved using two dual-media pressure vessels of identical size that treated approximately 165,000 gal/day during the high demand periods in the summer. Further study of water use patterns indicated that an estimated ninety-five percent of the treated water was used for landscape irrigation. Prior to the treatment plant updates, a new potable distribution system was constructed, while the existing distribution system was designated for non-potable use, primarily irrigation. Available commercial ultrafiltration packages could not accommodate the reduced potable demand of 10,000 – 15,000 gal/day, so the District opted to install a nanofiltration system at Pardee Center WTP per a recommendation from SWRCB DDW. This system has been in use since the year 2000.

2020 Update Period Upgrades

The existing NF membrane system at PACT WTP is twenty years old and nearing the end of its useful life. Further, as with PARA WTP, the PACT WTP membrane system was installed prior to SWRCB DDW's requirement for a pressure-based DIT system. The existing NF membranes are not equipped for such testing and the system cannot be modified for additional treatment processes to meet the current LT2ESWTR requirements without substantial infrastructure changes. The District is working with a consultant to design an upgraded water treatment process train for PACT WTP to be in operation in or before 2025. In the interim, in accordance with SWRCB DDW direction, the plant currently employs an online continuous particle counter to verify the existing membranes continue to work properly until the replacement project is completed.

The Pardee Center elevated raw water storage tank is also planned for replacement. The existing Pardee Elevated Water Tank is limited to two-thirds capacity to comply with seismic requirements. This tank provides raw water storage for irrigation, fire protection and is required to supply adequate water pressure for the pH treatment system that provides corrosion control for the linings of the Mokelumne Aqueduct pipelines. Further, the new Pardee Chemical Center for the Mokelumne Aqueducts, currently in design and discussed above in *Chemical Additions to Raw Water*, will require increased storage capacity from this tank. The District plans to rehabilitate or replace the elevated storage tank.

Camanche South Shore Recreation Area (CASS) WTP

CASS WTP is a community water system located in the eastern shore of Camanche Reservoir in Calaveras County. The system serves approximately 180 permanent residents and seasonal transient visitors through 448 service connections near mobile homes and campsites. The maximum capacity of the plant is limited to 0.5 MGD by its Water Permit. The treatment plant can be supplied by both Camanche Reservoir and Pardee Reservoir. The Camanche Reservoir intake is located approximately 1,200 feet from the shore along the north side of the recreation area, shown on Figure 2-2. A minimum 500-foot protection zone is established around the intake location. Raw water is continuously withdrawn from Camanche Reservoir by two 250-gpm pumps mounted on a floating platform, which draw water from a depth of thirty-two feet below the water surface. Pardee Reservoir water may be drawn from Mokelumne Aqueducts No. 2 and 3 via a newly installed pipeline. The treatment system has been fully upgraded during this update period. The new CASS WTP utilizes two skids with eight individual ultrafiltration (UF) membrane modules per skid, a granular activated carbon (GAC) adsorber system, and post-filtration chlorination. Two 242,000-gallon finished water storage tanks serve as chlorine contact chambers and distribution system reservoirs.

Historical Background

The CASS water system has been in operation since 1973. EBMUD assumed responsibility of the system in 1991. The original plant processes consisted of coagulation, in-line filtration through dual-media (sand and anthracite) filters, and chlorination. After submitting an application in 1993 and providing an additional report regarding recreational use and its impacts at Camanche Reservoir, EBMUD was issued a full permit for CASS WTP in 1994. A permit amendment was granted in 2007 to incorporate requirements from the Interim Enhanced Surface Water Treatment Rule (IESWTR, see Section 4 for more on drinking water regulations). Another permit amendment was granted in 2012 to change the disinfectant from calcium hypochlorite to liquid sodium hypochlorite. This plant was in operation until June 2018.

2020 Update Period Upgrades

In summer 2016, in response to elevated disinfection byproducts in the distribution system, the EBMUD replaced the anthracite in the CASS WTP filters with GAC.

Also in 2016, EBMUD completed the construction of its new UF treatment plant. The new CASS UF WTP utilizes sixteen membrane modules on two skids, chemical storage and feed systems, a membrane backwash/cleaning and disposal system, and a new 3,000-gallon filtered water clearwell tank. Pumps, flow meters, and water quality monitoring equipment for chlorine, pH, and turbidity were also installed for the new facility.

The new CASS UF WTP is hydraulically connected to both the former plant's raw water supply line from Camanche Reservoir, and to the Pardee Reservoir via pipelines from Mokelumne Aqueducts No. 2 and No. 3. EBMUD received an approval letter to operate the upgraded system on April 6, 2018. The former CASS WTP was removed from service and the new UF membrane plant was placed into service on June 11, 2018. After, the District completed the addition on a new GAC adsorber system in April 2019 to improve

disinfection by-product (DBP) precursor removal and comply with DBP maximum contaminant levels for trihalomethanes (THMs) and haloacetic Acids (HAAs).

Camanche North Shore (CANS) WTP

CANS WTP is a community water system that supplies the CANS Recreation Area with potable water (Figure 2-2). It is supplied by groundwater drawn from three wells, Well No. 2, 3, and 4. Well No.1 is not connected to the system. Table 2-3 contains depth and capacity information for the CANS WTP well system. Wells No. 2 and 3 are typically utilized simultaneously for water treatment. Well No. 4 is used for irrigation and as a standby drinking water supply.

Table 2-3. CANS WTP Well System

	Construction Date	Depth	Well Capacity (varies w/head)
Well #1	Not used		
Well #2	1977	374 ft.	150 gpm
Well #3	1979	228 ft.	200 gpm
Well #4	1997	460 ft.	125 gpm

The District received a permit to operate CANS WTP in 1990 to treat up to 170,000 gallons per day. The plant is operated intermittently based on storage tank levels. Initially, greensand filters were used, before a change to pyrolucite filters in 2006. The groundwater is pre-treated with sodium hypochlorite to oxidize contaminants, and the water routed through two 890-gallon reactor vessels and four parallel pyrolucite filters for detention and removal of manganese, iron, and hydrogen sulfide. Pre-treatment chlorine dosage is sufficient to retain an effluent residual, but the system is designed to allow for post-chlorination if needed. Sodium hypochlorite is stored in a 275-gallon tank with double containment. Treated water is stored in a 142,000-gallon welded steel tank or 150,000-bolted steel tank prior to distribution.

CARWSP

The Camanche Area Regional Water Supply Project (CARWSP) is a proposed partnership between three water agencies: AWA, CCWD, and EBMUD. The CARWSP will include upgrades to the CASS WTP to convert it into a new regional WTP, with a planned 0.5 – 2.5 MGD capacity. The three water purveyors can then distribute the treated water within their respective service areas around Camanche Reservoir.

As shown in Figure 2-9, the proposed CARWSP project will be implemented in phases as environmental documentation is completed and funding is available:

- Phase I: Once this phase is complete, CANS service area will be served by the proposed regional water treatment plant at Camanche South Shore and CANS WTP can be placed on standby for use in an emergency. Phase I of the project will require capacity, reliability, and treatment upgrades to convert CASS WTP into a regional water treatment plant. Also needed is a treated water transmission

Section 2. Water Supply, Conveyance, and Treatment Systems

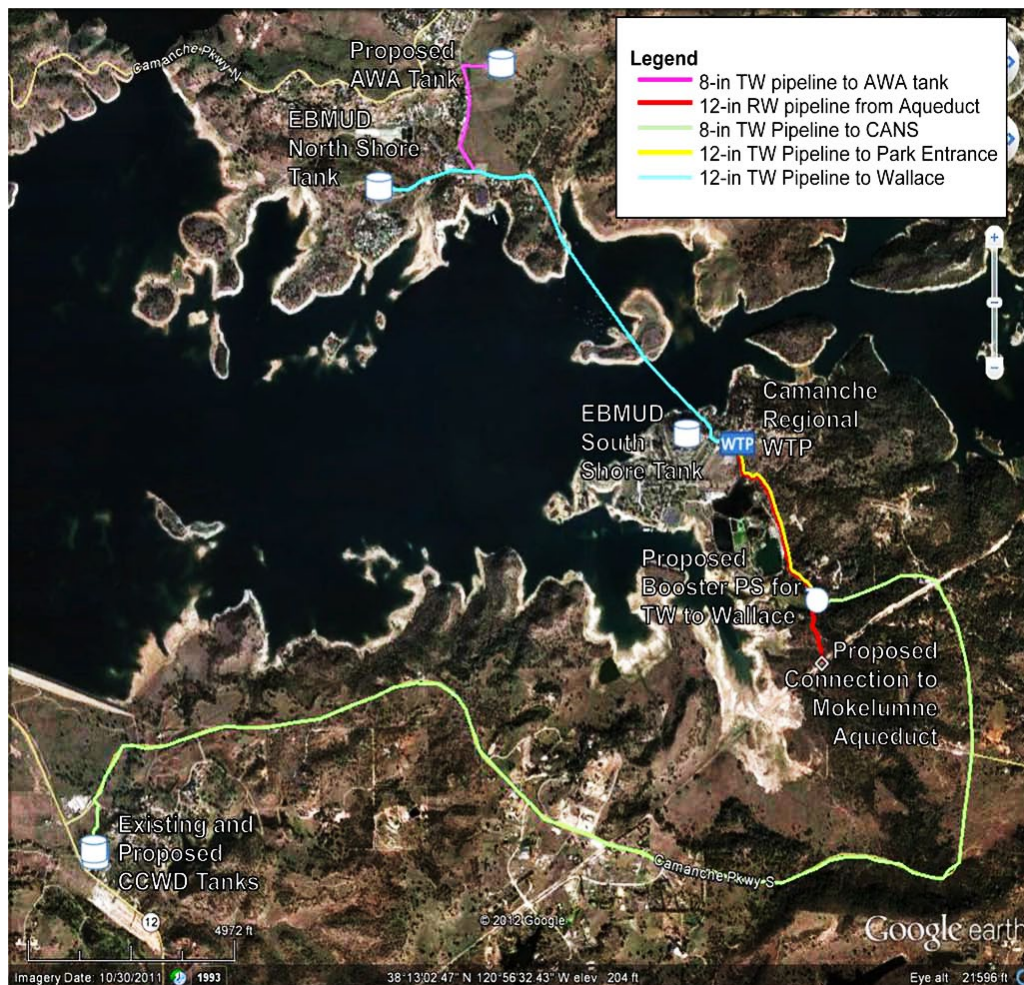
pipeline from the Camanche South Shore area to the North Shore area.

Approximately 6,000 feet of the planned transmission pipeline, that which crosses the Camanche Reservoir, was constructed during this update period when drought brought reservoir levels low. Additional pipe will be needed to finish connecting the future regional WTP to the Camanche North Shore area.

- Phase II: Phase 2 of the project will serve AWA's water demand of approximately 1.5 MGD (specifically, the Lake Camanche Village portion of their service area). A definitive construction date is not known at this time.
- Phase III: Phase 3 would serve Calaveras County Water District, specifically, the portion of their service area that serves the town of Wallace with an estimated water demand of 0.5 MGD. A definitive construction date is not known at this time.

As of the writing of this report, permit amendments, agreements between agencies, and environmental documentation are not complete.

Figure 2-9. Proposed Camanche Area Regional Water Supply Project (CARWSP)



Walnut Creek WTP

Due to the high quality of the Mokelumne Aqueduct water, and the Briones Reservoir backup supply, the Walnut Creek WTP was designed and permitted to operate as an in-line filtration plant. The current maximum permitted capacity of the plant is 115 million gallons per day (MGD). Pre-treatment consists of the addition of polyaluminum chloride, cationic polymer, and optional sodium hypochlorite for pre-oxidation. The plant employs eight gravity filters with dual media (anthracite and sand), which are permitted to operate at a maximum rate of 8.0 gpm per square foot (gpm/sf) when source water turbidity is lower than 1.0 nephelometric turbidity unit (NTU). Turbidity is a measurement of the amount of light scattered by particles in the water. When raw water turbidity is greater than 1.0 NTU, the filters are limited to a maximum rate of 6.0 gpm/sf. Sodium hypochlorite and fluoride are commonly added in the combined filter effluent pipe before the filtered water is delivered to the chlorine contact chamber (CCC) for disinfection. Sodium hydroxide and ammonia are added to the CCC effluent before water enters the clearwell. Sodium hydroxide is added to increase pH for corrosion control in the distribution system, and ammonia is added for chloramine formation which maintains a stable disinfectant residual in the system for continued pathogen protection.

The backwash water waste stream is discharged into two equalization basins. Anionic polymer is added to the backwash waste stream prior to flocculation and sedimentation. The settled backwash waste stream and the filter-to-waste stream are pumped at a rate up to ten percent of plant production rate to combine with the raw water for reuse as water supply. Sludge from the settling basin is discharged to a 500,000-gallon sludge detention basin prior to removal by trucks to the District's waste water treatment plant in Oakland. Supernatant from the sludge detention basin is periodically returned to the backwash waste stream equalization basins.

Improvements during this update period include the replacement of reclaim system pumps in 2018 and the construction of a new bulk ammonia tank in 2019 as part of an ongoing chemical system safety improvements project.

Several future improvements are planned for Walnut Creek WTP. In 2022, a carbonic acid (CO₂) feed system at the plant intake will be constructed to allow for the suppression of pH to improve coagulation and disinfection and reduce disinfection by-product formation. This will be more imperative once the new Pardee Chemical Center is in operation and raises the pH of the water traveling through the Mokelumne Aqueducts. The District is also planning to rebuild the four filters on the north end of the plant that are nearing the end of their useful life. Several chemical system safety improvements are currently in design and will be constructed in phases over the next several years. The District is planning pretreatment options to increase the reliability of the in-line plant during poor influent water quality events caused by droughts, wildfires, algae blooms, and climate change. The planned pretreatment processes include ballasted flocculation and ozonation.

Lafayette WTP

Lafayette WTP was designed and permitted to operate as an in-line filtration plant with a maximum capacity of 35 MGD. During the winter low demand periods, the plant typically is taken out of service. The Lafayette WTP process train consists of chemical pre-treatment, filtration, and chemical post-treatment.

Sodium hypochlorite is added to the raw water aqueducts upstream of Lafayette WTP: to the Lafayette Aqueducts when using the Mokelumne supply, and to the Briones aqueduct when using the Briones supply. This allows Lafayette WTP to meet part of the required disinfection CT upstream of the plant with chlorine residual contact. Additional sodium hypochlorite is added to the raw water entering the plant during the rapid mix process for further disinfection through the plant. Polyaluminum chloride and cationic polymer are also applied during the rapid mix process for coagulation. The plant has eight declining rate filters, six of which are dual media (sand and anthracite) filters and approved to operate at 6 gpm/sqft, and two of which are mono media (sand) filters and approved to operate at 3 gpm/sqft. Fluoride, sodium hydroxide, and ammonia are added to the water post-filtration as it flows by gravity through a 48-inch pipe into the clearwell. Sodium hypochlorite may also be added at this location to boost the chlorine residual entering the distribution system.

Backwash water from the Lafayette WTP is discharged to the wash water solids handling facility, which includes an equalization basin, clarifier, and solids storage basin. Anionic polymer is added to the backwash water waste stream as it is pumped from the equalization basin to the clarifier. Clarified backwash water is pumped back to the Lafayette Aqueducts for treatment at Orinda WTP or discharge to San Pablo Reservoir.

In July 2017, the District designed and installed an aeration system in the Lafayette WTP clearwell to reduce THMs in the treated water. THMs were high during this period due to unusual water quality from Pardee Reservoir after an extended drought followed by heavy stormwater runoff in early 2017. The aeration system has since been improved and will be used as needed to control THMs. Future improvements include a CO₂ feed system and chemical system safety improvements.

Orinda WTP

Orinda WTP is an in-line filtration plant with coagulation, dual media filtration, and disinfection, treating water from the Mokelumne Aqueducts and Briones Reservoir. Orinda WTP has a permitted capacity of 175 MGD. Sodium hypochlorite is added to the raw water aqueducts upstream of Orinda WTP: to the Lafayette Aqueducts when using the Mokelumne supply, and to the Briones aqueduct when using the Briones supply. This allows Orinda WTP to meet part of the required disinfection CT upstream of the plant with chlorine residual contact. Additional sodium hypochlorite is added to the raw water during the rapid mix process for further disinfection through the plant. Polyaluminum chloride and cationic polymer are also applied during the rapid mix process for coagulation. Twenty dual media (anthracite and sand) filters are used for filtration; each filter has a maximum filtration rate of 6.0 gpm/sqft, or 10 MGD. Sodium hydroxide,

Section 2. Water Supply, Conveyance, and Treatment Systems

fluoride, and ammonia are added after filtration. Sodium hydroxide is added to increase pH for corrosion control in the distribution system, and ammonia is added for chloramine formation which maintains a stable residual in the system for continued pathogen protection.

The waste-stream (consisting of backwash and filter-to-waste) is pumped into one of two settling basins, which are operated independently of each other, with a typical detention time of three to six hours. The supernate is then discharged to San Pablo Creek, which flows into San Pablo Reservoir, in accordance with the National Pollutant Discharge Elimination System (NPDES) permit. Sodium bisulfite is added to dechlorinate the supernate prior to release to San Pablo Creek.

Several improvements have been recently completed or are in design and construction for Orinda WTP. New filter under drains were installed and a new filter air scour system is in construction. The programmable logic controller control system was replaced, electrical upgrades completed, and other maintenance activities were carried out during this update period. Future improvements in the design phase include an ultraviolet (UV) disinfection and chlorine contact basin (CCB), carbonic acid (CO₂) feed system, and chemical safety improvements. The UV disinfection and CCB will increase reliability and provide further redundancy for pathogen inactivation at the treatment plant and eliminate the need to chlorinate the raw water aqueducts at all times. The CO₂ feed system will allow for the suppression of pH to improve coagulation and disinfection and reduce disinfection by-product formation. The chemical systems safety improvements will address chemical storage safety and reliability concerns and replace the ammonia eductor feed system in Los Altos pumping plant. The District is also evaluating future pretreatment options to increase the reliability of the inline plant during poor influent water quality events caused by droughts, wildfires, algae blooms, and climate change.

Process Changes at the WTPs

A summary of major changes at WTPs from 2015 through 2019 are presented below. For additional information, please refer to individual WTP sections in the pages prior.

PARA WTP:

- The water system classification was changed to non-transient, non-community water system in 2016.
- A sodium carbonate (soda ash) system was installed and put into service in 2016 for corrosion control and LCR compliance.
- A GAC adsorber system was installed in 2017 to reduce DBP precursors. The system is not yet in service.

PACT WTP:

- No major treatment, storage, conveyance, or regulatory upgrades occurred during the 2020 update period from 2015-2019.

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CASS WTP:

- A new ultrafiltration (UF) treatment plant was put into service in 2018 to replace the old media filter plant.
- New connections were completed from Pardee Reservoir to CASS WTP via two turnouts on Mokelumne Aqueducts No. 2 and 3.
- 5,650 ft of raw water pipeline was installed to convey supply from Pardee Reservoir to CASS WTP.
- 420 ft of raw water pipeline was installed to extend the raw water supply line at the old WTP to the new WTP.
- A GAC adsorber system was installed in 2019 to reduce DBP precursors. The system is in service.
- Approximately 6,000-ft of pipeline was installed from Camanche South Shore to Camanche North Shore in preparation for long-term plans for the future CARWSP. Pipeline construction is still in progress.

CANS WTP:

- No major treatment, storage, conveyance, or regulatory upgrades occurred during the 2020 update period.

Walnut Creek WTP

- Reclaim system pumps were replaced in 2018.
- New bulk ammonia tank was installed in 2019 as part of other planned chemical system safety improvements.

Lafayette WTP

- An aeration system for DBP removal was completed in July 2017. Additional system appurtenances were installed from 2019-2020.

Orinda WTP

- Electrical system improvements and standby fuel system were upsized in 2017
- The filter under drains were replaced in 2018
- Control system upgrades were installed in 2018 and implemented in 2020.
- An air scour system to improve backwashing is currently under construction.

Section 3: Watershed Description

Background

The Upper Mokelumne River and Camanche Watersheds lie on the western slope of the Sierra Nevada Mountains in Alpine, Amador, Calaveras, and San Joaquin Counties. The total area of both watersheds is 622 square miles. They extend from Round Top Peak (elevation 10,430 ft), near the crest of the Sierras, to Camanche Reservoir (crest elevation 235 ft), located in the lower western foothills near Clements. Over half of the watershed is forested land within the Eldorado and Stanislaus National Forests.

Natural Resources, Upper Mokelumne River Watershed

This section contains detailed descriptions of the Upper Mokelumne River Watershed geology, soils, vegetation, wildlife, hydrology, general land use, ownership and jurisdictions. In the hydrology section, graphs show river flows during the 2020 update period from 2015 to 2019 relative to historic flows. Summaries of climate data for four upper-basin stations used by the District are also provided.

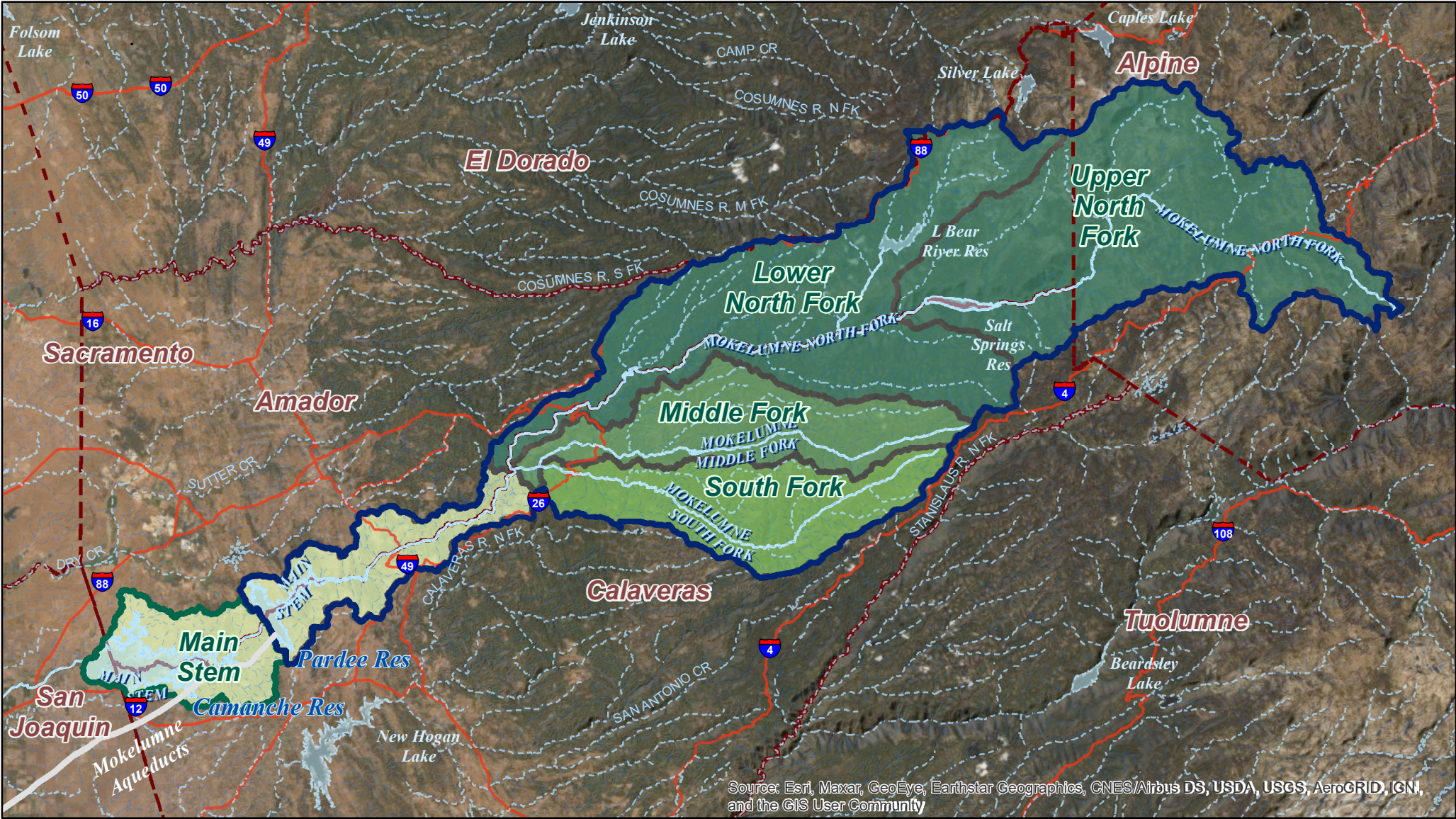
Location and Nomenclature

The Upper Mokelumne River Watershed is composed of the lands above Pardee Dam which drain to Pardee Reservoir. The watershed encompasses 579 square miles in Alpine, Amador, and Calaveras counties. Although referred to in this sanitary survey as a “watershed”, the Upper Mokelumne River Watershed is designated by the U.S. Geological Survey (USGS) as a subbasin or 4th level hydrologic unit with an 8-digit hydrologic unit code (HUC-8), 18040012. Figure 3-1 of this report depicts the subbasin, the watersheds that comprise the subbasin, and hydrologic features. Descriptions of the watersheds (5th level hydrologic units or HUC-10) that comprise the Upper Mokelumne River Watershed are referred to as sub-watersheds in this report and discussed below. Please note that naming conventions in this report are not consistent with that of the USGS.

The watershed is bounded in the north by the basins of the American River, Cosumnes River, and Dry Creek; in the south by the basins of the Stanislaus River, Calaveras River, and Bear Creek; in the west by Pardee Reservoir; and in the east by the basin of the East and West Forks of the Carson River. Elevations within the watershed range from about 10,430 feet at Round Top Peak to 568 feet at Pardee Dam.

The river system flows through impressively deep and remote canyons ranging from 1,000 to 4,000 feet in depth. The higher sub-watersheds, above the confluence of the forks - North, Middle, and South Forks sub-watersheds - are extremely rugged, consisting largely of granite overlain by volcanics carved into moderate to high relief.

Figure 3-1. Upper Mokelumne River Watershed, Sub-watersheds, and Camanche Watershed



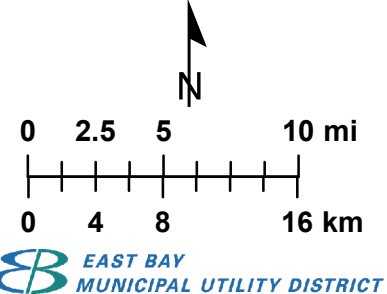
Legend

- | | | |
|---------------------|-------------------|---------------------------|
| Mokelumne Watershed | Named Streams | Watershed (HUC-10) |
| Camanche Watershed | Rivers and Creeks | |
| Waterbody | County | |
| | | |
| | | Main Stem and Camanche |
| | | Middle Fork |
| | | South Fork |
| | | Lower North Fork |
| | | Upper North Fork |

Data sources:

EBMUD GIS Database	Watershed Boundary Dataset
30m National Elevation Dataset	U.S. Geological Survey &
U.S. Geological Survey &	U.S. Department of Agriculture
EROS Data Center	2013
March 2014	https://datagateway.nrcs.usda.gov/

File Location:
\\omd\wo\EVERYONE\Process Engineering\WSS 2020\Chapter 3 -
Watershed Description\Graphics
Last Updated: Oct. 2020



Section 3. Watershed Description

The North Fork of the Mokelumne River originates from several high snow courses to the north and south of Blue Lakes along the crest of the Sierra Nevada at elevations ranging from approximately 7,500 to 10,400 feet. From here the North Fork flows predominantly northwest to the junction with Meadow Lake Creek and then changes direction and flows southwest toward the confluence of the Forks. The North Fork sub-watershed lies partially within Alpine and Calaveras Counties, but mostly in Amador County. Residential communities within the North Fork sub-watershed are: Roden Estates, Silverlake Pines, Robb Park Estates, and Blue Creek Subdivision. The major transportation routes are Highways 26 and 88. The North Fork drains approximately 373 square miles or two-thirds of the total area of the upper Mokelumne River basin. Note that USGS subdivides the North Fork into two 10-digit hydrologic units: Lower North Fork (1804001204) and Upper North Fork (1804001201). For the purposes of this section, the Lower and North Fork HUC-10 watersheds are demarcated in the figures but are combined and discussed as the North Fork of the Mokelumne River.

The Middle Fork Mokelumne River watershed (1804001203) is approximately 78 square miles and lies entirely within Calaveras County between the North Fork and South Fork of the Mokelumne River. The major communities in the Middle Fork sub-watershed include West Point, Wilseyville, Lily Valley, and Lynn Park Estates. State Highway 26 passes through its western boundary connecting West Point and Wilseyville.

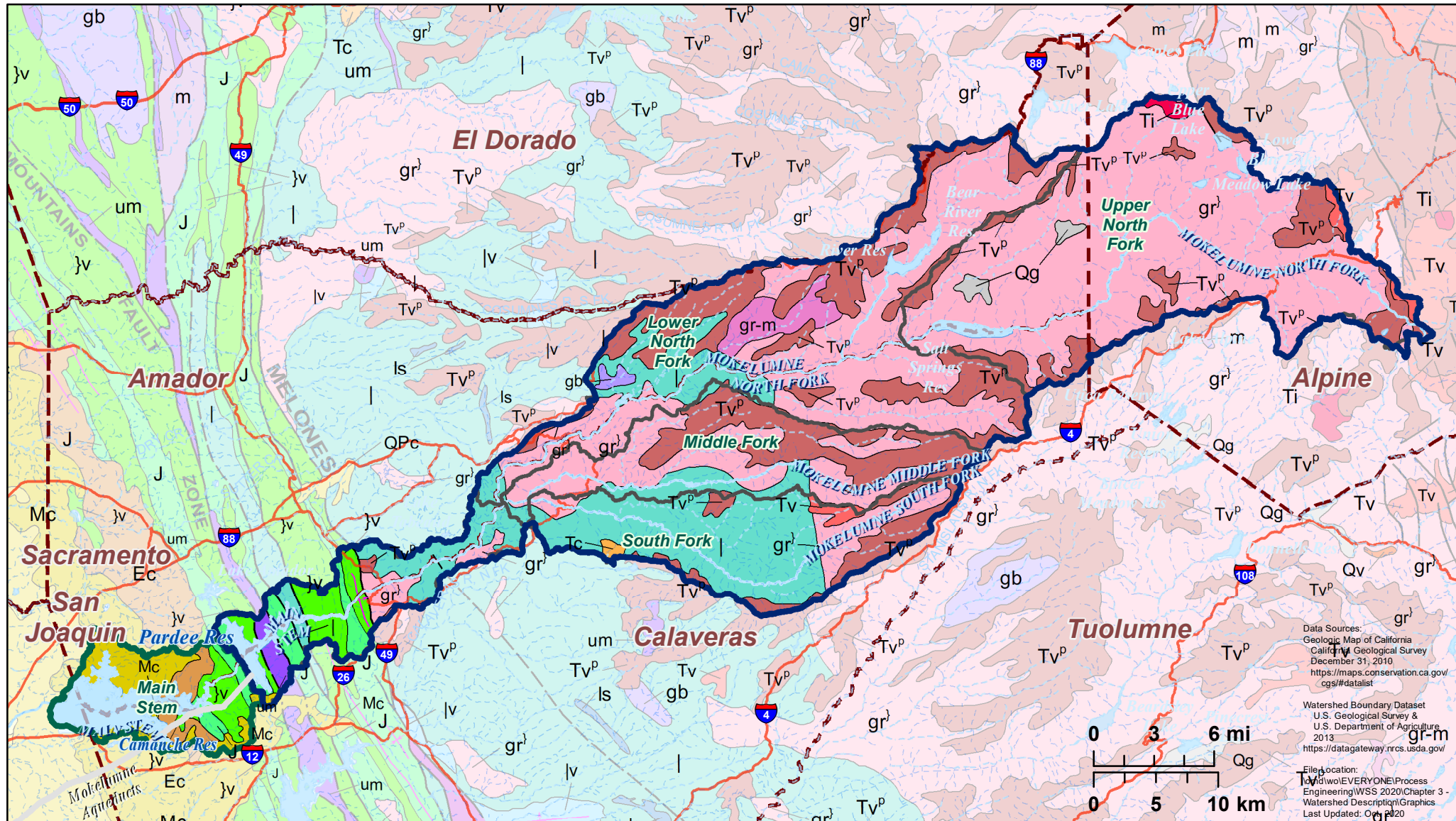
The South Fork Mokelumne River watershed (1804001202) is approximately 78 square miles and lies entirely within Calaveras County. Major communities within the South Fork sub-watershed include Wilseyville, Railroad Flat, and Glencoe. There are no major transportation routes through this sub-watershed area, except for Highway 26, which crosses the South Fork of the Mokelumne River. Highway 26 is a local thoroughfare extending from West Point to Mokelumne Hill.

The Main Stem Mokelumne River watershed (1804001208) -- from the confluence of the North and South Forks to Pardee Dam - lies in Amador and Calaveras Counties. This watershed is approximately 50 square miles. It begins at the confluence of the North and South Forks of the Mokelumne River at an elevation of approximately 900 feet and extends downstream 20 miles southwesterly to Pardee Reservoir. Highway 49 is the main transportation route through the watershed area. The major residential communities located in the Main Stem sub-watershed are Mokelumne Hill and Paloma. Note that the USGS designates this area as the Upper Mokelumne River Watershed. The naming conventions in this report are not consistent with that of the USGS. As mentioned in this report, the Upper Mokelumne River Watershed refers to Upper Mokelumne Subbasin as designated by the USGS.

Geology

The Upper Mokelumne River Watershed is located in the Sierra Nevada Geomorphic Province and is characterized by three major lithologic groups -- Paleozoic metamorphic rocks, granitic rocks of the Sierra Nevada batholith, and Tertiary volcanic rocks. A general geologic map of the watershed is depicted in Figure 3-2.

Figure 3-2. Upper Mokelumne River and Camanche Watersheds - Geologic Map



Legend

-  Mokelumne Watershed
 Camanche Watershed
 Watershed (HUC-10)
 Waterbody
 Named Streams
 Rivers and Creeks
 County

Ec: Nonmarine (continental) sedimentary rocks (Eocene) - Sandstone, shale, conglomerate; moderately to well consolidated.

J: Marine sedimentary and metasedimentary rocks (Jurassic) - Shale, sandstone, minor conglomerate, chert, slate, limestone; minor pyroclastic rocks.

gb: Plutonic rocks (Mesozoic) - Gabbro and dark dioritic rocks; chiefly Mesozoic.

gr-m: Mixed rocks (Mesozoic to pre-Cambrian) - Granitic and metamorphic rocks, mostly gneiss and other metamorphic rocks injected by granitic rocks. Mesozoic to Precambrian.

gr³, grMz: Plutonic rocks (Mesozoic) - Mesozoic granite, quartz monzonite, granodiorite, and quartz diorite.

Mc: Nonmarine (continental) sedimentary rocks (Miocene) - Sandstone, shale, conglomerate, and fanglomerate; moderately to well consolidated.

Mzv: Metavolcanic rocks (Mesozoic) - Undivided Mesozoic volcanic and metavolcanic rocks. Andesite and rhyolite flow rocks, greenstone, volcanic breccia and other pyroclastic rocks; in part strongly metamorphosed. Includes volcanic rocks of Franciscan Complex: basaltic pillow lava, diabase, greenstone, and minor pyroclastic rocks.

Pz: Marine sedimentary and metasedimentary rocks (Paleozoic) - Undivided Paleozoic metasedimentary rocks. Includes slate, sandstone, shale, chert, conglomerate, limestone, dolomite, marble, phyllite, schist, hornfels, and quartzite.

Qg: Nonmarine (continental) sedimentary rocks (Pleistocene-Holocene) - Glacial till and moraines. Found at high elevations mostly in the Sierra Nevada and Klamath Mountains.

QPC: Nonmarine (continental) sedimentary rocks (Pleistocene-Holocene) - Pliocene and/or Pleistocene sandstone, shale, and gravel deposits; mostly loosely consolidated.

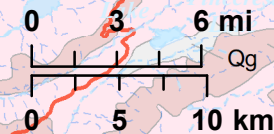
Tc: Nonmarine (continental) sedimentary rocks (Tertiary) - Undivided Tertiary sandstone, shale, conglomerate, breccia, and ancient lake deposits.

Ti: Volcanic rocks (Tertiary) - Tertiary intrusive rocks; mostly shallow (hypabyssal) plugs and dikes.

Tv: Volcanic rocks (Tertiary) - Tertiary volcanic flow rocks; minor pyroclastic deposits

Tvp: Volcanic rocks (Tertiary) - Tertiary pyroclastic and volcanic mudflow deposits.

um: Plutonic rocks (Mesozoic) - Ultramafic rocks, mostly serpentine. Minor peridotite, gabbro, and diabase; chiefly Mesozoic.



Data Sources:
Geologic Map of California
California Geological Survey
December 31, 2010
<https://maps.conservation.ca.gov/cgs/#datalist>

Watershed Boundary Dataset
U.S. Geological Survey &
U.S. Department of Agriculture
2013
<https://datagateway.nrcs.usda.gov/>

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Engineering\WSS 2020\Chapter 3 -
Watershed Description\Graphics
Last Updated: Oct 2020



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Paleozoic metamorphic rocks crop out prominently in the Western Sierra Foothills. These highly variable and complex deformed rocks are the result of low-grade metamorphism of argillaceous sedimentary and volcanic rocks. This formation includes lenses of recrystallized limestone and dolomite with some quartz- mica schist, graphitic schist, metachert, quartzite, and slate. Road cut observations made by PG&E in 1981 in the project area indicate that weathering may be quite variable within relatively small areas. The rocks have been assigned to the Calaveras Complex and the Shoo Fly Complex.

Granitic rocks of probable Jurassic age underlie the Sierra Nevada and intrude the metamorphic rocks of the study area. Equigranular, medium-grained, granodiorite comprises the most common lithology. True granites are not present in adequate quantity, and the percentage of mafic minerals varies. The granitic rocks in the area have weathered unevenly to depths ranging from a few feet to over 100 feet.

Tertiary volcanic rocks are present on ridge tops and probably once formed a thick sequence of pyroclastic rocks over the project area. These rocks have been assigned to the Mehrten Formation and the Valley Springs Formation. They consist of andesitic detritus, mudflows, massive andesite, sand and gravel. Only erosional remnants remain in the upper watershed. A thick unit of welded rhyolite tuff of the Valley Springs Formation crops out on the hill just east of the Licking Fork. The Valley Springs Formation is Miocene in age and is composed of a series of interbedded, light-colored vitric tuff and welded tuff units. Five small, flow-banded dacitic and rhyodacitic volcanic domes of Miocene-Pliocene age occur along the Melones fault near Mokelumne Hill.

A series of northwest trending faults form a 30- to 50-mile-wide band of rocks that parallels the Sierra Nevada Range. Collectively called the Foothills fault system, the faults can be subdivided into two fault zones -- the Bear Mountains and Melones zones. The area has little recent history of fault movement and few epicenters larger than 3.5 have occurred in the area since 1910. However, it is located in Seismic Zone 3, where damage potentials are considered to be major. The Calaveras, San Andreas, and Genoa Faults are all capable of producing earthquakes over magnitude 7.0 that could adversely affect the infrastructure of the Upper Mokelumne River Watershed.

Soils

Upper Mokelumne River Watershed soils represent two basic groups -- 1) those in the higher elevations of the Sierra Nevada above the confluence of the North, Middle, and South Forks and 2) those in the lower elevations of the Sierra Nevada and its foothills below the confluence of the Forks along the Main Stem.

North, Middle, and South Fork Soils: The higher elevations of the Upper Mokelumne River Watershed, above the confluence of the forks, have shallow-to-deep, medium-textured-to-stony soils. Most have weathered from metasedimentary or granitic rock and are located in a variety of topographic settings ranging from ridge tops to steep canyon sides. Five soil associations are present in these higher elevations.

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Mariposa-Josephine-Sites Association: These soils range from shallow to very deep, they are generally very rocky, or are gravelly- silt loams, and loams. Soils of this association are found on rolling hills and sharp parallel ridges at elevations near 1,200 feet, and on higher mountainous uplands; on parent materials derived from metasedimentary rocks.

Holland-Musick-Chaix Association: These soils are commonly very rocky, micaceous, porous, and very deep. They consist of well-drained coarse, sandy loam to very rocky, coarse sandy loam. Most soils were formed from parent materials derived from granitic rocks such as granodiorite. Soils of this association are found on both rolling and smooth terrain, at elevations exceeding 1,600 feet. The Chaix series are well drained, very rocky, coarse sandy loams (usually 24 to 40 inches deep) which overlie granite and occur from 2,000 to 4,000 feet in elevation. The Musick series (greater than 48 inches deep) occur between the elevations of 2,000 and 5,000 feet, over igneous rocks.

Main Stem Mokelumne River Sub-Watershed: Soils found in the Main Stem Mokelumne River sub-watershed consist of generally shallow to moderately deep, medium-textured and stony soils. Most are weathered from fractured metamorphic rocks and granite. Deep loamy soils have developed on gently rounded ridges underlain by granitic rocks, on occasional gently sloping table-top ridges underlain by volcanic flow deposits, and on sharp ridges underlain by schists and slates. Three soil associations are present within the Main Stem sub-watershed.

Auberry-Ahwahnee-Sierra Association: These soils are well-drained coarse, sandy loams and sandy loams formed in materials weathered from granitic rocks. The Auberry Series is generally found at elevations between 700 and 1,800 feet where granite is between 40 and 60 inches deep. The Ahwahnee Series are coarse, sandy loams to very rocky, coarse, sandy loams located where granite bedrock lies 24 to 40 inches deep, between 500 to 2,500 feet elevations. The Sierra Series are found at elevations between 1,000 and 2,000 feet where underlying granite is from 40 to 60 inches deep.

Auburn-Argonaut Association: These soils consist of well-drained silt loams to gravelly loams, formed in materials weathered from basic and metasedimentary rocks characteristic of this association. The Auburn Series is a heavy subsoil variant consisting of cobbly, clay loam. It has formed 8-to 27-inch soil layers above vertically tilted schists and associated rocks of the Calaveras Formation at elevations between 1,000 and 1,700 feet. The Argonaut Series have formed over metabasic or basic rocks.

Boomer-Auburn Association: These soils consist of well-drained silt loams and gravelly loams formed from weathered basic igneous rocks or metasedimentary rocks. The Boomer Series is a very rocky loam ranging from 24 to 52 inches thick above basic schists at elevations of 1,000 to 3,500 feet. The Auburn Series is a heavy subsoil variant consisting of cobbly, clay loam. It lies in 8- to 27- inch layers above vertically tilted schists and associated rocks of the Calaveras Formation at elevations between 1,000 and 1,700 feet.

Vegetation

The Upper Mokelumne River Watershed features vegetative communities typical of the Sierra Nevada Mountains and foothills. Ponderosa pine predominates on dry sites between 2,000 and 5,000 feet in elevation. Black oak is abundant in the lower canyons. Mixed conifers are most common in moist areas between 3,000 and 6,000 feet. White fir is the most common coniferous species of northern exposures at the higher elevations.

Open annual grasslands, dense oak woodlands, and oak savannah communities are common at the lower elevations. Sub-dominant vegetation types include chaparral and riparian scrub communities. Canyon chaparral, which is limited by the steep, rocky terrain of the canyon walls, includes Mariposa manzanita, buckbrush, and poison oak.

The banks of the Mokelumne River and its perennial tributaries support the bulk of the Upper Mokelumne River Watershed riparian vegetation, although several of the ephemeral tributaries support minor riparian communities. The riparian zones are limited to narrow strips along waterway embankments. Hydrophilic, deciduous trees and shrubs, such as alders, dogwoods, and willows, are typical of the riparian communities.

As part of the year 2000 watershed assessment conducted by Sierra-Pacific Industries, vegetation communities were identified based on elevation within the Upper Mokelumne River Watershed. An overview of the vegetation documented in the Sierra-Pacific watershed assessment is provided as follows:

Subalpine Conifer: The subalpine conifer vegetation community includes fragmented forests of foxtail, limber, and whitebark pines interspersed with shrublands, meadows, and riparian corridors. It occupies areas above elevations of 8,500 to 9,000 feet, depending upon aspect. This vegetation type occurs on approximately 6 percent of the Upper Mokelumne River Watershed.

Jeffery Pine: The Jeffery pine vegetation community forms an open layer, usually between 40 to 70 percent crown closures, over a lower canopy of hardwoods that usually has less than 50 percent crown closure. A shrub layer is common on most Jeffery pine sites. Aspen commonly dominate the lower canopy layer and huckleberry oak, manzanita, and mountain misery are common shrubs. The Jeffery pine vegetation community occurs downslope of the subalpine conifer type and upslope of the mixed conifer type. It occupies approximately 1 percent of the Upper Mokelumne River Watershed.

Lodgepole Pine: The lodgepole pine forest generally forms open stands downslope of the subalpine conifer type, beginning at elevations of about 6,500 feet, depending upon aspect. Lodgepole pine occupies the dryer areas in this elevation band. It overwhelmingly dominates these sites, forming nearly pure stands on over 80 percent of the sites. Occasional associates include aspen and mountain hemlock. The lodgepole pine forest generally has little understory. This vegetation community occupies approximately 2 percent of the Upper Mokelumne River Watershed.

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Red Fir: The red fir forest generally occupies wetter areas downslope of the lodgepole pine zone, beginning at elevations of about 6,000 feet, depending upon aspect. Red fir dominates north slopes and higher elevations, where conditions are colder and wetter. Mature stands are generally monotypic, with very few other species in any layer. High fuel loads are common. This vegetation community occupies approximately 10 percent of the Upper Mokelumne River Watershed.

White Fir: White fir vegetation has historically been considered a phase of the mixed conifer type. It is characterized by a nearly monotypic, even-aged overstory. It sometimes associates with sugar pine, incense cedar, and red fir. The understory is usually sparse, with high levels of downed wood. It grows downslope of the mixed red fir zone, beginning at about 5,500 feet. It may be intermixed with the red fir vegetation species at the boundary between these two zones. White fir forests occupy approximately 15 percent of the Upper Mokelumne River Watershed.

Mixed Conifer: The mixed conifer forests are a mixture of ponderosa pine, sugar pine, white fir, incense cedar, Douglas fir, and black oak. Ceanothus and manzanita grow in openings. The mixed conifer vegetative species occupy areas downslope of the white fir, beginning at elevations of about 4,000 feet, depending on aspect. Mixed conifer forests occur on approximately 25 percent of the Upper Mokelumne River Watershed.

Ponderosa Pine: The ponderosa pine vegetation includes ponderosa pine, sugar pine, and incense cedar. Canyon live oak, black oak, and manzanita are also common. Ponderosa pine species grow downslope of the mixed conifer zone, beginning at about 2,000 feet. They are often near, or intermixed with, chaparral or oak woodland. Ponderosa pine vegetation communities occupy approximately 14 percent of the Upper Mokelumne River Watershed.

Montane Hardwood and Montane Harwood Conifer: These low to mid-elevation vegetative species contain the highest biodiversity of the Sierra Nevada. Common species include blue oak, interior live oak, canyon live oak, and valley oak. At higher elevations they include California buckeye, digger pine, ponderosa pine, and black oak. Willows, California sycamore, cottonwoods, and white alder grow in riparian areas. Non-native annual grasses have largely replaced native perennial grasses and herbaceous species. These vegetative species occupy approximately 6 percent of the Upper Mokelumne River Watershed.

Chaparral: Chaparral is a diverse vegetation community dominated by shrubs. It occurs in a wide variety of ecological conditions but generally on dryer slopes, where it may border or be intermixed with the black oak, ponderosa pine, or mixed conifer zones. Evidence indicates that its occurrence is strongly correlated with fire regimes. This vegetation community occupies approximately 8 percent of the Upper Mokelumne River Watershed.

Grasslands: Grasslands, dominated by annual grasses, occupy approximately 2 percent of

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the Upper Mokelumne River Watershed generally on the lowest elevations. Lands surrounding the Pardee Reservoir are predominantly grasslands.

Wildlife

The Eldorado National Forest provides habitat for approximately 340 species of wildlife. This total includes 202 bird species, 79 mammal species, 20 fish species, 24 reptile species, and 15 amphibian species. The Stanislaus National Forest provides habitat for approximately 343 wildlife species. Reptiles, amphibians, birds, fish and mammals of all size ranges are located in the aquatic and upland communities of the Upper Mokelumne River Watershed. Some of the larger mammals include the mountain lion, black-tailed deer, and black bear. Smaller mammals include the western grey squirrel, racoon, muskrat and brush rabbit.

As documented in the year 2000 watershed assessment conducted by Sierra Pacific Industries, 33 wildlife species (seven amphibian and reptile species, 13 bird species, one fish species, five mammal species, and seven invertebrate species) of special status and/or concern potentially occur in the Upper Mokelumne River Watershed. The principal sources consulted for the description of target species -- special status species -- included the California Natural Diversity Database (CNDD); California Wildlife Habitat Relationships; publications by California Native Plant Society; reports on Status of Sierra Nevada and other relevant references. Of the 33 special status wildlife species potentially occurring in Upper Mokelumne River Watershed, ten species are listed as federal and/or state endangered or threatened species. These endangered or threatened species include the California red-legged frog, bald eagle, great gray owl, willow flycatcher Lahontan cutthroat trout, Sierra Nevada red fox, California wolverine, vernal pool fairy shrimp (two sub-species), and valley elderberry longhorn beetle. Based on vertebrate species distribution information, the California red-legged frog, bald eagle, great gray owl, willow flycatcher, and Sierra Nevada red fox are species of special status to be considered for habitat management and/or distribution minimization.

Drainage Basins

The watershed encompasses an area of approximately 579 square miles above Pardee Dam. This area is divided into four sub-basins: the North Fork (373 sq. mi.), Middle Fork (78 sq. mi.), South Fork (78 sq. mi.), and the Main Stem (approximately 50 sq. mi). It is approximately 60 miles long and ranges from a mile and a half in width at its narrowest point to 17 miles at its widest. In addition to the Main Stem of the Mokelumne River which drains into Pardee Reservoir, three major forks (tributaries) comprise the upper reaches of the Mokelumne River -- North, Middle, and South Forks.

North Fork Drainage Basin. The North Fork is the major tributary flowing some 55 miles from its source at the crest of the Sierras to its confluence with the South Fork near West Point. Elevations within the North Fork sub-watershed range from 10,430 feet at Round Top Peak to 900 feet at the confluence with the Middle Fork of the Mokelumne River. Major tributaries to the North Fork include: Blue Creek which is fed by Upper and

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Lower Blue Lakes (elevation 8,000 ft) and by Twin Lake; Meadow Creek which flows from Meadow Lake (elevation 7,800 ft); Summit Creek; the Bear River which flows through Upper Bear (elevation 5,900 ft) and Lower Bear (elevation 5,820 ft) reservoirs; and Tiger Creek. Flow in the North Fork is regulated by Pacific Gas and Electric's (PG&E) Mokelumne River Project which is located upstream of Pardee Dam.

Middle Fork Drainage Basin. The Middle Fork of the Mokelumne River flows about 22 miles from its headwaters in Stanislaus National Forest at elevation 7,200 feet near Baily Ridge to join the South Fork about one mile upstream of its confluence with the North Fork. The elevation of the Middle Fork sub-watershed ranges from 7,380 feet on the eastern boundary to 900 feet at the confluence with the North Fork of the Mokelumne River. The major tributaries are Forest Creek, which enters the Middle Fork about 2.5 miles east of Wilseyville, and Bear Creek, which flows into the Middle Fork about one mile east of Wilseyville. Schaads Reservoir (1,800 acre-foot capacity) partially regulates streamflow on the Middle Fork.

South Fork Drainage Basin. The South Fork flows about 24 miles from its headwaters in Stanislaus National Forest near elevation 7,000 feet between Summit Level Ridge and Bailey Ridge to its confluence with the North Fork. The elevation range within the South Fork sub-watershed varies from approximately 7,000 feet on the top of the ridge at the eastern border to about 1,200 feet at the confluence with the Middle Fork. Licking Fork is the major tributary and joins the South Fork about one mile southeast of Wilseyville or four miles upstream of its confluence with the Middle Fork.

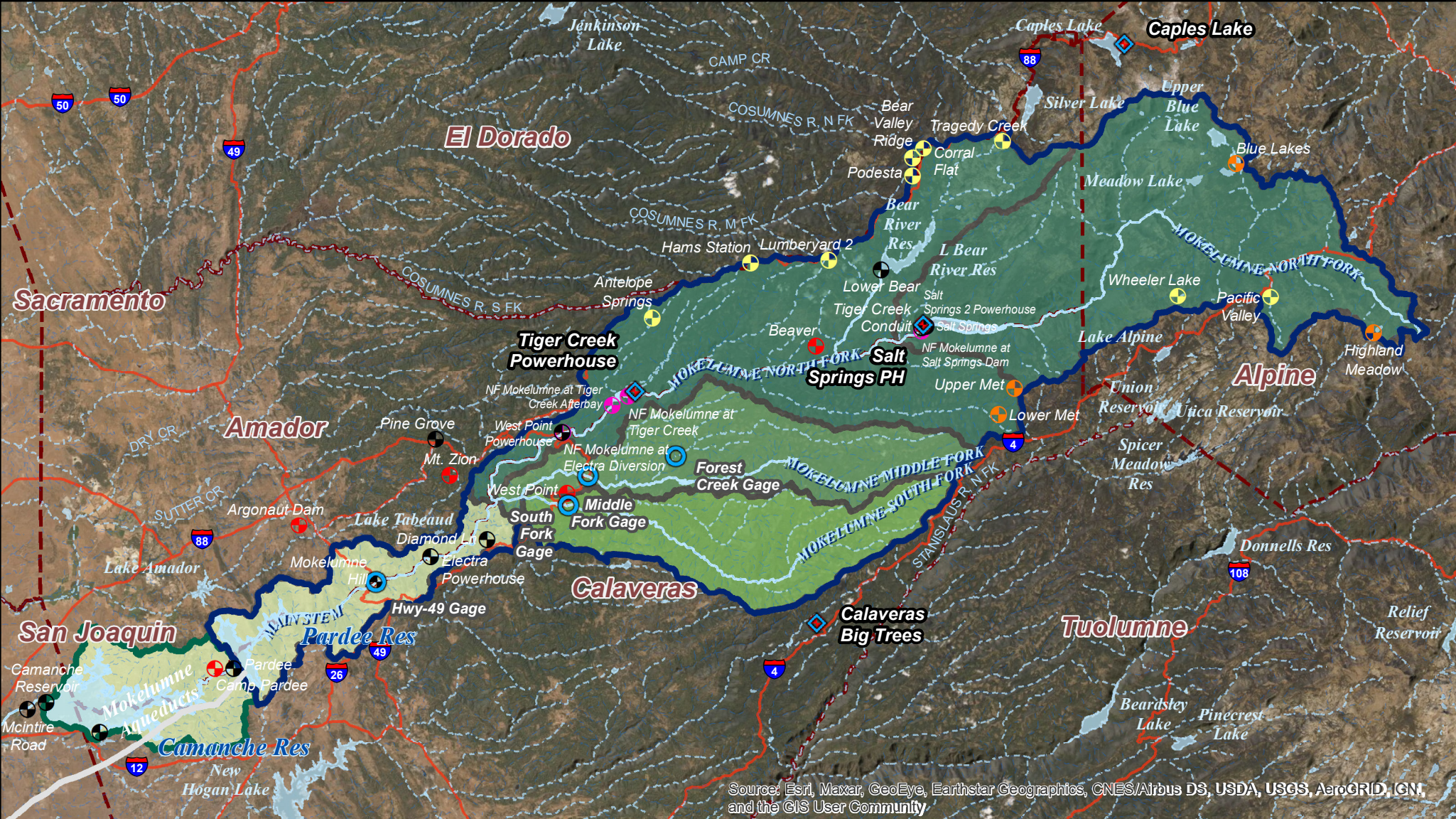
Main Stem Drainage Basin. The Main Stem of the Mokelumne River begins 17 miles upstream of Pardee Dam at the confluence of the North and South Forks. It flows southwest through the foothills in a narrow valley, passes PG&E's Electra Powerhouse, flows under Highway 49 near the community of Mokelumne Hill, and enters Pardee Reservoir about two miles downstream of the Highway 49 bridge. Elevations within the Main Stem sub-watershed range from 3,012 feet near Alabama Hill on the east border of the basin to 568 feet at Pardee Reservoir. There are no significant tributaries within the Main Stem sub-watershed. The only other inflows to Pardee Reservoir are from overland flow or ephemeral streams. Pardee Reservoir has a gross storage capacity of about 197,950 ac-ft at its maximum pool elevation of 568 feet.

Appendix 3-1 contains two river maps showing approximate river miles above the top of Pardee Reservoir.

Precipitation and Evaporation

Figure 3-3 shows the locations of important climate stations for the Upper Mokelumne River Watershed, including those that make up the 4-Station Average, indicative of rainfall in the watershed: Caples Lake, Salt Springs Powerhouse (PH), Tiger Creek PH, and Calaveras Big Trees. Figure 3-4 shows the 4-Station average total monthly total monthly precipitation from 2015 to 2019, along with the historical 1930 through 2019 monthly precipitation average.

Figure 3-3. Upper Mokelumne River Watershed - Climate and Gauging Stations



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- | | | |
|------------------------------|-------------------------------|------------------------|
| Mokelumne Watershed | Flow Gauging Station | Main Stem and Camanche |
| Camanche Watershed | Climate Station (Rain) | Middle Fork |
| Waterbody | Climate Station (Snow) | South Fork |
| Named Streams | Climate Station (Rain & Snow) | Lower North Fork |
| Rivers and Creeks | Other Station | Upper North Fork |
| County | Stream Gauges | |
| Weather Stations (4-Station) | | |

Data Sources:
Water Supply Engineering (2020)

CA Department of Water Resources
California Data Exchange Center
CDEC Gauging Stations
<http://stratus.water.ca.gov/staInfo.html>

30m National Elevation Dataset
U.S. Geological Survey &
EROS Data Center
March 2014

Watershed Boundary Dataset
U.S. Geological Survey &
U.S. Department of Agriculture
2013
<https://datagateway.nrcs.usda.gov/>

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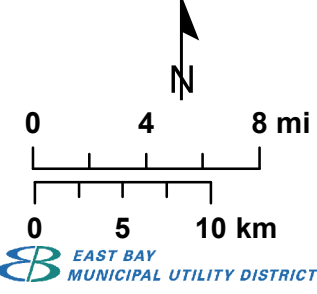
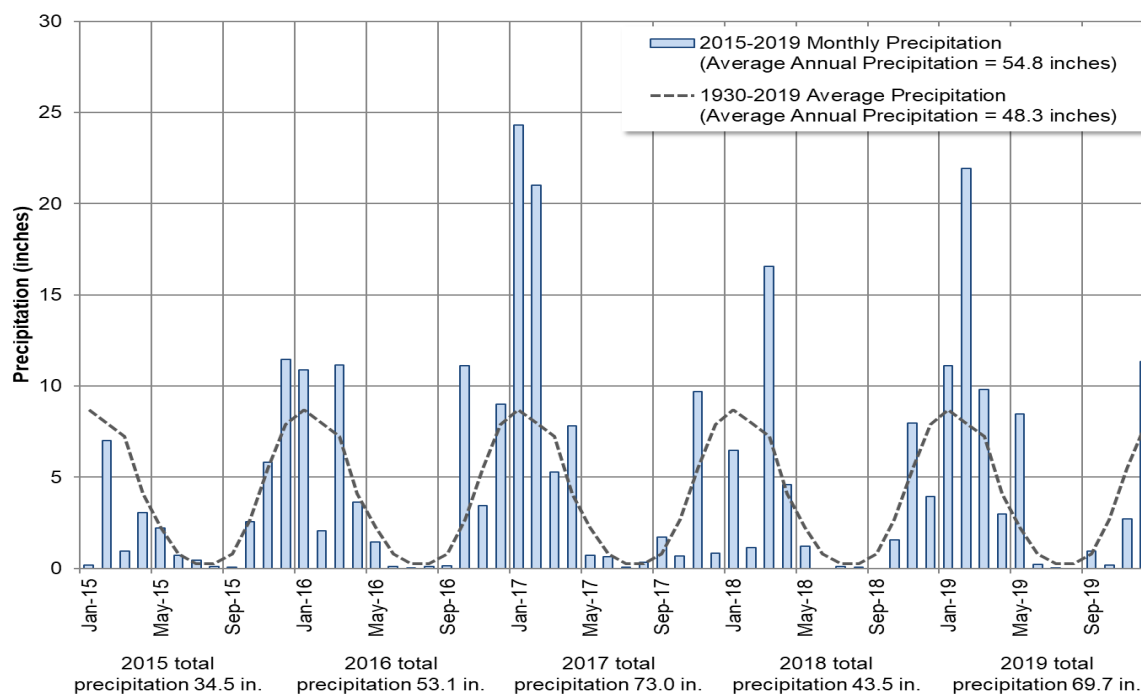


Figure 3-4. Upper Mokelumne Watershed 4-Stations Average Precipitation^a

a. Source: District's Water Supply Engineering Database, which may contain provisional data, and Annual Statistical Report.

The average annual precipitation during the 2015-2019 period was 54.8 inches, based on the Mokelumne Basin 4-Station average, higher than the historical (1930-2019) average of 48.3 inches. Precipitation was significantly higher than average in 2017 and 2019 (73.0 and 69.7 inches, respectively), and significantly lower than average in 2015 (34.5 inches).

Winter precipitation above 5,000 feet elevation usually occurs as snow, while at lower elevations precipitation occurs more commonly as rain or sleet. Most of the Middle Fork, South Fork, and Main Stem sub-basin area lies below 5,000 feet elevation. Cumulative seasonal snowfalls above 6,000 feet typically approach 400 inches, with compacted snow depths attaining 100 inches or more at densities varying from 35 to 50 percent water. However, warming temperature trends are expected to increase the snowline to higher elevations with more precipitation occurring as rain rather than snow.

Local Runoff and Diversions

Stream flow in the Mokelumne River is modified by upstream diversions and regulated by reservoir storage operations for hydroelectric power generation and water supply as discussed in Section 2. Figure 3-5 is a schematic depicting the diversions and storage of Mokelumne River water in the Upper Mokelumne River Watershed. Peak runoff in the Upper Mokelumne Watershed normally occurs during the spring snowmelt season from March through June and then tapers off during the summer to minimum flows in late summer or fall. Figures 3-6 and 3-7 depict flows along the Mokelumne River and its tributaries and are discussed below.

Figure 3-5. Mokelumne River Releases, Diversions, and Losses

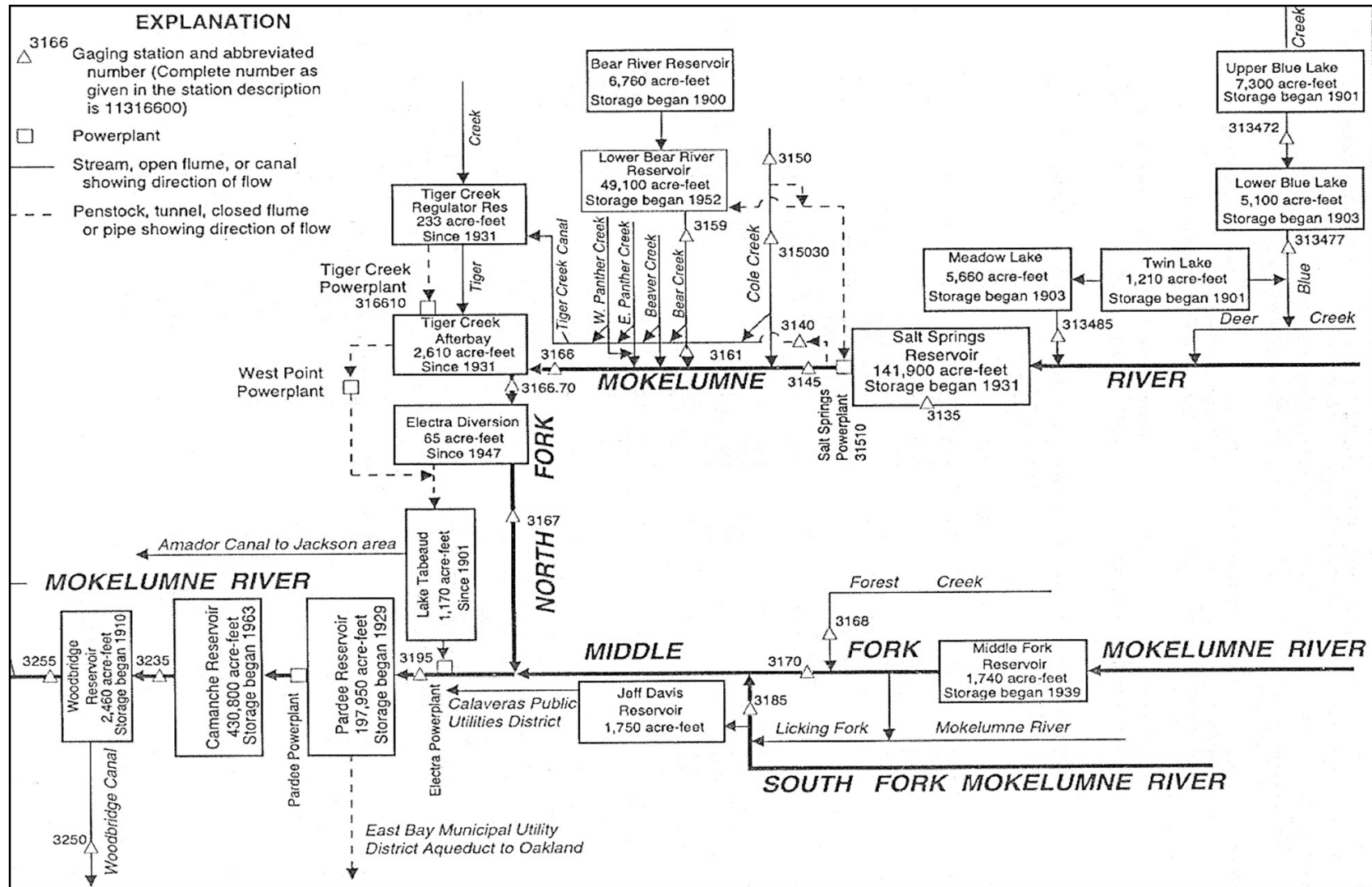
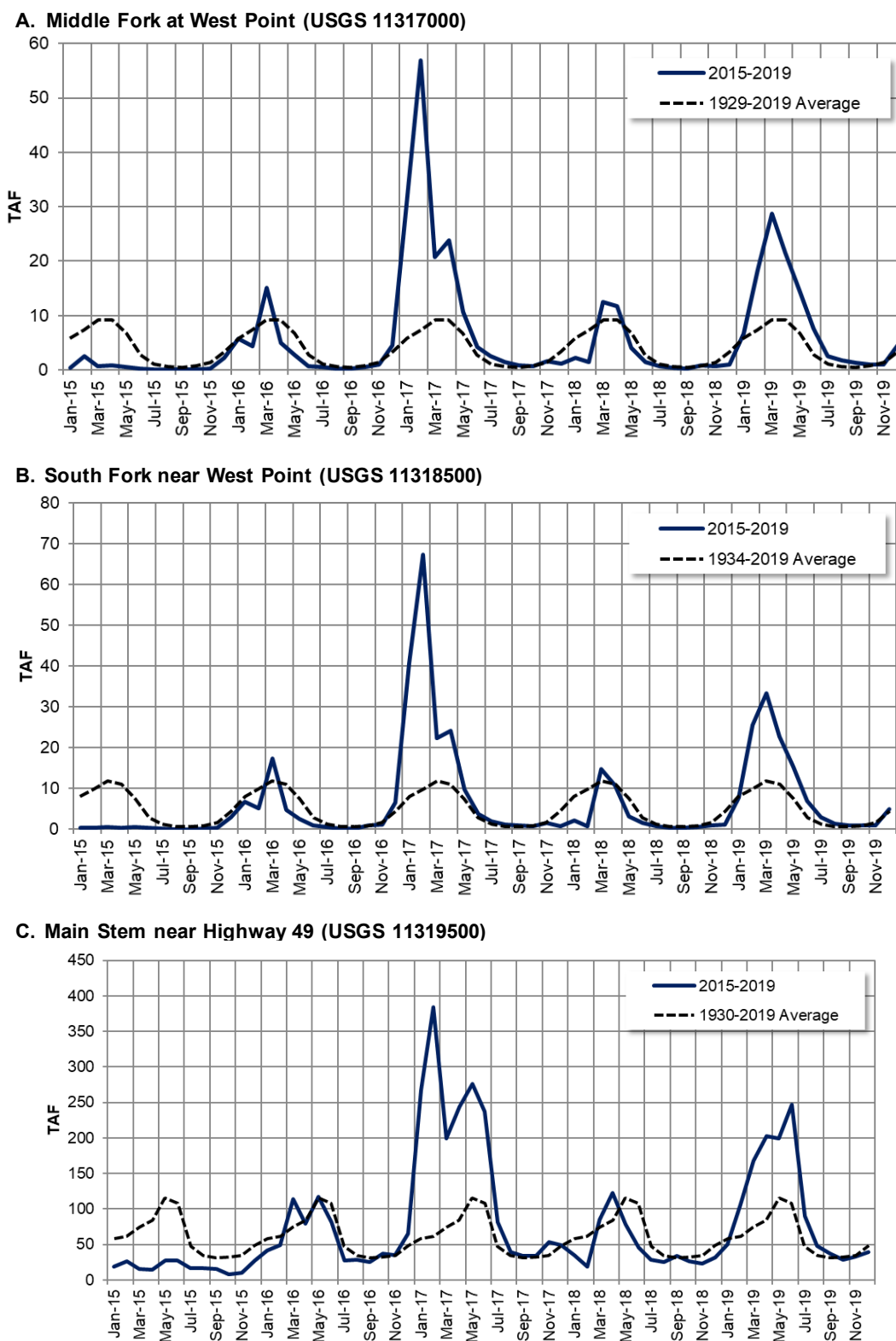


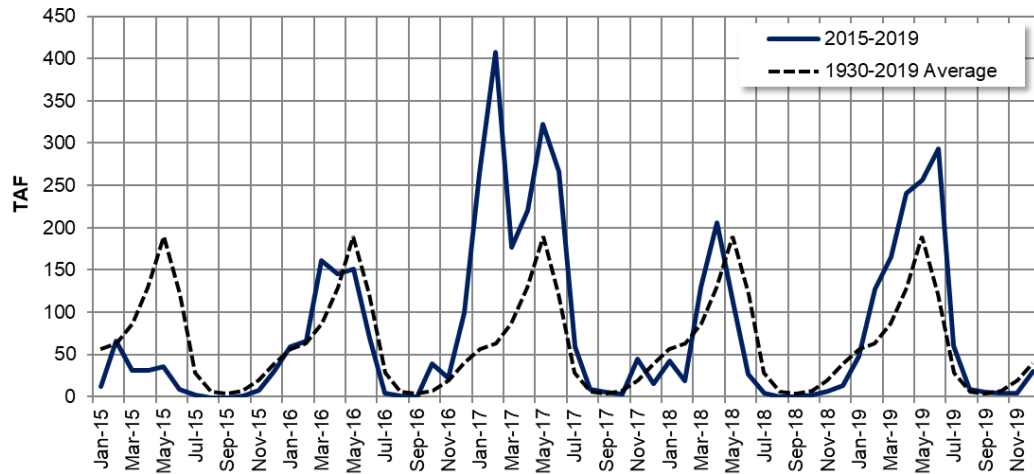
Figure 3-6. Mokelumne River Monthly Tributary Flows, This Update Period (2015 through 2019) and Average Monthly Historical (1930 through 2019)^a



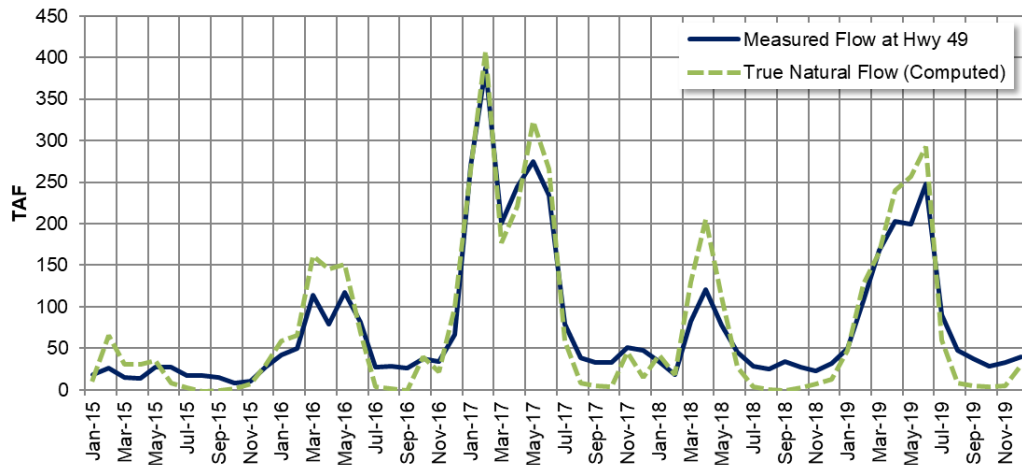
^a. Source: District's Water Supply Engineering Database, which may contain provisional data, and Annual Statistical Reports.

Figure 3-7. Mokelumne River, Main Stem Monthly True Natural Flows and Regulated Flows^a

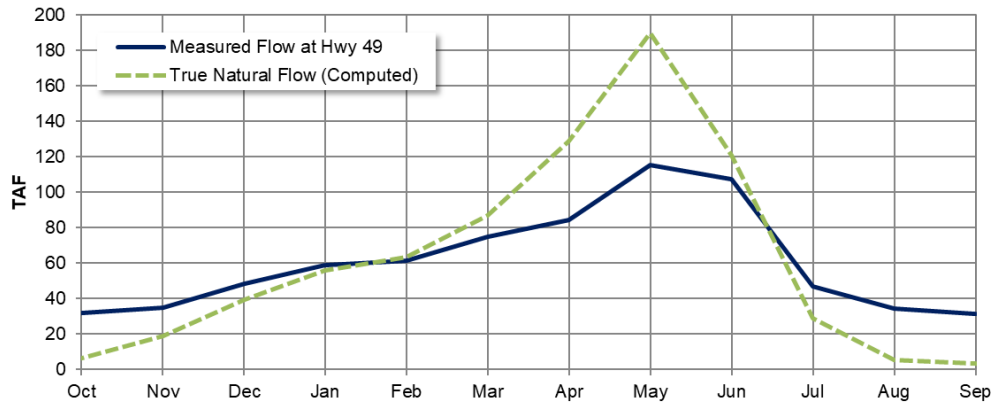
A. Unimpaired True Natural Flow (Computed), This Update Period (2015 through 2019) and Average Historical (1930 through 2019)



B. Measured Flow at Highway 49 (USGS 11319500) and True Natural Flow (Computed), This Update Period (2015 through 2019)



C. Historical Average Monthly Flows: Measured Flow at Highway 49 and True Natural Flow (Computed), Average Historical (1930 through 2019)



^a. Source: District's Water Supply Engineering Database, which may contain provisional data, and Annual Statistical Reports.

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North Fork Sub-Watershed: PG&E operates a network of storage reservoirs and diversion facilities on the North Fork. Water storage in the reservoirs tends to reduce and retard peak flows and raise minimum flows downstream. Flow rates in the lower portion of the North Fork sub-watershed are governed by release rates from PG&E's Salt Springs Reservoir. The largest flows occur during April, May, and June during a typical year, when the reservoirs are unable to contain snowmelt from the upper reaches of the sub-watershed. Minimum flow releases required by the Upper Mokelumne Project FERC license range from natural stream-flow (which is highly variable depending on the season) to 10 cubic feet per second (cfs). The Central Amador Water Project of Amador Water Agency draws from the rainfall and snowmelt from the North Fork Mokelumne River and Bear River stored in the PG&E's Tiger Creek Regulator Reservoir. Effects of the flow regulation on true natural flow is discussed more thoroughly in the Main-stem Sub-Watershed subsection below.

Middle Fork Sub-Watershed: Figure 3-6A depicts the monthly variation in discharge for the Middle Fork of the Mokelumne River at West Point (USGS Station 11317000). Flows from the upstream tributaries, Forest Creek and Bear Creek, are also included at this station. This figure shows the historical average flow over the past 89 years and monthly flow for the five year update period from January 2015 to December 2019. Monthly flows ranged from a minimum of 107 acre-feet in September 2015 to 57,000 acre-feet in February 2017. The highest monthly flows in the Middle Fork of the Mokelumne River typically occurred during the months of March through May.

Calaveras County Water District (CCWD) diverts water primarily through a gravity diversion on Bear Creek, approximately six miles above the confluence with the Middle Fork. To supplement its raw water supply, CCWD maintains a contract with Calaveras Public Utility District (CPUD) to purchase additional water from the Middle Fork through Schaads Reservoir. Schaads Reservoir (Middle Fork Reservoir), which is operated by CPUD is the only significant storage reservoir on the Middle Fork. Schaads Reservoir has a capacity of 1,740 acre-ft. It is located six miles upstream, of the West Point gaging station. Based on surface water records provided by the USGS, maximum output from the Schaads powerplant is 35 cfs. According to Tudor Engineering Company (September 1983), its effect on monthly flows in the Middle Fork is negligible.

South Fork Sub-Watershed: Figure 3-6B depicts the monthly variation in discharge for the South Fork Mokelumne River near West Point (USGS Station 11318500). This figure shows the historical average flow over the past 89 years and monthly flow for the five year update period from January 2015 to December 2019. Monthly flows ranged from a minimum of 14 acre-feet in September 2015 to a maximum of 67,000 acre-feet in February 2017. The highest monthly flows in the South Fork of the Mokelumne River typically occurred during the months of March through May.

CPUD diverts water at the diversion dam, located downstream of the confluence of the Licking Fork and South Fork of the Mokelumne River, to Jeff-Davis Reservoir. Jeff-Davis Reservoir has a storage capacity of 2,000 acre-feet (AF) and supplies the Jeff Davis Water Treatment Plant

Main Stem Sub-Watershed: Flows from all forks of the Mokelumne River reach the gauging station at Mokelumne Hill (USGS Station 11319500) before entering Pardee Reservoir. Figure 3-6C depicts monthly flows at Mokelumne Hill near Highway 49. This figure shows the historical average flow over the past 89 years and monthly flow for the five year update period from January 2015 to December 2019. For this update period, monthly flows ranged from a minimum of 4,300 acre-feet in January 2014 to a maximum of 388,000 acre-feet in February of 2017. The highest monthly flows in the Mokelumne River typically occurred during the months of April and May.

Flows into Pardee are regulated by upstream reservoirs and hydroelectric power plants. Figure 3-7A shows the true natural flows computed for the five-year update period and the monthly average true natural flows during the historical period (1930 to 2019). Figures 3-7B and 3-7C show a comparison of the annual variation of true natural flow with measured flow, for the update period and historically, respectively. The upstream diversions attenuate the maximum and minimum true natural flow fluctuations.

Both Amador Water Agency (AWA) and Jackson Valley Irrigation District (JVID) draw supply from reservoirs in the Main Stem. AWA diverts Mokelumne River water from Lake Tabeaud through the Amador Canal and from the Tiger Creek Afterbay. As discussed in Section 2, AWA is planning to phase out the Amador Canal as a raw water conveyance facility and is currently using it only to serve raw water to customers living along the canal. Since 2007, AWA's Amador Transmission Pipeline has connected Lake Tabeaud to Tanner Reservoir. Water supply for JVID is diverted to Lake Amador from Jackson Creek or from the Mokelumne River via a pipeline at the Jackson Creek Spillway Dam on the north arm of Pardee Reservoir. JVID treats water from Pardee Reservoir in the 175 gpm Lake Amador Resort Area (LARA) treatment plant.

Land Uses

The Upper Mokelumne River Watershed comprises approximately 370,000 acres (579 square miles). Based on the most recent county general plans, the vast majority of this upper watershed consists of open-space and forestland with large tracts of designated wilderness and small concentrations of residential development. There are only very small amounts of agriculture (mainly orchards and vineyards) and a few areas dedicated to recreational development. There are very few areas devoted to industrial or commercial use, mostly along Highway 26 near Mokelumne Hill and West Point. Table 3-1 summarizes the predominant land uses identified within Upper Mokelumne River Watershed. Figure 3-8 complements Table 3-1 by depicting the spatial distribution predominant land uses identified. Appendix 3-2 tabulates how general plan designations were consolidated into the categories shown in Table 3-1.

Most of the intensely developed areas within the Upper Mokelumne River Watershed are residential communities. As shown in Figure 3-8, the majority of these areas are located in the lower elevations of the sub-watershed areas of the Middle Fork, South Fork, and Main Stem of the Mokelumne River. Table 3-2 summarizes both historical and projected

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watershed populations by county for the decades from 2010 through 2060. Current growth projections vary around negative 0.3 percent per year over the next 5 years. The county-wide population growth rates may not be representative of growth within the Upper Mokelumne Watershed. Most of the faster-growing areas in Amador and Calaveras counties fall outside the watershed boundaries. Table 3-3 presents an estimate of the total population within the Upper Mokelumne River Watershed based on the 2010 Census GIS dataset overlaid on the watershed boundary. The total population in the watershed in 2010 was estimated at 8,647 persons living in 5,589 homes.

Table 3-1. Land Use in the Upper Mokelumne River Watershed^{a, b}

Land Use	Alpine (acres)	Amador (acres)	Calaveras (acres)	El Dorado (acres)	Mokelumne Watershed	
					(acres)	(percent)
Natural Resources	20,000	90,050	158,501	847	269,398	72.8%
Residential	0	1,616	1,781	0	3,397	0.9%
Commercial	0	8	479	0	487	0.1%
Industrial	0	14	47	0	61	0.0%
Mixed Use	0	171	115	0	286	0.1%
Recreation	2,000	4,298	25	0	6,323	1.7%
Wilderness	61,000	21,927	0	0	82,927	22.4%
Public Facility	0	22	628	0	650	0.2%
Mineral Resource	0	994	0	0	994	0.3%
Other	0	784	4,473	0	5,257	1.4%
Unspecified	0	360	0	0	360	0.1%
Total	83,413	120,244	166,050	847	370,141	100.0%

- a. Data was compiled from General Plan GIS data from Amador County (September 2020), Calaveras County (January 2019), and El Dorado County (estimated 2015). Alpine County data was generated from georeferenced land use raster data from the county's general plan PDF document (March 2017). Alpine County land use data is highly approximate; acreage is therefore rounded to the nearest thousands. Land use designations from the respective general plans were consolidated into the categories listed in Table 3-1. See Appendix 3-2 for relationships between general plan land use designations and land use categories in Table 3-1.
- b. GIS databases between agencies do not overlap perfectly. The total acreage in this table sums to 370,141 ac, which is 0.13% less than the EBMUD-defined area of the Upper Mokelumne Watershed (370,613 ac).

Table 3-2. Population Projections by Decade for Each County in the Watershed^a

County	Projected Population						
	2010	2015	2020	2030	2040	2050	2060
Alpine	1,175	1,154	1,117	1,060	958	823	764
Amador	37,682	36,385	38,531	40,160	40,651	41,419	43,691
Calaveras	45,542	44,907	44,289	42,608	39,186	35,688	34,122

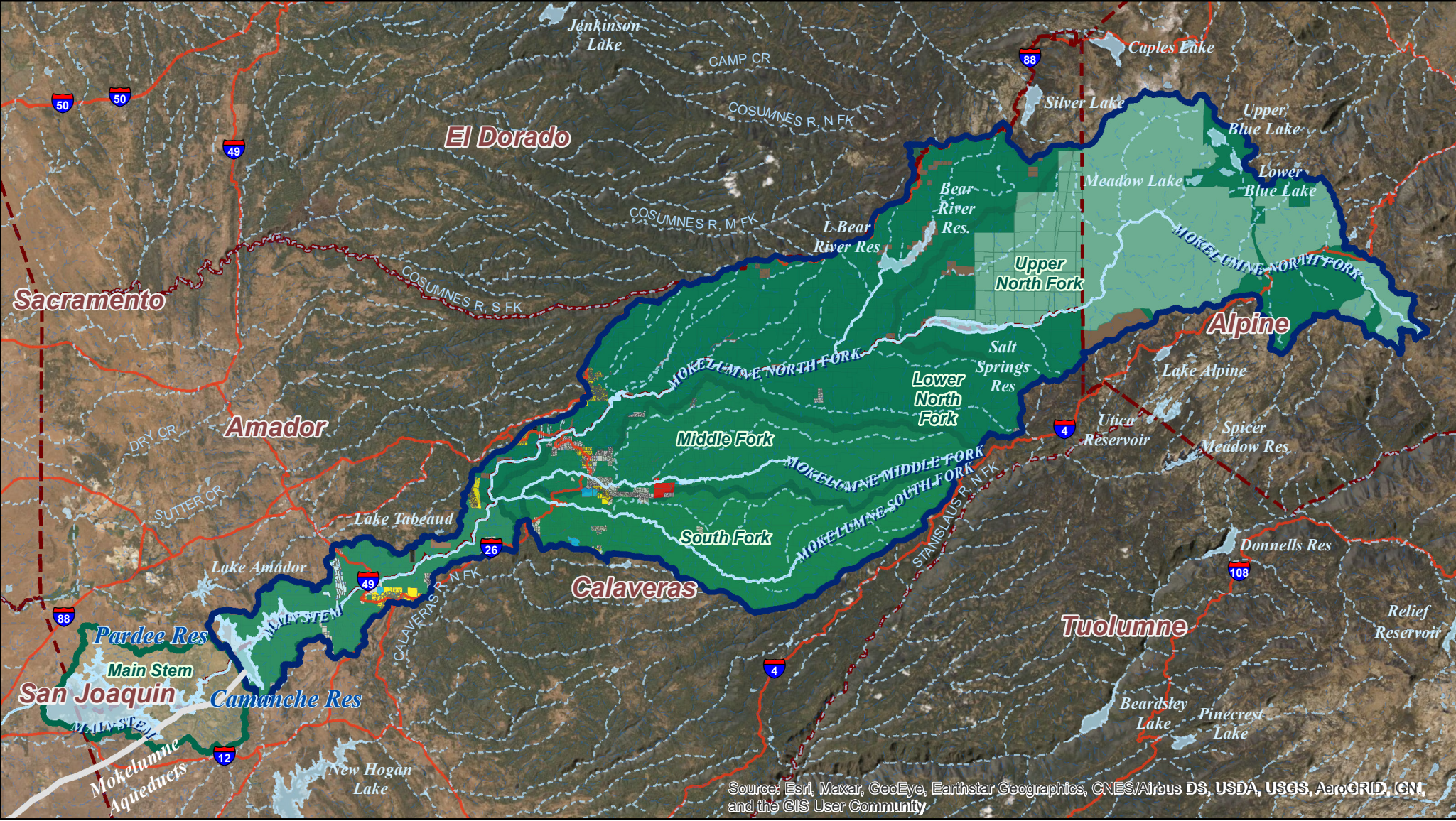
- a. Sources: Current Census data from California Department of Finance. Projections prepared by Demographic Research Unit, California Department of Finance, January 2020. <http://www.dof.ca.gov/Forecasting/Demographics/Projections/>

Table 3-3. Estimated Populations and Number of Homes within the Upper Mokelumne River Watershed in 2010^a

Sub-watershed	Population	Number of Homes
North Fork	2,756	2,286
Middle Fork	1,865	1,146
South Fork	1,061	688
Main Stem	2,965	1,469
Total	8,647	5,589

- a. Source: 2010 Census data and GIS analysis.

Figure 3-8. Upper Mokelumne River Watershed - County General Plan Land Use Designations



Legend

- | | | |
|---------------------|-------------------|------------------|
| Mokelumne Watershed | Natural Resources | Public Facility |
| Camanche Watershed | Residential | Mineral Resource |
| Waterbody | Commercial | Wilderness |
| Named Streams | Industrial | Other |
| Rivers and Creeks | Mixed Use | Unspecified |
| County | Recreation | |

Data sources:
Alpine County General Plan
III Land Use Element
February 3, 2009

Amador County General Plan 2016
Figure LU-1 Land Use Diagram

Amador County Planning Department
Updated GP designation shapefile (email)
September 10, 2020
gisviewer.amadorgov.org/gpw/Viewer.aspx
www.amadorgov.org/departments/information-technology/gis/gis-data

Calaveras County General Plan 2019
Section C Land Use
July 31, 2019

Calaveras County Open Data Portal
Calaveras County Open Data Landuse (GIS)
opendata-calaveras-gis.opendata.arcgis.com
November 12, 2019

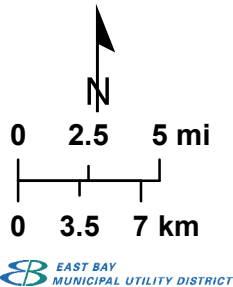
El Dorado General Plan 2004
Figure LU-1: Land Use Diagram
Parcel Base Map Currency:
September 28, 2015

El Dorado Parcel Data
see-eldorado.edcgov.us/ugotnet

EBMUD GIS Database
30m National Elevation Dataset
U.S. Geological Survey &
EROS Data Center
March 2014

Watershed Boundary Dataset
U.S. Geological Survey &
U.S. Department of Agriculture
2013
<https://datagateway.nrcs.usda.gov/>

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Watershed Description\Graphics
Last Updated: Oct. 2020



Land Ownership and Jurisdictional Authority

Including the District, six major institutional landowners and several major private landowners have been identified in the Upper Mokelumne River Watershed. The major landowners are listed in Table 3-4. Ownership is divided approximately as follows: Sierra Pacific Land & Timber Company (SPI) - 23 percent, U.S. Forest Service (USFS) - 21 percent, Federal, but not classified under USFS - 8 percent, Bureau of Land Management (BLM) - 6 percent, the District - 3 percent, Pacific Gas & Electric Company (PG&E) - 2 percent, and others - 37 percent.

Table 3-4. Major Landowners in the Upper Mokelumne River Watershed ^{a, b}

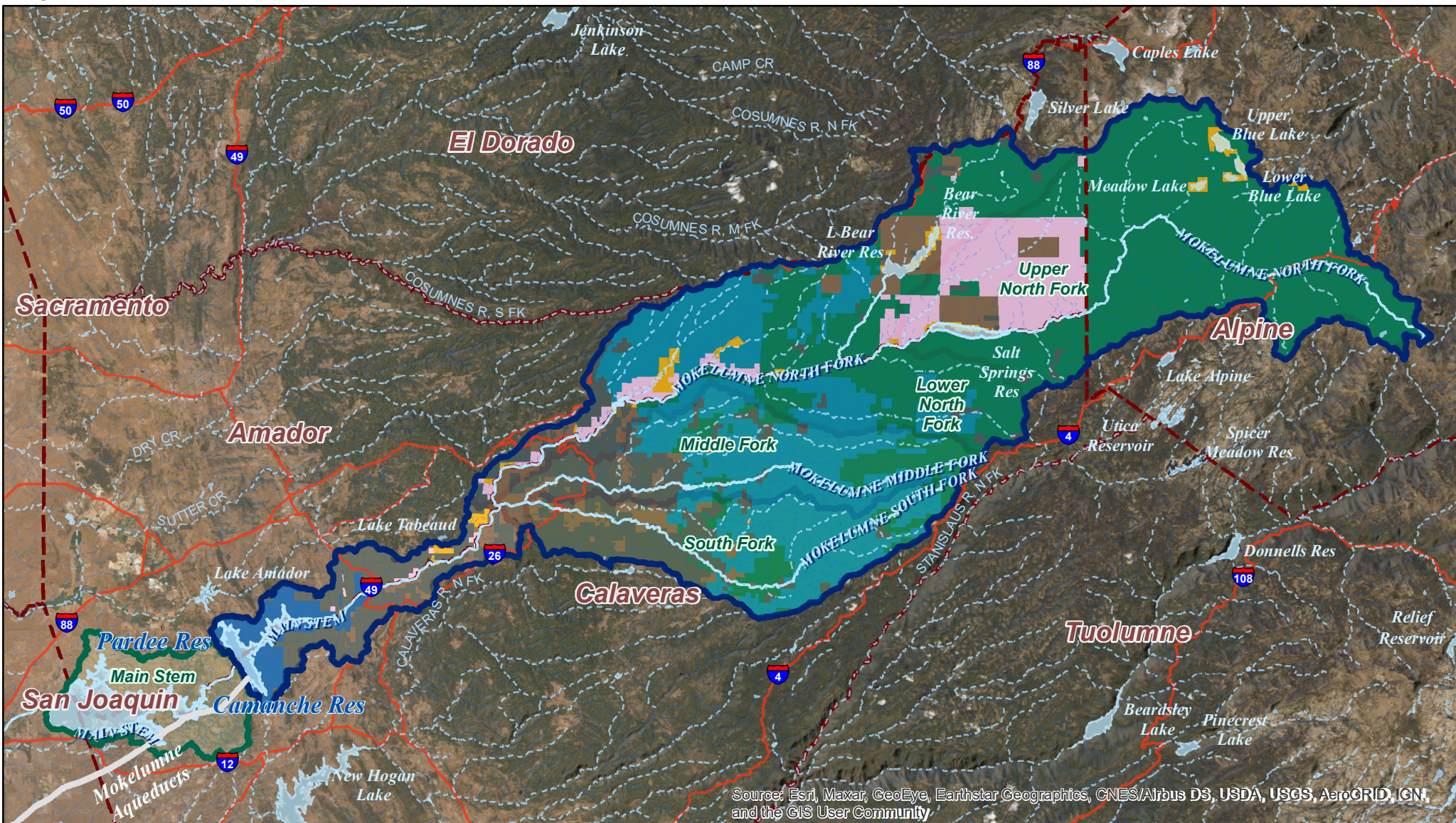
Sub-Basin	BLM	EBMUD	PG&E	SPI	USFS	Other - Federal	Other	Total
Main Stem	2,104	10,973	881	0	0	438	17,152	31,548
North Fork (Lower)	9,414	0	2,879	34,870	48,578	7,063	9,889	112,694
North Fork (Upper)	3,904	0	2,679	0	16,450	20,932	82,274	126,240
North Fork	13,319	0	5,558	34,870	65,029	27,995	92,163	238,934
Middle Fork	3,437	0	0	26,225	9,075	0	11,446	50,183
South Fork	4,300	0	0	24,268	6,856	0	14,671	50,095
Total Acres	23,160	10,973	6,439	85,363	80,960	28,433	135,431	370,759
% of Total Upper Watershed	6.2%	3.0%	1.7%	23.0%	21.8%	7.7%	36.5%	100.0%

- a.* Source: GIS Analysis of Amador County parcel data (Feb 2020), Calaveras County parcel data (Feb 2020), El Dorado Parcel Data (estimated 2015), U.S. Geological Survey Gap Analysis Program (2018), Alpine County ownership data (accessed 2020), U.S. Geological Survey and Natural Resources Conservation Service Watershed Boundary Dataset (2013), and EBMUD GIS data. Data retrieved from internal geodatabases or United States Department of Agriculture Geospatial Data Gateway (accessed 2020).
- b.* GIS databases between agencies do not overlap perfectly. The total acreage in this table sums to 370,759 ac, which is 0.04% greater than the EBMUD-defined area of the Upper Mokelumne Watershed (370,613 ac).

Figure 3-9 shows land ownership in portions of Alpine County, Amador County, and Calaveras County that fall within the boundaries of the Upper Mokelumne Watershed. Note that SPI is one of the largest lumber producers in the United States, and that they own a very large band of mid-elevation land encompassing much of the Middle and South Fork watershed land. Figure 3-10 shows forest administrative boundaries within and near the Upper Mokelumne Watershed, primarily the Eldorado and Stanislaus National Forests in the upper elevations in the eastern watershed.

There are at least 38 private landowners within the Upper Mokelumne River Watershed with more than 160-acre holdings. In addition to these landowners, there are three counties (Alpine, Amador, and Calaveras) and four utilities (AWA, CPUD, CCWD, and JVID) with major jurisdictional authority. Jurisdictional authority is important to the District in managing watershed lands, particularly with the lands which are not owned by the District. Land use controls for water quality protection are an important management technique and are discussed in Section 6.

Figure 3-9. Upper Mokelumne River Watershed - Land Ownership



Legend

- | | | | |
|---|---------------------|---|---------------------------|
|  | Mokelumne Watershed |  | Bureau of Land Management |
|  | Camanche Watershed |  | EBMUD |
|  | Waterbody |  | Pacific Gas and Electric |
|  | Named Streams |  | Sierra Pacific Industries |
|  | Rivers and Creeks |  | US Forest Service |
|  | County |  | Other - Federal |
| | |  | Other |

Data sources:
Alpine Ownership Data
Landvision

Amador County Parcel Data
EBMUD GIS Database
Digital Map Products, Inc
Published February 2020

Calaveras County Parcel Data
EBMUD GIS Database
Digital Map Products, Inc
Published February 2020

California_Land_Ownership
U.S. Geological Survey &
U.S. Department of Agriculture
2018

El Dorado Parcel Data
see-eldorado.edcgov.us/ugotnet
Estimated 2015

EBMUD GIS Database
30m National Elevation Dataset
U.S. Geological Survey &
EROS Data Center
March 2014

Watershed Boundary Dataset
U.S. Geological Survey &
U.S. Department of Agriculture
2013
<https://datagateway.nrcs.usda.gov/>

File Location:
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Watershed Description\Graphics
Last Updated: Oct. 2020

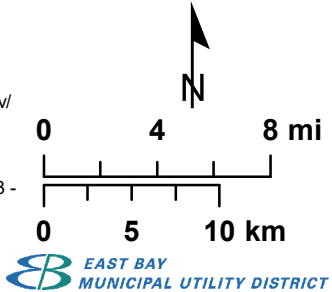
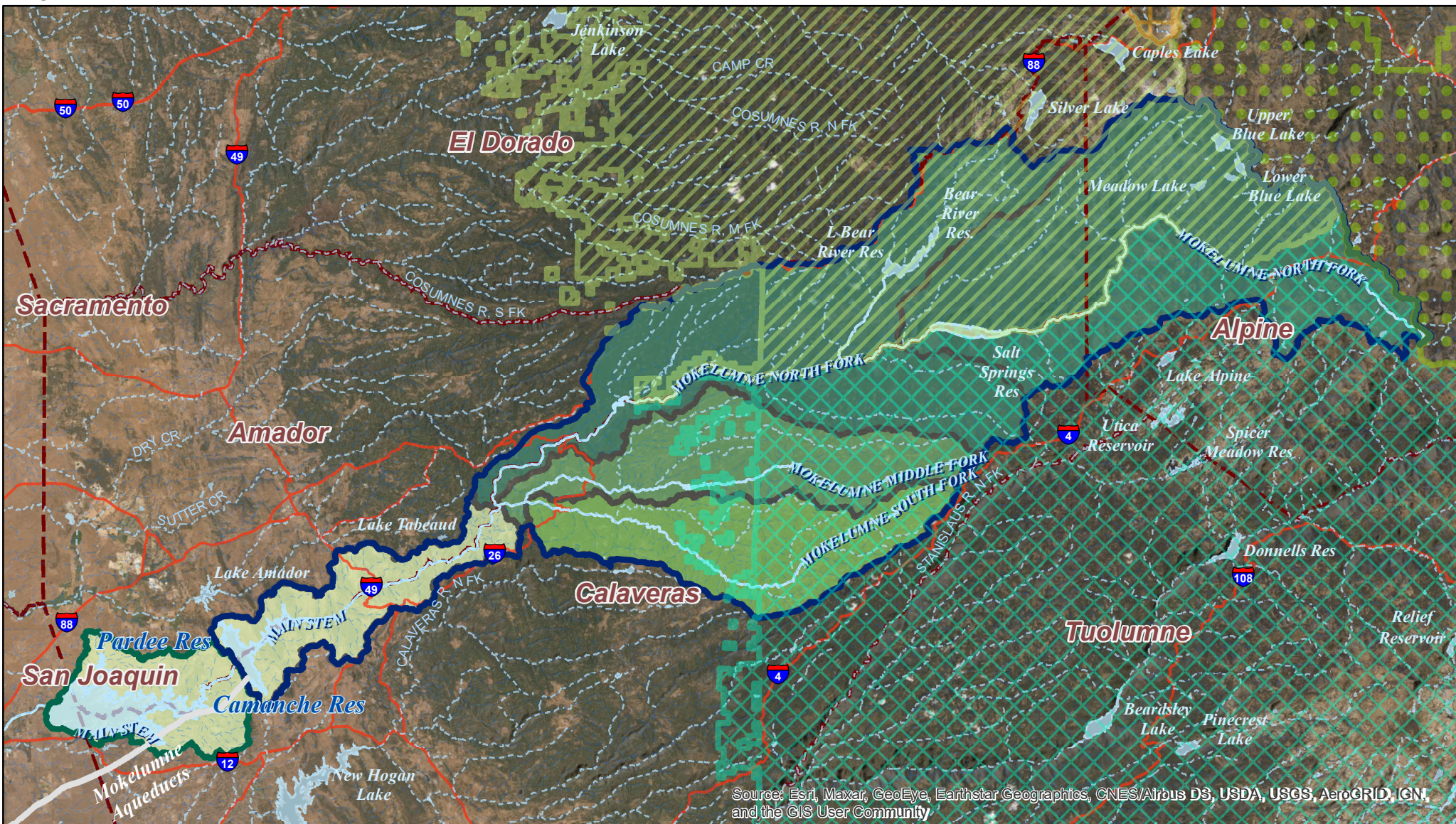


Figure 3-10. Upper Mokelumne River Watershed - Forest Administrative Boundaries



Legend

Forest

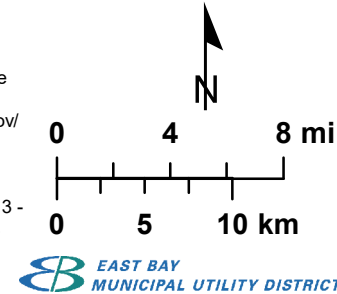
-  Eldorado National Forest
  Camanche Watershed
  Middle Fork
-  Humboldt-Toiyabe National Forest
  Waterbody
  South Fork
-  Lake Tahoe Basin Management Unit
  Named Streams
  Lower North Fork
-  Stanislaus National Forest
  Rivers and Creeks
  Upper North Fork
-  County

Data Source:
CA Department of Water Resources
California Data Exchange Center
CDEC Gauging Stations
<http://stratus.water.ca.gov/staInfo.html>

EBMUD GIS Database
30m National Elevation Dataset
U.S. Geological Survey &
EROS Data Center
March 2014

Watershed Boundary Dataset
U.S. Geological Survey &
U.S. Department of Agriculture
2013
<https://datagateway.nrcs.usda.gov/>

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Watershed Description\Graphics
Last Updated: Oct. 2020



Natural Resources of the Camanche Watershed

Camanche Watershed (subwatershed, 180400120803) is composed of the lands above Camanche Dam and below Pardee Dam that drain toward Camanche Reservoir. This section includes descriptions of the Camanche Watershed geology, soils, vegetation, wildlife, hydrology, general land use, ownership and jurisdictions.

Location

The Camanche Watershed is approximately 43 square miles, draining lands to the north and south of the lower Mokelumne River and immediately to the west of Pardee Reservoir. It is bounded on the west by Camanche Dam.

Geology and Soils

The topography of the watershed varies from the gently sloping plain of the eastern San Joaquin Valley to the moderately rolling hills and ridges of the western-most Sierra Nevada foothills. Elevations range from 235 feet above Mean Sea Level (MSL) to about 700 feet above MSL on the ridge-crests adjacent to Pardee Dam. The most noticeable outcroppings are comprised of Mehrten Formation lahar deposits. This formation generally overlies older sediments. Mehrten Formation generally consists of an upper, soft volcanoclastic layer with interbedded sediments; middle, resistant volcanoclastic unit and a lower unit of light-colored ashly tuff.

Major soil groups in the watershed include well-drained stony clays to stony silt loams; well-drained gravelly to cobbly loams; well-drained clays occupying moderate slopes; relatively young overlying soil deposits consisting of well-developed alluvia with resistant hardpans; and unconsolidated to slightly-consolidated alluvia. Small, valley-side deposits consist of alluvial fans, landslides, and very recent in-channel deposits. All exposed sedimentary rocks and soils are subject to erosion and transport into the reservoir, largely as a function of slope. The presence of vegetation is a major factor in the prevention of erosion. Local sediments are the primary source of inorganic turbidity.

Vegetation and Wildlife

The Camanche watershed vegetation can be classified primarily as blue oak woodland and annual grassland. Blue oak woodland is dominated by blue oaks, commonly forming open savanna-like stands on dry ridges and gentle slopes. Shrubs may be present but are rarely extensive, often occurring on rock outcrops. Associated shrub species include poison oak, California coffeeberry, buckbrush, redberry, California buckeye, and manzanita. Typical understory is composed of annual grassland vegetation such as brome grass, wild oats, foxtail, filaree, fiddleneck and other non-native annuals. Blue oak woodland usually intergrades with annual grasslands or valley oak woodlands at lower elevations and blue oak-grey pine woodlands at higher elevations.

Section 3. Watershed Description

Annual grasslands are dominated by introduced annual grasses, including wild oats, ripgut grass, foxtail chess, wild barley, and foxtail fescue. Common forbs include broadleaf filaree, redstem filaree, turkey mullein, clover, bur clover, popcorn flower and California poppy.

Blue oak woodlands and annual grasslands in the western Sierra Nevada support numerous species of amphibians, reptiles, birds and mammals. The Camanche watershed provides habitat for about 303 species of wildlife, including 176 bird species, 67 mammal species, 26 fish species, 22 reptile species and 12 amphibian species. The area potentially supports 37 species classified as special status species – 3 invertebrates, 1 fish, 6 amphibians, 2 reptiles, 21 birds and 4 mammals. Those special status species listed as endangered and/or threatened include the vernal pool fairy shrimp, vernal pool tadpole shrimp, valley elderberry longhorn beetle, hardhead, California red-legged frog, California tiger salamander, bald eagle, Swainson's hawk, and bank swallow.

Drainage Basins

The hydrologic drainage pattern of Camanche Watershed was shown in Figure 3-1. All local streams, except Mokelumne, are ephemeral, and the only named streams in clockwise order from Camanche Dam are Rabbit Creek and Camanche Creek. Unnamed streams occupy China Gulch, a draw that passes through the community of Campo Seco, and Chile Camp Gulch.

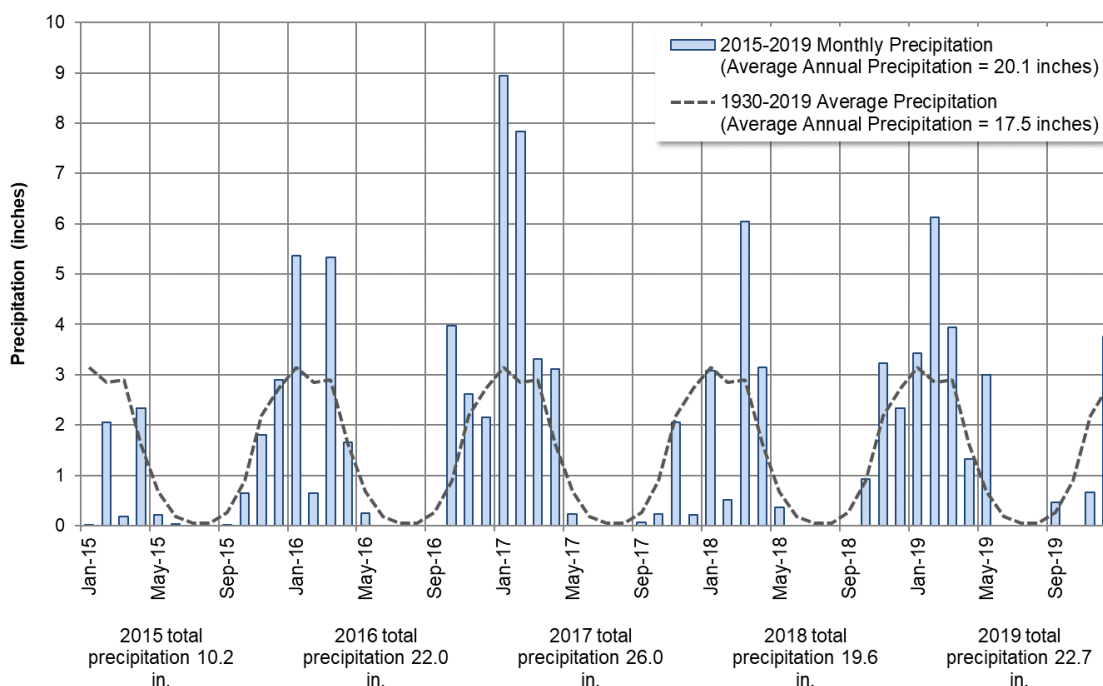
Precipitation and Evaporation

The District collects monthly precipitation (rainfall) and evaporation data at the District's Camanche Reservoir Weather Station. Prior to July 2017, the District collected rainfall and evaporation data at the Camanche North Weather Station. Average monthly rainfall and temperatures are shown on Figure 3-11. Almost ninety percent of the precipitation occurs as rainfall during the months of November through April. Snowfall is extremely rare in the Camanche Watershed.

Local Runoff and Diversions

As previously mentioned, the local streams are ephemeral and therefore, do not carry flows during most of the year. High flows occur only during periods of significant runoff produced by major frontal storms. Total annual runoff volumes are relatively small and are not individually quantified; only aggregate volumes are estimated for the watershed. Based on studies of similar intermittent foothill streams, which are proximate geographically, instantaneous peak flows are expected to be of relatively short duration and approximately two orders of magnitude larger than their mean flows.

Figure 3-11. Camanche Precipitation



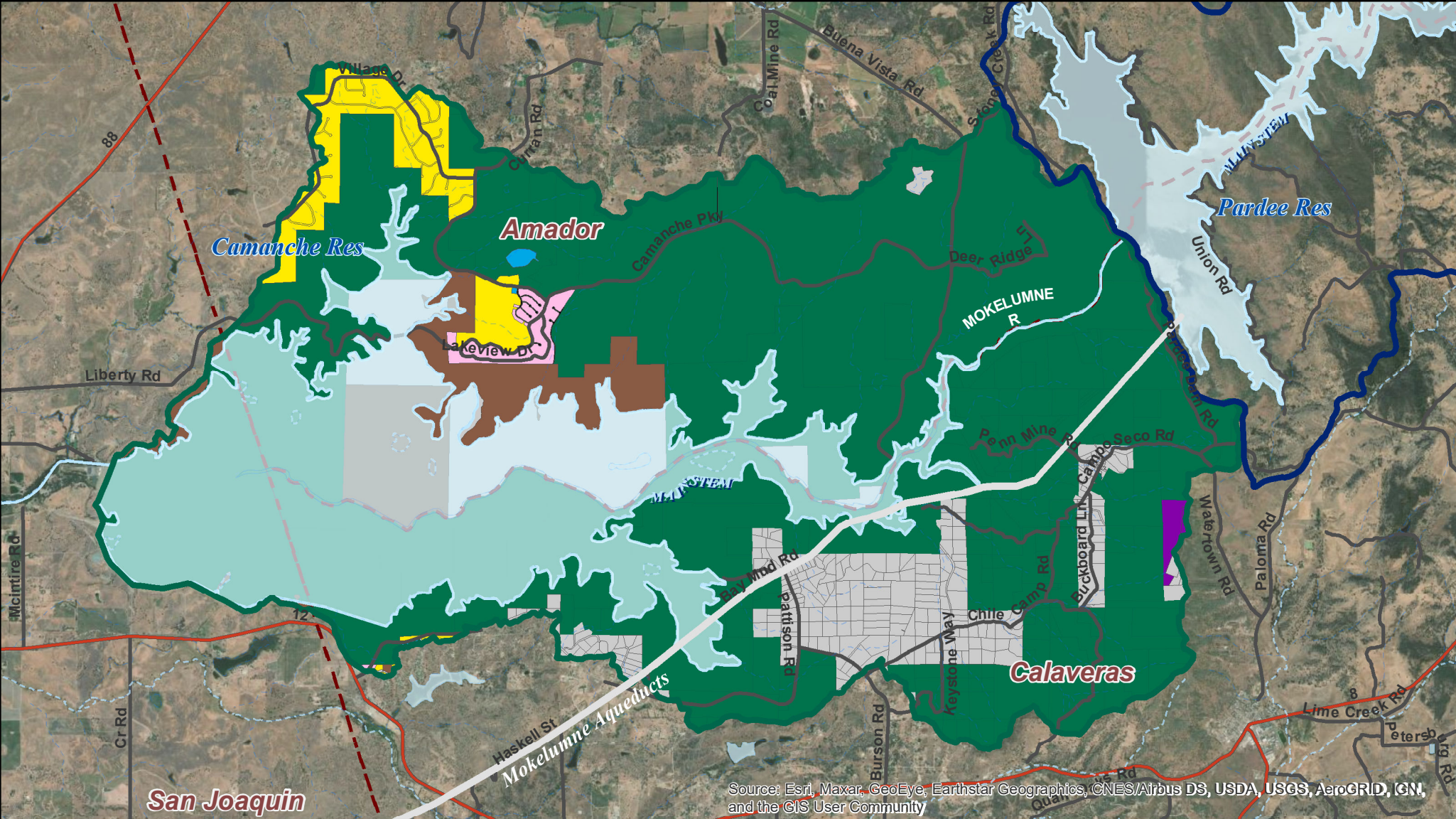
No storage reservoirs or natural impoundments other than Camanche Reservoir are present in the watershed except in the northeast corner of the basin. Ten small but permanent ponds and impoundments and at least one ephemeral pond are present in this quadrant. Some of these are connected to the natural drainage courses and some are confined to natural or quarried depressions. Most of these depressions appear to be the products of historical mining and quarrying activities.

Land Uses

Camanche Reservoir comprises the majority land use within Camanche Watershed. The remaining area is comprised of open-space, agricultural areas and localized urban areas adjacent to the District's recreational facilities. The major transportation corridors include Highway 12 and the secondary roads leading to CANS and CASS Recreation Areas. Table 3-5 summarizes available land use information from county general plan data within the Camanche Watershed boundaries. Figure 3-12 shows the land use designations consolidated from county general plans.

The Camanche Watershed is located at the nexus of three block groups (Federal Information Processing Series (FIPS) codes: 060050003042, 060090002102, and 060770047032). However, the intersection of 060770047032 and the watershed is almost entirely comprised of Camanche Reservoir. Therefore, only populations of the remaining block groups represent meaningful population metrics for the watershed, which totaled 4,417 based on the 2010 census. Note that portions of these block groups lie outside of the watershed, so 4,417 is an overestimate of the population in the watershed.

Figure 3-12. Camanche Watershed - County General Plan Land Use Designations



Legend

Mokelumne Watershed	Land Use	Recreation
Camanche Watershed	Natural Resources	Public Facility
Waterbody	Residential	Mineral Resource
Named Streams	Commercial	Wilderness
Rivers and Creeks	Industrial	Other
County	Mixed Use	Unspecified
Streets		

Data sources:
 Amador County Parcel Data
 EBMUD GIS Database
 Digital Map Products, Inc
 Published February 2020

Amador County Planning Department
 General Plan shapefile (email)
 Upload date: March 19, 2012
www.amadorgov.org/departments/information-technology/gis/gis-data

Calaveras County Parcel Data
 EBMUD GIS Database
 Digital Map Products, Inc
 Published February 2020

San Joaquin Ownership Data
 Landvision (accessed Oct 2020)

30m National Elevation Dataset
 U.S. Geological Survey &
 EROS Data Center
 March 2014

EBMUD GIS Database
 Watershed Boundary Dataset
 U.S. Geological Survey &
 U.S. Department of Agriculture
 2013
<https://datagateway.nrcs.usda.gov/>

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 Watershed Description\Graphics
 Last Updated: Oct. 2020

0 0.75 1.5 mi
 0 0.5 1 2 km

EAST BAY MUNICIPAL UTILITY DISTRICT

Section 3. Watershed Description

Table 3-5. Land Use in the Camanche Watershed ^{a, b}

Land Use	Amador (acres)	Calaveras (acres)	San Joaquin (acres)	Camanche Watershed	
				(acres)	(percent)
Natural Resources	9,642	10,010	1,635	21,287	76.7%
Residential	961	19	0	980	3.5%
Commercial	0	0	0	0	0.0%
Industrial	0	76	0	76	0.3%
Mixed Use	181	4	0	185	0.7%
Recreation	1,523	4	95	1,622	5.8%
Wilderness	0	0	0	0	0.0%
Public Facility	25	5	0	29	0.1%
Mineral Resource	0	0	0	0	0.0%
Other	1,451	2,045	0	3,496	12.6%
Unspecified	86	0	0	86	0.3%
Total	13,868	12,163	1,730	27,761	100.0%

a. Source: Data was compiled from General Plan GIS data from Amador County (March 2012) and Calaveras County (January 2019), as well as parcel data for San Joaquin County (accessed October 2020). Land use designations from the respective general plans were consolidated into the categories listed in Table 3-5. For a table showing the relationship between general plan land use designations that fall and land use categories in Table 3-1, refer to Appendix 3-2.

b. GIS databases between agencies do not overlap perfectly. The total acreage in this table sums to 27,761 ac, which is 0.05% less than the EBMUD-defined area of Camanche Watershed (27,776 ac).

Land Ownership and Jurisdictional Authority

Including Camanche Reservoir and CANS and South Shore Recreation Areas, the District owns approximately 55 percent of the lands within the Camanche Watershed. The majority of the remaining land is privately owned. A small portion is owned by BLM. The watershed basin encompasses portions of three counties – Amador, Calaveras and San Joaquin. Table 3-6 summarizes available ownership information from parcel data in the Camanche Watershed. Figure 3-13 shows land ownership within the Camanche Watershed.

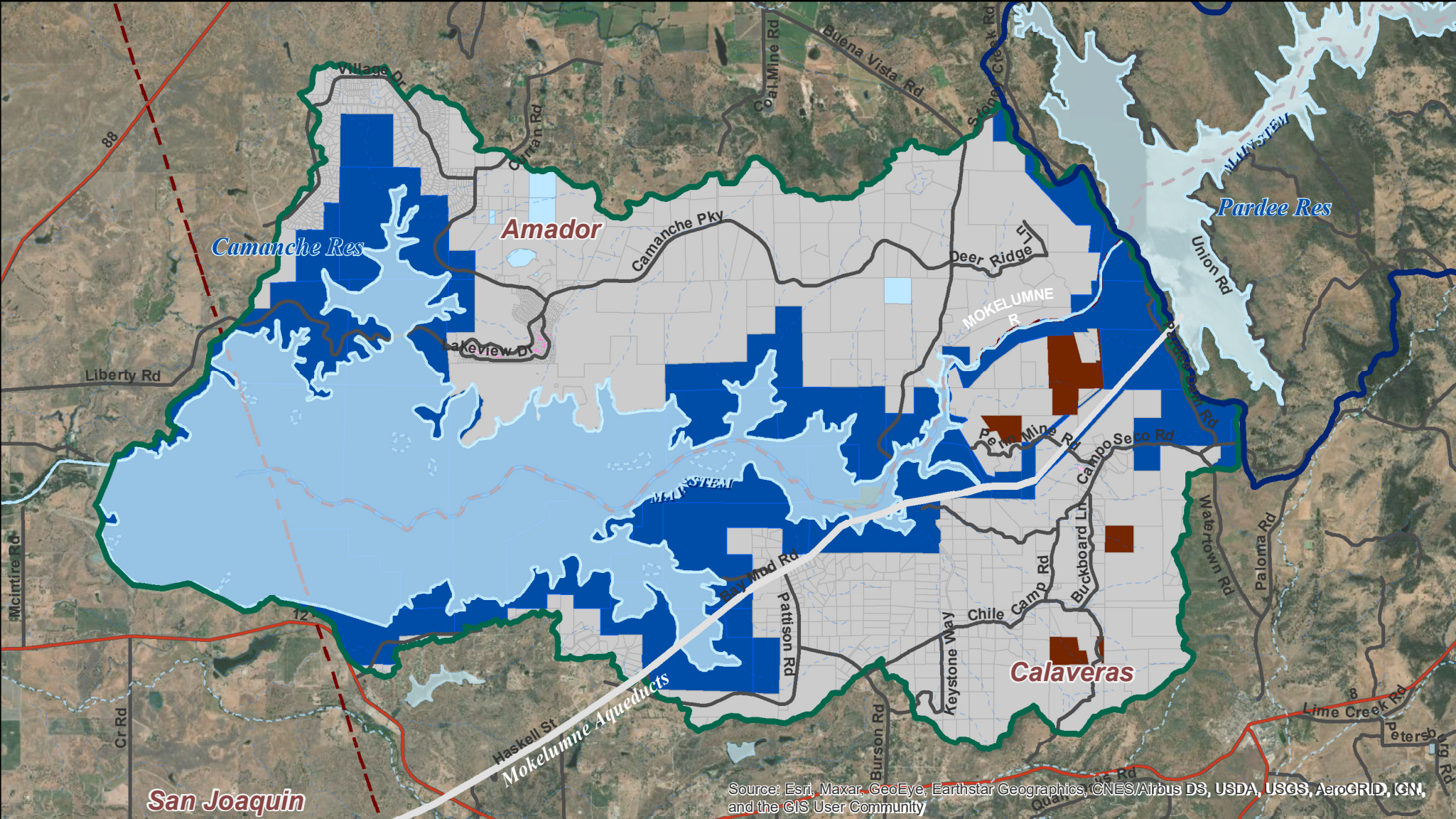
Table 3-6. Land Ownership in the Camanche Watershed ^{a, b}

County	BLM	EBMUD	CCWD	Calaveras County	Amador County	AWA	JVID	Other	Total
Amador County	0	7,532	0	0	13	104	45	6,506	14,200
Calaveras County	315	5,939	5	2	0	0	0	5,903	12,163
San Joaquin County	0	1,756	0	0	0	0	0	38	1,795
Total Acres	315	15,227	5	2	13	104	45	12,447	28,158
% of Total Upper Watershed	1.1%	54.1%	< 0.1 %	< 0.1 %	< 0.1 %	0.4%	0.2%	44.2%	100.0%

a. Source: GIS Analysis of Amador County parcel data (Feb 2020), Calaveras County parcel data (Feb 2020), San Joaquin County (accessed Oct 2020), U.S. Geological Survey Gap Analysis Project (2018), U.S Geological Survey and Natural Resources Conservation Service Watershed Boundary Dataset (2013), and EBMUD GIS data. Data retrieved from internal geodatabases and United States Department of Agriculture Geospatial Data Gateway.

b. GIS databases between agencies do not overlap perfectly. The total acreage in this table sums to 28,158 ac, which is 1.4% greater than the EBMUD-defined area of Camanche Watershed (27,776 ac).

Figure 3-13. Camanche Watershed - Land Ownership



Legend

	Mokelumne Watershed	Land Ownership	
	Camanche Watershed		Other
	Waterbody		EBMUD
	Named Streams		Other Water Agency
	Rivers and Creeks		County
	County		Bureau of Land Management
	Streets		

Data sources:

Amador County Parcel Data
EBMUD GIS Database
Digital Map Products, Inc
Published February 2020

Calaveras County Parcel Data
EBMUD GIS Database
Digital Map Products, Inc
Published February 2020

San Joaquin Ownership Data
Landvision (accessed Oct 2020)

30m National Elevation Dataset
U.S. Geological Survey &
EROS Data Center
March 2014

EBMUD GIS Database

Watershed Boundary Dataset
U.S. Geological Survey &
U.S. Department of Agriculture
2013
<https://datagateway.nrcs.usda.gov/>

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Watershed Description\Graphics
Last Updated: Oct. 2020

0 0.75 1.5 mi

0 0.5 1 2 km

EAST BAY
MUNICIPAL UTILITY DISTRICT

Section 4: Water Quality

Introduction

This section is a summary of raw water quality monitoring programs and sample results from 2015 through 2019 for the Camanche and Pardee Watersheds. Raw water is monitored in the Upper Mokelumne River as well as in Pardee and Camanche Reservoirs. To evaluate East Bay Municipal Utility District's (the District's) source water quality, results of raw water quality sampling are compared to drinking water standards. The results of this comparison indicate the water quality parameters that require removal and/or reduction through treatment. A general evaluation of the District's water treatment plants (WTPs) is conducted with regard to the federal Surface Water Treatment Rules (SWTR) and California Surface Water Treatment Rules (CASWTR) performance standards, monitoring requirements, and operating criteria. The District has six WTPs directly treating surface water from the Upper Mokelumne River. Three of these WTPs serve small systems (less than 10,000 people served) and three serve the large system in the East Bay (serving 1.4 million people). The three small system WTPs include: Pardee Center (PACT), Pardee Recreation Area (PARA), and Camanche South Shore (CASS) WTPs. The three large system WTPs are Walnut Creek, Lafayette, and Orinda WTPs in the East Bay. Camanche North Shore WTP uses only groundwater supplies and so is not evaluated in the Mokelumne River Watershed Sanitary Survey (MRWSS) updates.

Drinking Water Regulations & Required Monitoring

California Code of Regulations Title 22 is a compilation of rules and regulations that addresses human health and safety issues. The Domestic Water Quality and Monitoring chapter, which details the drinking water standards and monitoring requirements, and the Surface Water Filtration and Disinfection Treatment chapter, have the most relevance to watershed sanitary survey requirements. Many drinking water contaminants are regulated with primary standards, which specify a maximum contaminant level (MCL) for the contaminant, while other contaminants are targeted by required Treatment Techniques in lieu of MCLs. Regulated contaminants include microbial contaminants, inorganic chemicals, synthetic non-volatile organic chemicals (SOCs), radionuclides, disinfection byproducts, and volatile organic chemicals (VOCs). There are also secondary standards, which require monitoring for constituents that impact the drinking water aesthetics and consumer acceptance. Where applicable, the water quality data presented in this section are compared to the MCL and the detection limit for the purposes of reporting (DLR). The DLR is the minimum numerical result that must be reported to the State Water Resources Control Board Division of Drinking Water (SWRCB-DDW).

Table 4-1 summarizes existing drinking water regulations. During the MRWSS 2020 Update period, 1,2,3-trichloropropane (1,2,3-TCP), a contaminant previously monitored as part of the Third Unregulated Contaminant Monitoring Rule (UCMR3), was added to the list of regulated contaminants. Another contaminant, hexavalent chromium, was removed from the list. Also during this update period, UCMR4 monitoring was

Section 4. Water Quality

conducted, mainly in the distribution system. In raw water, UCMR4 only required monitoring of two parameters, total organic carbon (TOC) and bromide. These are associated indicators of a group of disinfection byproducts included in the UCMR4 distribution system monitoring (brominated haloacetic acids).

Table 4-1. Summary of Major Federal and State Drinking Water Regulations

Regulation	Year of Promulgation	Number of Contaminants	Targeted Contaminants
National Interim Primary Drinking Water Regulations (NIPDWR)	1975-1981	7	Trihalomethanes, Arsenic, Radiologicals
Phase I Standards	1987	8	VOCs
Phase II Standards	1991	36	VOCs, SOCs, and IOCs
Phase V Standards	1992	23	VOCs, SOCs, and IOCs
Surface Water Treatment Rule (SWTR)	1989	5	Microbiological and Turbidity
Total Coliform Rule (TCR)	1989	2	Microbiological
Lead and Copper Rule (LCR)	1991/2003 ^a 2000, 2007 ^b	2	Lead and Copper
Drinking Water Source Assessment and Protection Program	1996	-	Source Water Protection
Stage 1 Disinfectants/Disinfection By-Products Rule (S1DBPR)	1998/2006 ^a	14	D/DBPs and Precursors
Interim Enhanced Surface Water Treatment Rule (IESWTR)	1998/2007 ^a	2	Microbiological and Turbidity, Systems >10,000
Radionuclides Rule	2000	4	Radionuclides
Arsenic MCL	2001/2008 ^a	1	Arsenic
Filter Backwash Recycling Rule	2001/2007 ^a	-	Microbiological and Turbidity
Stage 2 Disinfectants/Disinfection By-Products Rule (S2DBPR)	2006/2012 ^a	9	DBPs
Long Term 2 ESWTR	2006/2013 ^a	1	Cryptosporidium
Unregulated Contaminant Monitoring Rule 2	2006	25	Chemical and Microbiological
CA Public Notification Requirements	2006	None	None
CA Secondary Drinking Water Standards	2006	25	Aesthetics
CA Perchlorate MCL	2007	1	Perchlorate
Contaminant Candidate List 2	2008	11	Chemical
CA Waterworks standard	2008	None	None
Endocrine Disruptors Screening Program	2009/2010	73	Endocrine Disruptors
Contaminant Candidate List 3	2009	104	Chemical and Microbiological
CA Notification Levels	Ongoing	54	IOCs, VOCs, SOCs
Unregulated Contaminant Monitoring Rule 3	2012	30	Chemical and Biological
Revised Total Coliform Rule	2013	2	Microbiological
Hexavalent Chromium MCL ^c	2014/2017	Rescinded	Hexavalent Chromium
Unregulated Contaminant Monitoring Rule 4	2016	30	Haloacetic acids and cyanotoxins

^{a)} California Adoption of Federal Rule

^{b)} LCR Minor Revisions and LCR Short-Term Revisions

^{c)} California established an MCL and monitoring requirements for hexavalent chromium in 2014. This was withdrawn on September 11, 2017. There is currently no MCL for hexavalent chromium.

Overview of Raw Water Quality Monitoring

The District conducts extensive water quality monitoring of raw water in Pardee and Camanche Reservoirs as well as the Upper Mokelumne River and its tributaries. This monitoring is conducted for various programs at numerous monitoring locations as summarized below.

Monitoring Programs

The District conducts raw water quality monitoring for drinking water compliance purposes in accordance with Title 22. In addition, the District conducts several raw water quality monitoring programs on Pardee and Camanche Reservoirs and at Upper Mokelumne Watershed. The District evaluates general water quality throughout the reservoirs to assist staff in managing reservoir operations and water treatment issues. Water quality monitoring of watershed tributaries provides insight to changes in water quality. Special stormwater monitoring studies also help the District evaluate best land management practices. In addition, some monitoring is conducted for water rights, environmental assessment, and water supply objectives. Descriptions of the monitoring programs that pertain to drinking water are presented in the following sections.

Title 22 Monitoring

Appendix 4-1 contains the District's Title 22 monitoring schedule for Pardee and Camanche Reservoirs. Pardee Reservoir has three monitoring schedules: one for the large East Bay system and one each for the small water systems of PACT and PARA. Camanche Reservoir has one monitoring schedule for the small CASS water system. The monitoring schedule for the East Bay system is developed every nine years, and Appendix 4-1 contains the schedule for 2010 through 2019. For the small systems served by both Pardee and Camanche Reservoirs, the monitoring schedules were formerly developed every three years, but since 2018, have only been revised annually as needed. The three-year small system schedules from 2016 through 2018 are included in Appendix 4-1 and are representative of required monitoring for the entire MRWSS 2019 Update period.

Most regulated contaminants are monitored in Pardee Reservoir at the Pardee Outlet Tower for the East Bay System, and at the WTP influents for the three small systems. WTP influent sampling locations are upstream of any chemical addition. For the East Bay System, the compliance monitoring location for many inorganic contaminants and chemicals with secondary standards are the treated water effluent of the water treatment plants, instead of the raw water, since these are reduced in the treatment processes. Required sampling frequency for all regulated chemicals varies from monthly to once every nine years. All results for regulated contaminants that are collected at compliance locations are submitted electronically to SWRCB-DDW on a monthly basis as results become available.

In accordance with Title 22 requirements, the District prepares an Annual Water Quality Report – also known as a Consumer Confidence Report (CCR) - that summarizes the quality of the water supplied to consumers during the calendar year, and starting in 2021, the East Bay large system CCRs will be updated every six months. Appendix 4-2 includes

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annual CCRs from 2015 through 2019 for the District's East Bay water system and for the small systems of CASS, PACT and PARA.

Reservoir Limnological Profiling

The District periodically monitors reservoir water quality conditions at several locations in Pardee and Camanche Reservoirs using a vertical profiler device with multiparameter sondes (YSI). The water quality parameters (temperature, pH, dissolved oxygen, specific conductance, and oxidation reduction potential) are analyzed at various depths. Field conditions and turbidity measurements are recorded as well. This information is analyzed and reviewed on an as-needed basis to assist the District's water supply and treatment operations and to characterize the reservoir limnology. The reservoir profile data is not included in this WSS.

Upper Mokelumne River Monitoring

The District also monitors water quality at several stations along the Upper Mokelumne River and its main tributaries upstream of Pardee Reservoir. The purpose of this monitoring program is to develop a long-term record of water quality conditions to establish a baseline and to monitor long-term trends for turbidity, total coliform, *E. coli*, *Cryptosporidium*, *Giardia*, TOC, metals, nutrients, and other parameters. This data is summarized later in this report

Wildfire and Stormwater Monitoring

In September 2015, near the end of a four-year drought, the Butte Fire burned over 70,000 acres of forest, including a 12,000-acre section of the Mokelumne watershed. This was followed by the first relatively wet winter in four years (2015 - 2016), and the next winter (2016 - 2017), was the wettest since 1995. During winter storms, runoff in the watershed carried debris accumulated during the drought, soil loosened by the fire, and burned materials into the river and reservoir. The District performed special water quality monitoring during storms in the fall and winter following the Butte Fire (2015 - 2016). The results of this monitoring are included in this report.

Penn Mine

Penn Mine is an abandoned copper and zinc mine in the Camanche Watershed, a potential contaminant source discussed in Section 5. An onsite landfill with a clay liner and leachate collection system were completed in 1999. The District continued quarterly monitoring of surface water runoff from the site for metals, turbidity and pH for more than ten years, before discontinuing in 2010.

In accordance with Title 27 of the California Code of Regulations and the *Penn Mine Landfill Post-Closure Operations and Maintenance Plan* (TRC, 1999), the District conducts groundwater monitoring at four wells around the landfill. Based on the results of monitoring and site inspections performed from 2000-2019, there is no evidence of release of landfill leachate to groundwater. The District will continue to perform groundwater sampling and analysis and landfill inspections and submits bi-annual reports to the SWRCB. The latest bi-annual report was completed in 2018 and a copy of the report is included in Appendix 4-3.

PFAS Monitoring

Per and polyfluoroalkyl substances (PFAS) are a large group of human-made substances. Major sources of PFAS are certain types of manufacturing and processing facilities, airports, and industrial complexes that use a specific class of firefighting foams, none of which are in the District watersheds. They are also found in many consumer products that have been treated to be resistant to moisture, heat, and stains. UCMR3 required public water supplies to monitor for six PFAS in treated water at all entry points to the distribution system (EPTDS) for the East Bay larger systems. The District conducted the sampling at all District WTPs in 2014 and 2015, and all results were non-detect. Since then, methods have been revised, detection limits are lower, and more compounds are included. In advance of potential new regulations, the District tested the influents and effluents of all East Bay WTPs quarterly in 2020 using the latest analytical methodology.

Invasive Mussel Monitoring

To protect against invasive quagga and zebra (dreissenid) mussels and other invasive species, the District has developed an “Invasive Aquatic Species Control and Prevention Program.” As part of that program, Pardee and Camanche Reservoirs are monitored three times per year for the presence of quagga and zebra mussels. Artificial substrates (also known as “quagga condos”) are installed and monitored for adult mussels, and veliger (larval stage) tows are conducted to identify the presence of mussels in their planktonic larval life stage. In addition, all boats entering the reservoirs are subject to inspection. No adult or larval stage mussels have been observed in Pardee or Camanche Reservoirs.

Harmful Algal Blooms

Harmful algal blooms (HABs) with verified presence of cyanotoxins have occurred in the Rabbit Creek arm of Camanche Reservoir, as well as small ponds in the hills north of Camanche Reservoir on District property. None have been confirmed in Pardee Reservoir. In 2016, the District developed a comprehensive Cyanotoxin Management Plan. Field staff conduct regular visual inspections of all District source water reservoirs to identify visible algae blooms or odors for signs of algal blooms. When blooms or odors are detected, a semi-quantitative Abraxis “dipstick” test kit is used to quickly determine the presence of cyanotoxins. If the test indicates the presence of toxins, a water sample is collected and submitted for laboratory analysis to identify and quantify the toxin. The District lab maintains a contract with a commercial lab that can run these samples quickly.

In addition, at Pardee Reservoir plankton samples are collected from the surface and from the level of the open gates of the outlet towers at least monthly and more frequently when algal activity is high. Water quality depth profiles are also conducted: temperature, dissolved oxygen, pH, chlorophyll-a, and phycocyanin (via fluorescence) are measured at various depths. The District’s laboratory identifies and counts the plankton in the samples to the genus level. If a significant number of algae with cyanotoxin producing potential were found, cyanotoxin samples would be collected for analysis. Such toxin-producing algae have not been detected in the main body of Pardee and Camanche Reservoirs at sufficient concentrations to trigger additional laboratory sampling. In an abundance of caution, cyanotoxins were collected weekly for two months at CASS WTP in 2015 when cyanotoxins were detected in Rabbit Creek, which at the time was not flowing into the

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reservoir at the surface level due to low water levels. All results at the WTP were non-detect.

Cyanotoxins can be harmful, potentially even fatal, to people or animals that come into contact with or drink the water. Additionally, it is possible for fish and waterfowl to accumulate the toxins in their organs, which can in turn present a hazard to humans who may consume the fish or waterfowl. If the presence of cyanotoxins was suspected or confirmed, appropriate signage would be placed in the area to warn visitors of the danger. Body contact, whether human or canine, is never allowed in Pardee Reservoir.

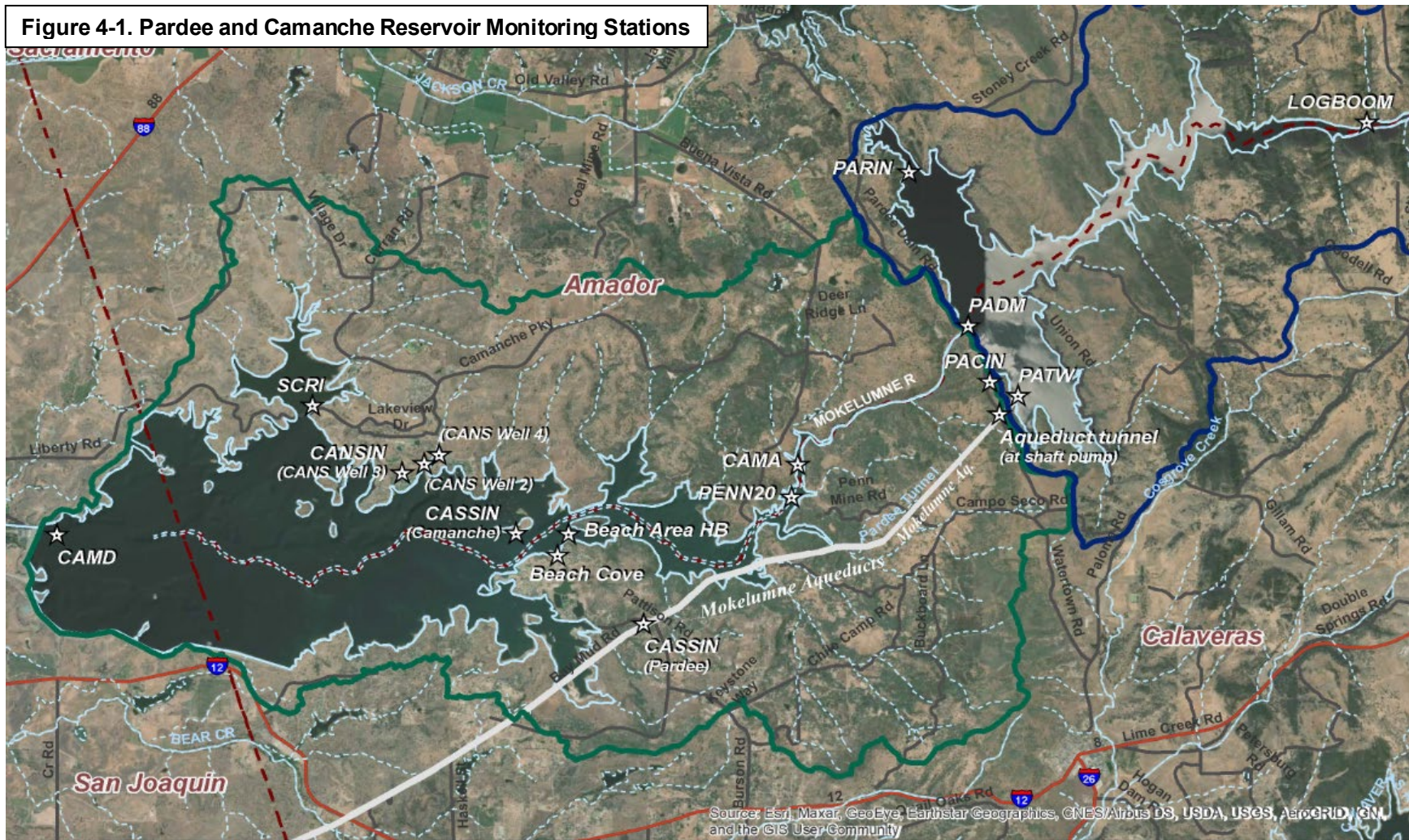
If cyanotoxins were suspected near a drinking water intake to the treatment plant(s), the District would take action to protect public health. Various operational options are available, and the option(s) selected depend on many factors. A WTP may be shut down, or operators may evaluate appropriate gate opening elevations to minimize loading to the treatment plant. If the plant(s) remain in service, testing will be conducted to confirm that treatment plant processes are eliminating toxins in the treated water, and adjustments to processes will be made if necessary. If toxins were present in the treated water, appropriate notifications will be made to regulatory agencies and the public.

Raw Water Quality Monitoring Locations

The sampling locations in Pardee and Camanche Reservoirs are mapped in Figure 4-1 and listed in Table 4-2. The District also monitors water quality at several sampling locations along the Upper Mokelumne River and its main tributaries upstream of Pardee Reservoir, as mapped in Figure 4-2 and listed in Table 4-3.

A map showing the extent of the Butte Fire burn area, with relation to the Upper Mokelumne River Watershed is shown in Figure 4-3. The Butte Fire started on September 1, 2015 and lasted through October 1, 2015. Most Upper Mokelumne River sampling locations are upstream of the burn area and thus unaffected. The main stem of the river below Electra Power House (sample location MS RPH) was in the middle of the burn area. Further downstream on the main stem at the Highway 49 bridge, sample location MS RHW49 was downstream of the burn area.

Figure 4-1. Pardee and Camanche Reservoir Monitoring Stations



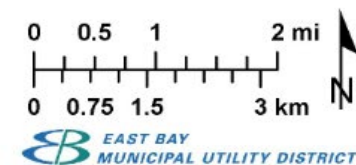
Legend

- ☆ Sampling Locations
- ▭ Mokelumne Watershed
- ▭ Camanche Watershed
- Named Streams
- Rivers and Creeks
- ▭ County
- Streets

Data sources:
Figure drafted in conjunction with
Pardee Operations Staff

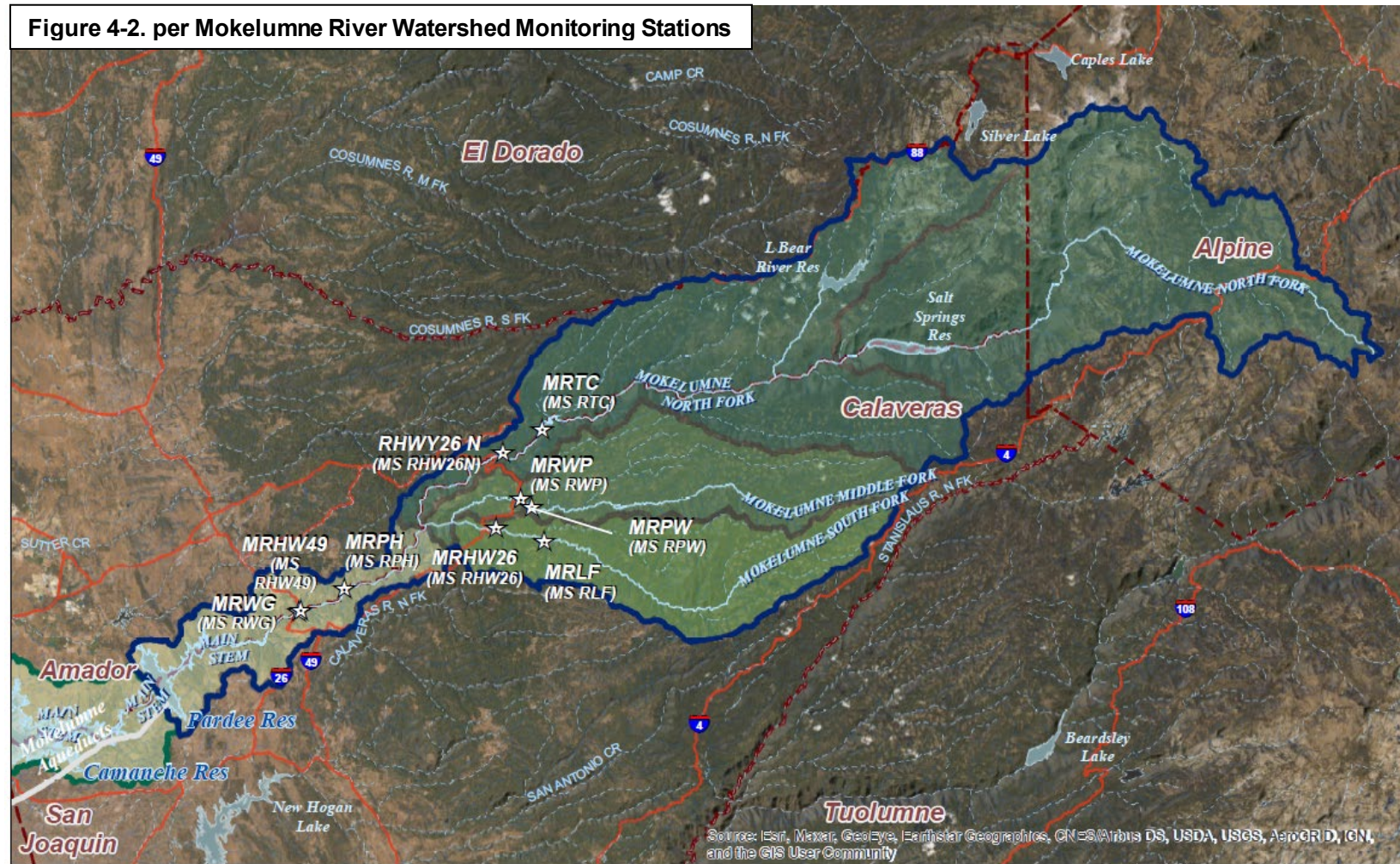
EBMUD GIS Database
30m National Elevation Dataset
U.S. Geological Survey &
EROS Data Center
March 2014

Watershed Boundary Dataset
U.S. Geological Survey &
U.S. Department of Agriculture
2013
<https://datagateway.nrcs.usda.gov/>
File Location:
\\omd\\wo\\EVERYONE\\Process Engineering
\\WSS 2020\\Chapter 3 - Watershed Description
\\Graphics
Last Updated: Oct. 2020



EAST BAY
MUNICIPAL UTILITY DISTRICT

Figure 4-2. per Mokelumne River Watershed Monitoring Stations



Legend

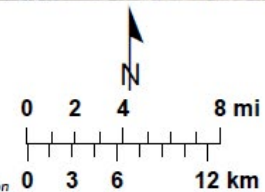
- ☆ Sampling Locations
- Named Streams
- Rivers and Creeks
- County
- Waterbody
- Watershed (HUC-10)
 - Main Stem and Camanche
 - Middle Fork
 - South Fork
 - Lower North Fork
 - Upper North Fork

Data sources:
Figure drafted in conjunction with
Pardee Operations Staff

EBMUD GIS Database
30m National Elevation Dataset
U.S. Geological Survey &
EROS Data Center
March 2014

Data sources:
Watershed Boundary Dataset
U.S. Geological Survey &
U.S. Department of Agriculture
2013

<https://datagateway.nrcs.usda.gov/>
File Location:
I:\m\w\EVERYONE\Process Engineering
IWSS 2020\Chapter 3 - Watershed Description
IGraphics
Last Updated: Oct. 2020



EAST BAY
MUNICIPAL UTILITY DISTRICT

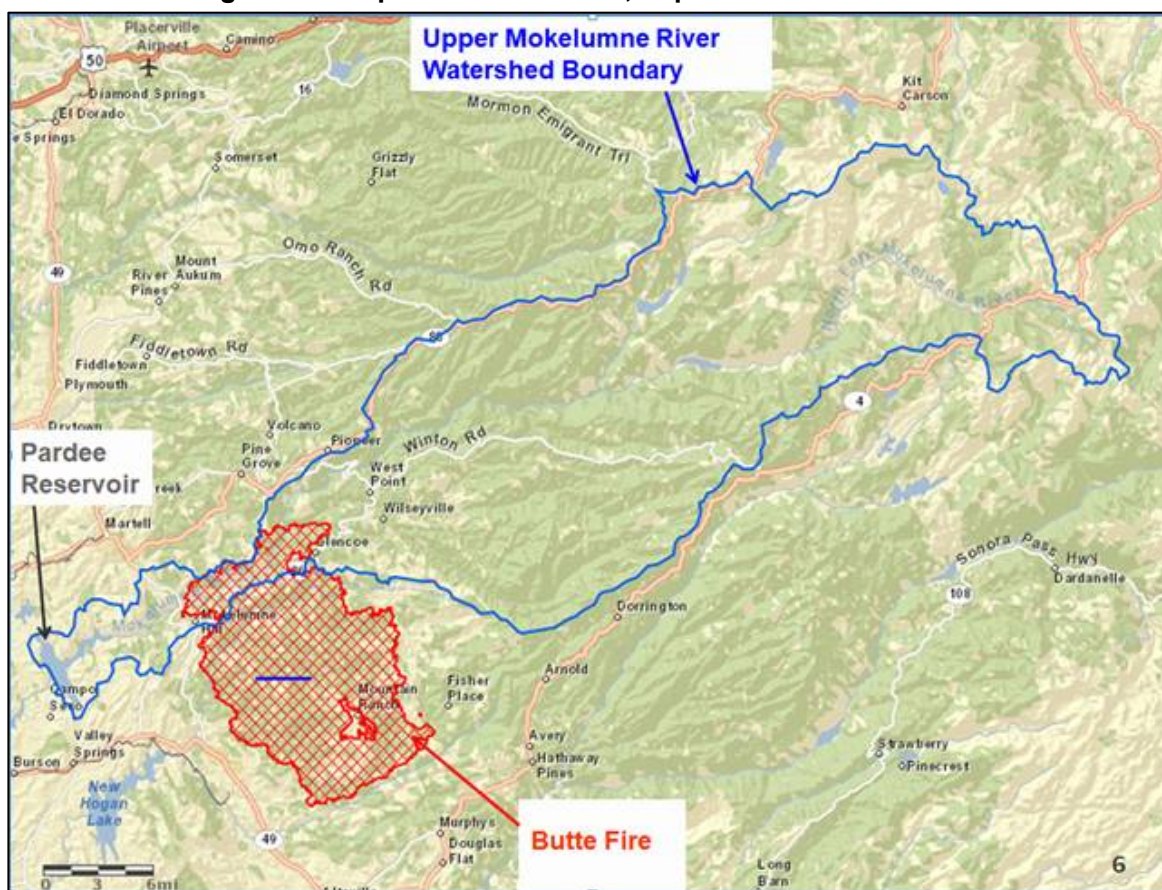
Table 4-2. Pardee and Camanche Reservoir Monitoring Stations

Station	Description
Pardee Reservoir	
<u>Pardee Tower</u>	
PATW	Pardee Outlet Tower (all Depth Locations)
<u>Pardee Center WTP</u>	
PACIN	Raw water influent to Pardee Center (PACT) WTP
<u>Pardee Recreation Area WTP</u>	
PARIN	Raw water influent to Pardee Recreation Area (PARA) WTP
<u>Pardee Reservoir Inlet</u>	
Logboom	Pardee Reservoir Upstream Location
<u>Pardee Dam</u>	
PADM	Pardee Dam location
<u>Mokelumne Aqueduct</u>	
Aqueduct Tunnel	Tunnel at shaft pump
Camanche Reservoir	
<u>Camanche Reservoir</u>	
CAMA (Surf CAMA)	Mokelumne Arm 1/4 mile above Penn Mine
Beach Area HB (Surf Beach Area HB)	Camanche Res - Beach Area at Handicap Boat Ramp
Beach Cove (Surf Beach Cove)	Camanche Res - Beach Cove South of Raw Intake
SRCI (Surf Rabbit Creek Inlet)	Rabbit Creek Arm north of Camanche Parkway North, in Camanche Hills Hunting Preserve, Amador Co.
<u>Camanche South Shore WTP</u>	
CASSIN (Pardee Source)	Raw Water Influent to Camanche South Shore (CASS) WTP
CASSIN (Camanche Source)	Raw Water Influent to Camanche South Shore (CASS) WTP

Table 4-3. Mokelumne River and Tributary Monitoring Stations

Station	Description
North Fork Mokelumne River	
MS RTC	(MRTC) Mokelumne River North Fork, below Tiger Creek After bay.
MS RHW26N	(MRHW26N) Mokelumne River North Fork, north bank just upstream of the Hwy 26 bridge at end of PGE kayak take-out path; Tiger Creek White Water Take Out area.
Middle Fork Mokelumne River	
MS RPW	(MRPW) Mokelumne River - Middle Fork, 1 mile upstream of Hwy 26.
MS RWP	(MRWP) Mokelumne River - Middle Fork at Hwy 26 bridge, near West Point.
South Fork Mokelumne River	
MS RHW26	(MRHW26) Mokelumne River - South Fork upstream of Hwy 26 at gage station.
MS RLF	(MRLF) Mokelumne River - South Fork upstream of Licking Fork at Railroad Flat Road.
Mokelumne River (Main stem below confluence of forks)	
MS RPH	(MRPH) Mokelumne River – Main Stem, below Electra Power House. This sample location is within the Butte Fire burn area.
MS RHW49	(MRHW49) Mokelumne River – Main Stem at Hwy 49 bridge. Water quality at this location is considered representative of inflow to Pardee Reservoir. It is downstream of the Butte Fire burn area.
Wilson Gulch	
MS RWG	(MRWG) Wilson Gulch which drains from Mokelumne Hill into the Main Stem of the Mokelumne River, 1/2 mile downstream of Hwy 49.

Figure 4-3. Map of Butte Fire Area, September – October 2015



Raw Water Quality Update

This sanitary survey update summarizes the results for all regulated parameters as well as other minerals and nutrients that were sampled in the river, tributaries, and reservoirs, regardless of the monitoring purpose. Water quality is divided by site (watersheds and reservoirs) and then by category of parameter – microbial constituents, inorganic chemicals, etc.

Data summarized in this report are: (1) analytical results from laboratories certified by the SWRCB-DDW Environmental Laboratory Accreditation Program for those parameters; (2) results of field samples measured by trained certified treatment or distribution operators using calibrated instruments; or (3) calibrated on-line water quality analyzers archived in the District's SCADA system. Some unregulated water quality parameters are included in this document.

Raw water quality data are compared with corresponding water quality regulatory standards, as well as the method detection limits (MDLs). The MDL is the minimum concentration that can be measured and reported with 99% confidence that the concentration is greater than zero. It is determined by the laboratory or, in the case of field

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measurements, by the manufacturer of the analytical device. For regulatory compliance, the MDL must be less than or equal to the DLR. In this document, results are reported as detected when greater than or equal to the MDL, despite being below the DLR. For each parameter, if more than fifty percent of sample results were less than the MDL, the median is stated as non-detect (ND).

Upper Mokelumne River and Tributaries

As discussed in previous Sections, the vast majority of the Upper Mokelumne River Watershed consists of open-space and forestland. Peak runoff normally occurs during the spring snowmelt season from March through June and then tapers off during the summer to minimum flows in late summer or fall. The North Fork is the largest tributary and is also the only one with significant watershed area above elevation 5,000 feet, where most of the precipitation falls as snow. Most of the Middle Fork and South Fork are below 5,000 feet where most precipitation falls in the form of rain. The North Fork sub-watershed contains nearly all of the major impoundments and diversion systems located in the Upper Mokelumne River Watershed above Pardee Reservoir.

Existing Water Quality and Trends in the Upper Mokelumne River and Tributaries

All of the sampling locations mapped in Figure 4-2 and listed in Table 4-3 were monitored on a quarterly basis in 2015 through 2019. All grab samples in the Upper Mokelumne River and its tributaries were analyzed for turbidity, total coliform, and *E. coli*, and accompanied by flow monitoring. At MS RHW49, the samples collected include a much wider range of parameters, including TOC. Additionally, the District conducted special monitoring of metals and nutrients during the fall and winter after the Butte Fire during rainstorms in 2015-2016.

Turbidity and Coliforms

Table 4-4 is a statistical summary of turbidity, total coliform, *E. coli*, and flow at the nine river sampling locations. There were more samples during the MRWSS 2020 Update compared with the previous update, with 19 or 20 samples collected during the 20-quarter period at all monitoring locations except for Wilson Gulch (MS RWG). Wilson Gulch is intermittently dry and does not have enough flow for sampling during much of the year.

Table 4-4. Upper Mokelumne River and Tributaries: Statistical Summary of Turbidity, Total Coliform, *E. coli*, and Flow Quarterly Monitoring, 2015-2019

Parameter	River/Tributary	Sampling Station	No. Samples	Median	90th %ile	Max
Flow at Time of Sampling (CFS)	Main Stem ^a	MS RHW49	20	745	3,300	8,200
		MS RPH	20	435	3,560	4,300
	North Fork ^b	MS RHW26N	20	475	1,530	2,900
		MS RTC	19	500	1,480	2,800
	Middle Fork ^a	MS RWP	20	39	273	720
		MS RPW	20	39	273	720
	South Fork ^a	MS RHW26	19	13	216	850
		MS RLF	20	14	671	830
	Wilson Gulch ^c	MS RWG	11	< 0.1	< 1	< 1
Turbidity (NTU)	Main Stem	MS RHW49	20	1.2	4.3	25.6
		MS RPH	20	1.1	6.1	21.9
	North Fork	MS RHW26N	20	1.0	3.4	9.9
		MS RTC	19	1.1	2.4	3.6
	Middle Fork	MS RWP	20	1.1	6.1	20.0
		MS RPW	20	1.1	10.7	20.9
	South Fork	MS RHW26	19	0.5	3.0	19.3
		MS RLF	20	0.5	6.2	15.6
	Wilson Gulch	MS RWG	15	0.9	3.6	18.0
Total Coliform (MPN/100 mL)	Main Stem	MS RHW49	20	120	364	790
		MS RPH	20	46	821	5,400
	North Fork	MS RHW26N	20	24	114	5,400
		MS RTC	19	17	89	140
	Middle Fork	MS RWP	20	225	1,230	16,000
		MS RPW	20	145	1,330	5,400
	South Fork	MS RHW26	19	79	1,260	5,400
		MS RLF	20	170	1,880	9,200
	Wilson Gulch	MS RWG	17	110	2,400	9,200
<i>E. coli</i> (MPN/100 mL)	Main Stem	MS RHW49	20	13	71	110
		MS RPH	20	8	84	170
	North Fork	MS RHW26N	20	4	28	140
		MS RTC	19	5	13	33
	Middle Fork	MS RWP	20	41	249	1,600
		MS RPW	20	23	52	3,500
	South Fork	MS RHW26	19	23	72	540
		MS RLF	20	33	252	1,100
	Wilson Gulch	MS RWG	16	20	3,138	9,200

a) Historical 15-minute data were used for flow at the time of sampling for the Main Stem, Middle Fork, and South Fork from the District's flow monitoring equipment at MS RHW49, MS RWP, and at MS RHW26. Flows at other sample locations on the same river/tributary are assumed to be the same for purposes of sample collection data. Differences in statistics between locations on the same river/tributary are due to time of sample collection.

b) North Fork flows at the time of sampling were calculated by sampling staff from releases from Salt Springs and Lower Bear Lakes. Differences in statistics between MS RHW26N and MS RTC are due to time of sample collection.

c) Wilson Gulch flows were visually estimated by the staff collecting the sample.

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The flow statistics in Table 4-4 are for flows at the time of sampling in units of cubic feet per second (CFS). The District has continuous flow monitoring equipment on the main stem at MS RHW49, on the Middle Fork at MS RWP, and South Fork at MS RHW26, and this data is shared with the United States Geological Survey (USGS) National Water Information System (NWIS). Historical 15-minute data was referenced for recorded sample collection times. Flows at other sample locations on the same tributary are assumed to be the same for purposes of sample collection data. North Fork flows at the time of sampling are calculated from releases from Salt Springs and Lower Bear Lakes. Differences in statistics between MS RHW26N and MS RTC are due to time of sample collection. Wilson Gulch flows at the time of sampling are estimated by visual observation.

The highest flows during sampling were in the Main Stem below the confluence of all three forks. Flows in Wilson Gulch (MS RWG), a small drainage from Mokelumne Hill, were several orders of magnitude less than the river or its main tributaries. Flows on the North Fork were an order of magnitude higher than the Middle Fork and South Fork. The North Fork watershed covers a much larger area and higher elevation than the other main tributaries.

The winter of 2015 - 2016 was the first wet winter after four years of drought, and the next winter (2016 - 2017), was the wettest since 1995. Precipitation during the winter of 2018 - 2019 was also higher than average. Due to the increased precipitation between this MRWSS 2020 Update five-year period compared to the previous MRWSS 2015 Update five-year period, the 90th percentile flows during sample events increased at all locations. The Main Stem and North Fork 90th percentile flows were approximately double this update period over the previous, the Middle Fork was approximately four times larger, and the South Fork 90th percentile flows were approximately eight times the flows of previous update period.

The median turbidity on the main stem of the river at MS RHW49 was 1.2 nephelometric turbidity units (NTU), the same median turbidity value from the previous MRWSS 2015 Update period. This was the highest median turbidity from all sample locations. The MS RHW49 median total coliform and *E. coli* results were slightly higher in this update period than the previous, but within an order of magnitude: the median total coliform increased from 70 to 120 MPN/100 mL (most probable number per 100 milliliters) and the median *E. coli* increased from 9 to 13 MPN/100 mL between 5-year update periods.

The highest total coliform sample results came from the West Point (MS RWP) sampling location on the Middle Fork with a maximum of 16,000 MPN/100 mL. The next highest were from the Licking Fork (MS RLF) sampling location on the South Fork and Wilson Gulch (MS RWG), both with maximum coliform counts of 9,200 MPN/100 mL. These maximum total coliform concentrations were approximately two to three times higher than the other sampling locations. These locations also exhibited the highest total coliform results in the MRWSS 2015 Update.

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The Wilson Gulch (MS RWG), which flows from Mokelumne Hill into the mainstem of the river downstream of Highway 49, had the highest maximum *E. coli* result during the MRWSS 2020 Update at 9,200 MPN/100 mL. The median and maximum *E. coli* concentrations from the South Fork and Middle Fork were an order of magnitude higher than the North Fork and Main Stem.

Figures 4-4 through 4-8 depict the fluctuations in turbidity, total coliform, and *E. coli* during the MRWSS 2020 Update period, and flows at the time of sampling in the Upper Mokelumne River and tributaries:

- Figure 4-4: Mokelumne River Main Stem below Confluence of Forks
- Figure 4-5: North Fork Mokelumne River
- Figure 4-6: Middle Fork Mokelumne River
- Figure 4-7: South Fork Mokelumne River
- Figure 4-8: Wilson Gulch

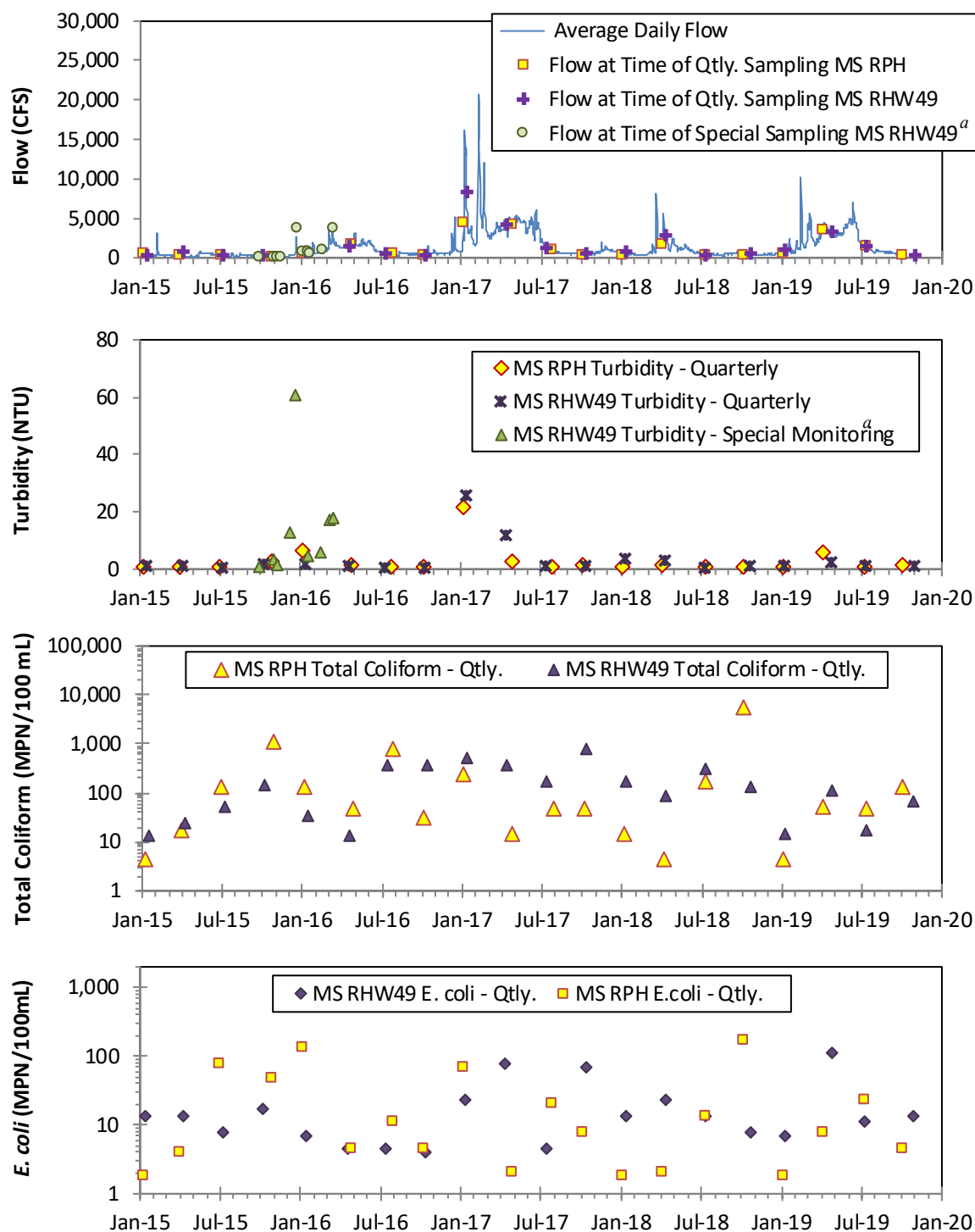
Average daily stream flow data (mean daily flow from continuous automated flow monitoring and recording stations) is included in Figures 4-4 through 4-8 to supplement instantaneous flow values at the time of sampling. As discussed in Section 3, precipitation above 5,000 feet typically occurs as snow, while at lower elevations precipitation occurs as rain or sleet. Most of the Middle Fork and South Fork are below 5,000 feet, while elevation in the North Fork ranges from 900 to over 10,000 feet. The fluctuations in flow result from several watershed conditions and activities, including drought, snow melt and precipitation, as well as the diversions and releases associated with the extensive hydroelectric facilities along the Mokelumne River discussed in Section 3. Average daily flow measurements at all locations depict noticeable flow increases in the wet seasons, with the largest flows in winters of 2016 - 2017 and in 2018 - 2019. As discussed in Section 3, four years of drought ending in 2015 dried out the soil and contributed to lower flows in the fall and winter of 2015 - 2016.

Seasonal fluctuations in quarterly turbidity on the Upper Mokelumne River and tributaries are seen in Figure 4-4 through Figure 4-8, with elevated turbidities occurring during the wet season. *E. coli* and total coliform did not seem to follow a discernable trend with respect to season or flow.

As part of a monitoring program to assess the impacts of the Butte Fire on water quality, additional turbidity samples were collected during or after storm events in the fall and winter of 2015 – 2016 at MS RHW49 as shown in Figure 4-7. The maximum turbidity from this special stormwater monitoring was 61 NTU, on December 22, 2015. The flow at the time of sampling was measured at 3,700 cfs, the third highest flow encountered during turbidity sample collection for the five years of this update. Although the maximum river flow in subsequent years was significantly higher (20,700 cfs in February 2017), in December 2015, the flow of 3,700 cfs was higher than it had been for four years. Previous storms that year had led to very little runoff, due to low soil saturation. Thus, it is unclear to what extent this turbidity excursion was due to accumulated debris on the watershed lands due to the drought, versus the loosening of soil and ash from the Butte Fire.

Figure 4-4. Water Quality and Flow on the Main Stem of the Mokelumne River, below Confluence of Forks

All flows are from the District's continuous flow monitoring station MS RHW49 (USGS 11319500). Instantaneous flow at time of sampling is based on 15-minute flow records.



a) Following the Butte Fire in September 2015, special monitoring was conducted that included turbidity and flow measurements at MS RHW49 during or after storm events through the fall and winter of 2015 – 2016. These results are not included in Table 4-4 quarterly monitoring statistics.

Figure 4-5. Water Quality and Flow on the North Fork Mokelumne River

Instantaneous flow at time of sampling is estimated from upstream releases, and average daily flows are recorded by USGS 11316670 near MS RTC, where available.

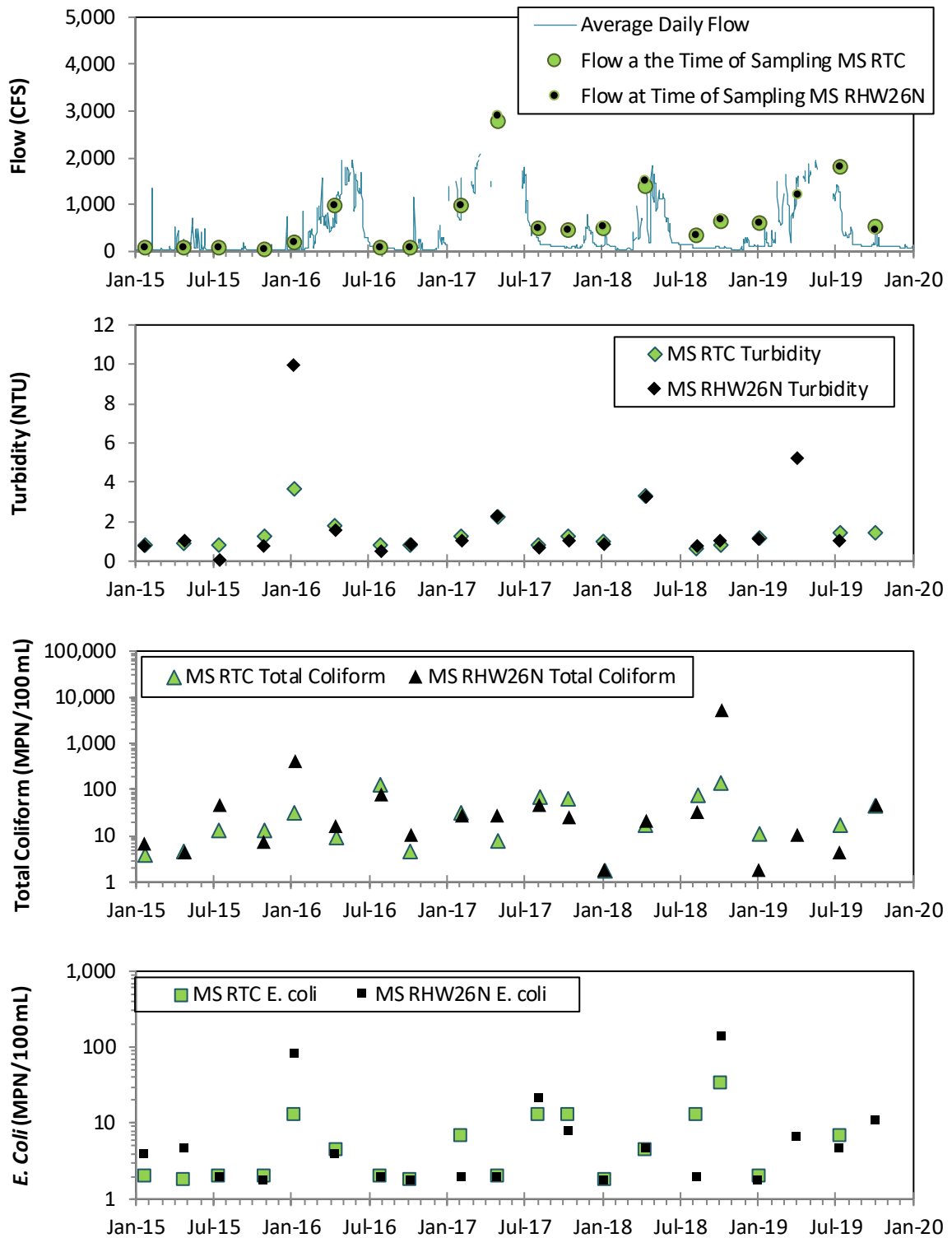


Figure 4-6. Water Quality and Flow on the Middle Fork Mokelumne River

All flows are from the District's continuous flow monitoring station at MS RWP (USGS 11317000).
Instantaneous flow at time of sampling is based on 15-minute flow records.

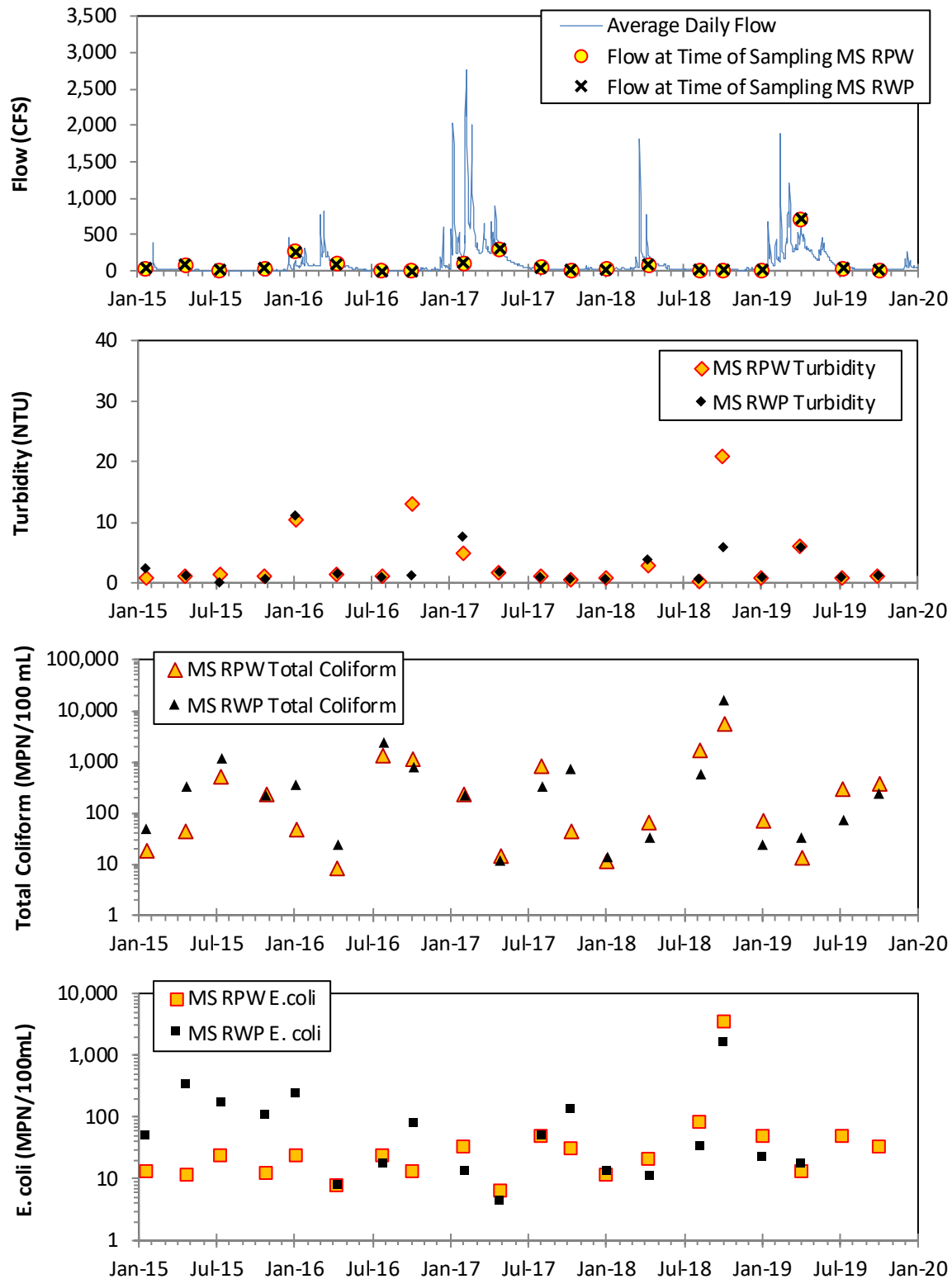
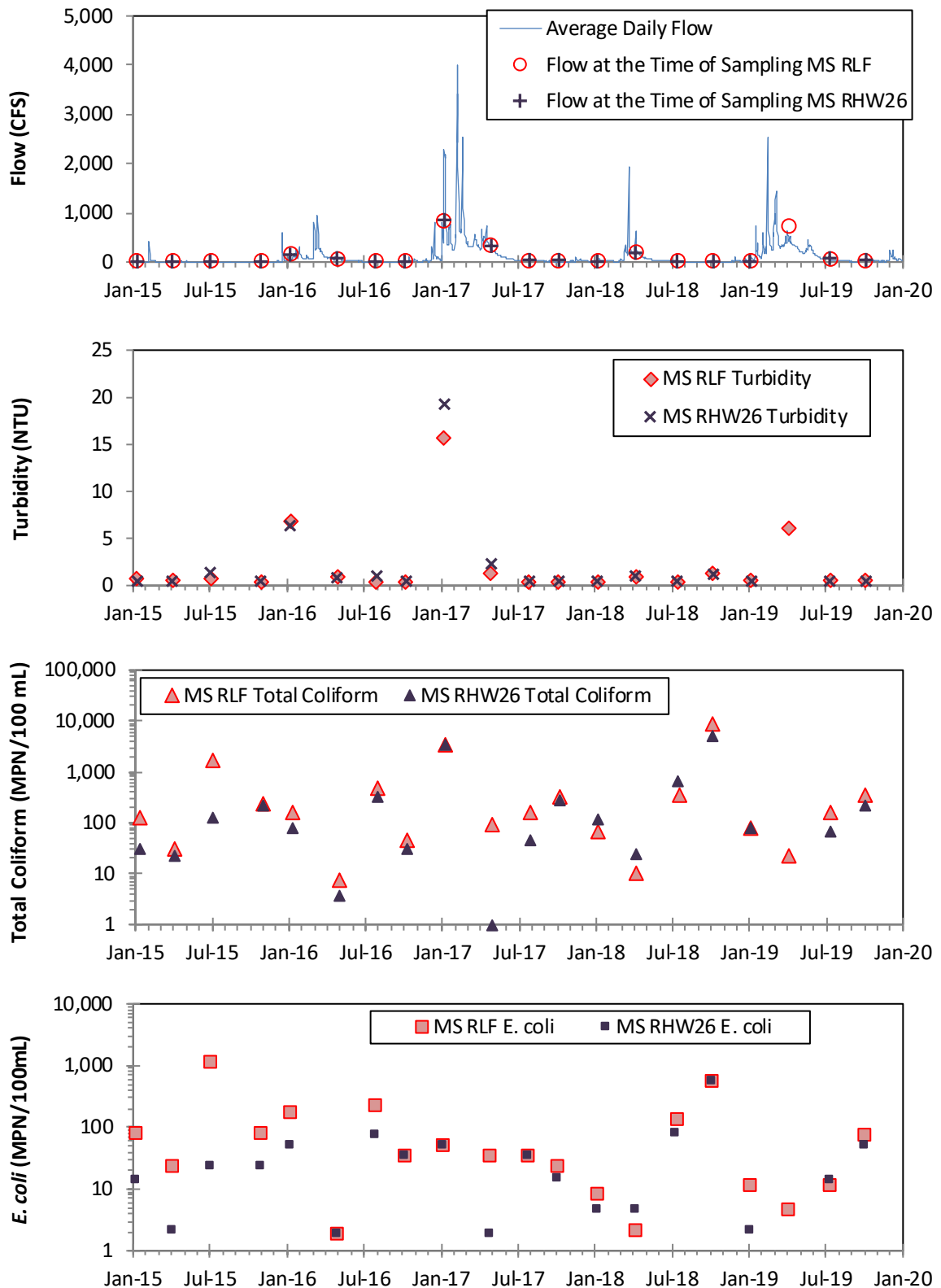


Figure 4-7. Water Quality and Flow on the South Fork Mokelumne River

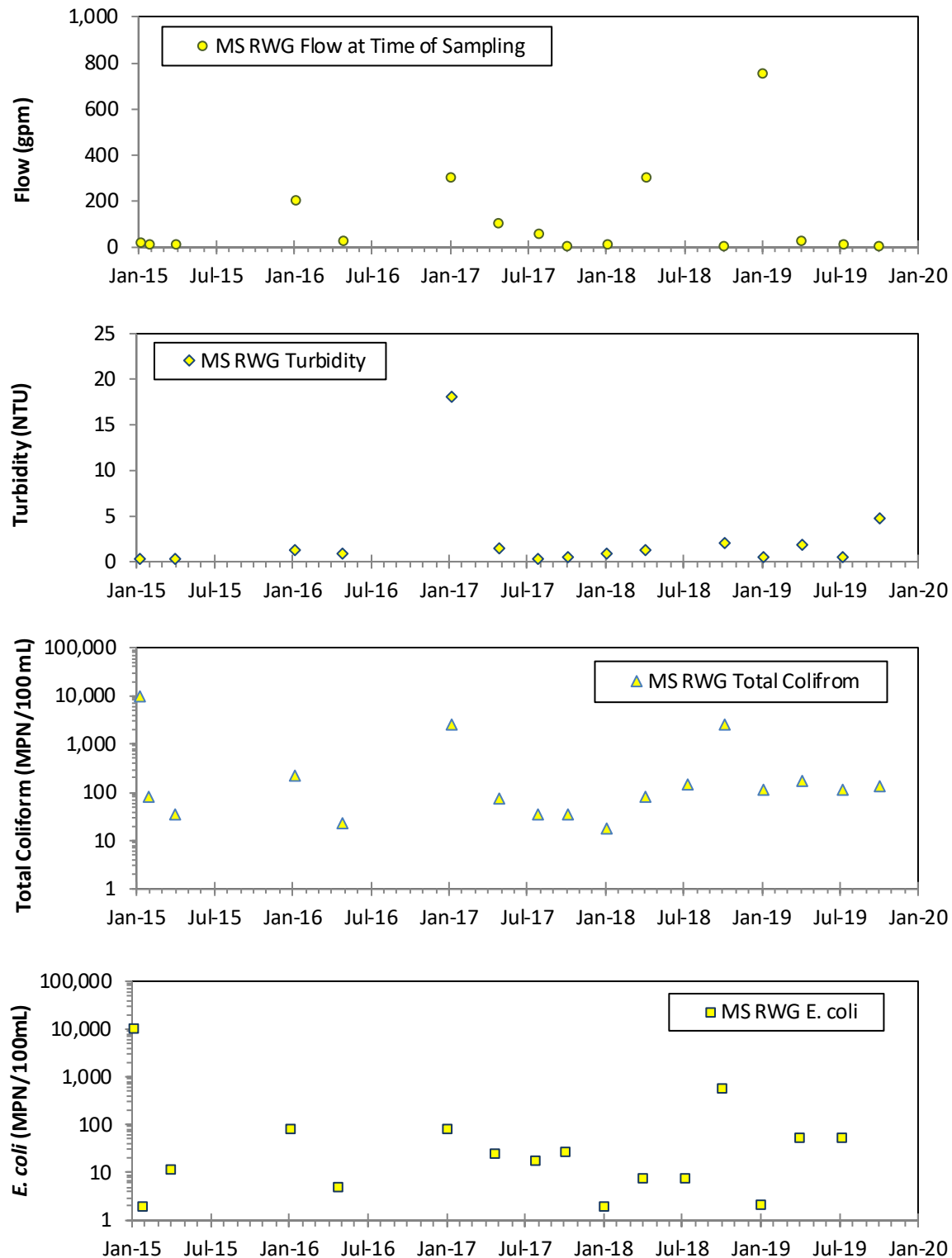
All flows are from the District's continuous flow monitoring station at MS RHW26 (USGS 11318500). Instantaneous flow at time of sampling is based on 15-minute flow records.



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Figure 4-8. Water Quality and Flow on the Wilson Gulch at MS RWG

Instantaneous flow at time of sampling estimated by staff collecting the sample. The flow at Wilson Gulch is significantly less than the other sample locations and thus is shown in gallons per minute (gpm) instead of cfs. 1 cfs is equal to 449 gpm.



On July 14, 2015, Calaveras County Water District (CCWD) issued a “boil water” notice in the Bummerville area near West Point, because total coliforms and fecal coliforms were detected in their distribution system intermittently over several days. At the time, the CCWD West Point WTP was treating water from the Middle Fork of the Mokelumne River, purchased from Calaveras Public Utility District (CPUD). Follow-up monitoring and analyses determined that the positive total and fecal coliform results were likely the result of laboratory errors. The “boil water” notice was lifted on July 18, 2015.

Total Organic Carbon

Figure 4-9a shows all TOC grab sample results from MS RHW49 during the MRWSS 2020 Update period, including quarterly samples collected at MS RHW49, along with average daily flow at MS RHW49 for reference. Figure 4-9b shows all TOC samples collected during the year following the Butte Fire (September 2015 through October 2016), when additional TOC samples were collected at MS RHW49 and other locations during or soon after storm events to capture high runoff periods. As can be seen in Figure 4-9a, after a year of special sampling in 2015-2016, monitoring returned to quarterly at MS RHW49. Then, in the summer of 2017, disinfection byproduct (DBP) formation increased in the East Bay WTPs taking water from the Mokelumne Aqueducts, so TOC monitoring at MS RHW49 was increased from quarterly to monthly to better track the DBP precursor material entering the reservoir. This frequency continued through the remainder of the MRWSS 2020 Update period.

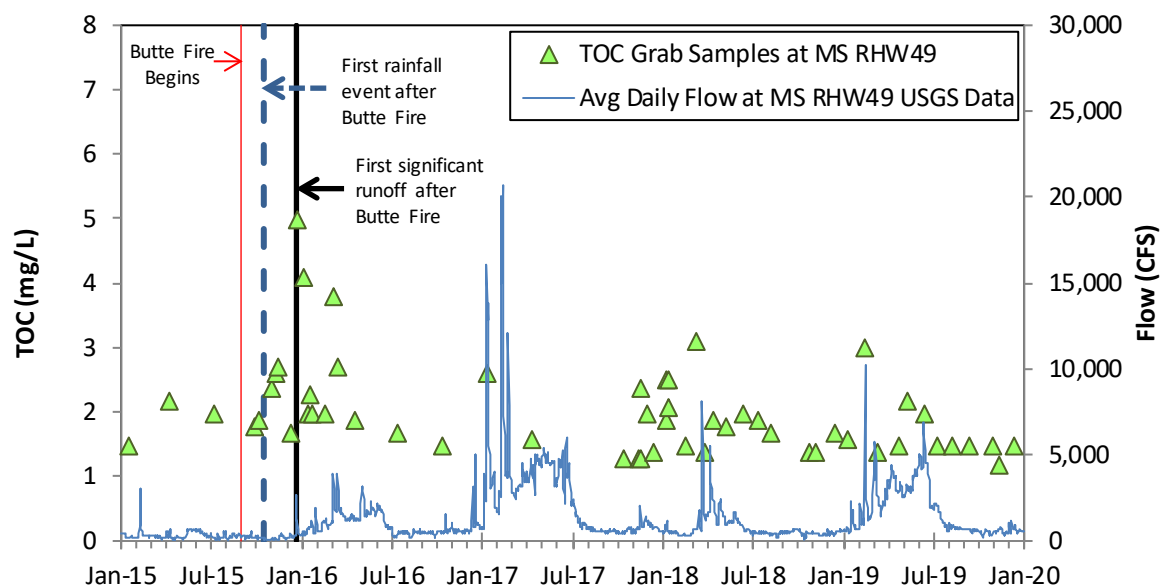
Figure 4-9b also includes composite samples collected by automated sampling equipment. Grab samples can only be collected during daylight hours due to safety considerations, and often the peak of the storm runoff occurs overnight. Thus, as part of the Butte Fire water quality study, automatic sampling equipment (ISCO) was set up at two locations: 1) on the North Fork, about one mile downstream of MS RHW26N to represent water quality upstream of the burn area, and 2) on the Main Stem of the river at MS RHW49 to represent water quality downstream of the burn area. The automated samplers were configured to collect samples at hourly intervals during storms, which were composited in groups of three or four consecutive hourly samples. These auto/composite samples were analyzed for TOC, other nutrients, and metals. This allowed water quality to be monitored at various stages of the storm hydrograph.

During the five years covered by this update, TOC from grab samples collected at MS RHW49 ranged from 1.2 to 5.0 mg/L, with a median of 1.9 mg/L (Figure 4-9a). This was slightly higher than the median TOC from the previous update period, which was 1.6 mg/L. TOC was higher during periods of increased flows, and this MRWSS update included significantly more precipitation and higher runoff than the previous update.

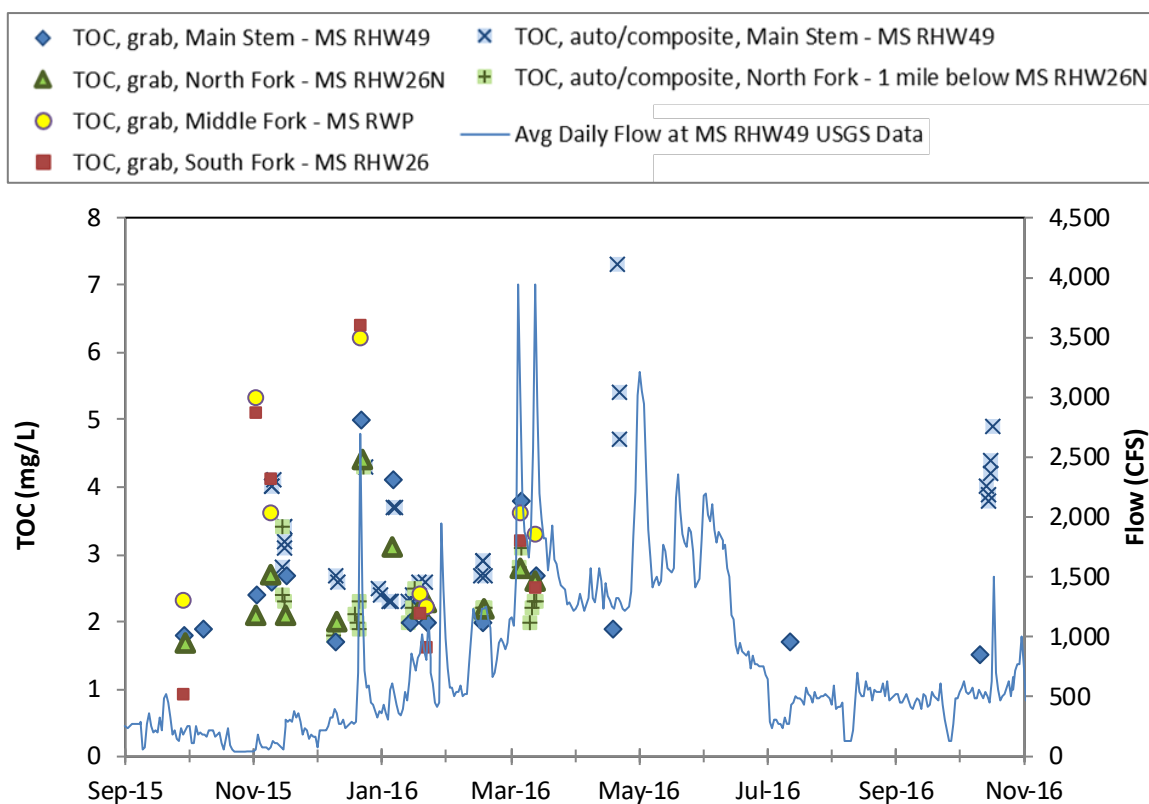
During the wet season of 2015-2016, the first relatively wet winter following four years of drought, and the winter immediately following the Butte Fire, TOC sample results were higher than other years, with a maximum grab sample TOC of 5.0 mg/L on December 22, 2015 (Figure 4-9a). However, more sampling was done on the river that year than other years, with an emphasis on sampling during or soon after storm events. This increased the chances of capturing elevated TOC during peak runoff that year.

Figure 4-9. TOC in the Upper Mokelumne River

a. TOC on the Main Stem at MS RHW49 – Five years (2015 through 2019)



b. TOC in the Upper Mokelumne River and Tributaries – Special Monitoring after the Butte Fire (September 2015 through October 2016)^a



a) MS RHW49 is downstream of the burn area, while all other sample locations in this figure are upstream of the burn area.

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Runoff was not as high in the winter of 2015-2016 as in the subsequent three years, but it was higher than it had been in the previous four years of drought, potentially bringing a build-up of loose material into the reservoir, causing TOC to be higher than would have otherwise been for the amount of runoff that year. On the other hand, as will be shown later in this report (Figure 4-13), the TOC in Pardee reservoir in 2015-2016 was similar to or less than TOC during the three subsequent winters. It should be noted that the range of TOC in the reservoir is much lower than in the river, due to dilution and dispersion in the larger water body. Nevertheless, trends in reservoir TOC do follow river flow patterns, and for at least a month in early 2017, TOC in Pardee Reservoir was higher than in 2015-2016. Early 2017 brought extraordinary levels of rain, yet TOC results on the Mokelumne River were not as high as during the previous winter. This is at least in part due to the difference in sample frequency and timing. Sampling on the river during this period of time was quarterly, and no samples were collected between January 12 and April 13, 2017. The high flows were just beginning when the January 12 sample was collected (2.6 mg/L), and the highest daily average flow occurred on February 9, two months before the next TOC sample was collected. Thus, it is likely the peak TOC in the river in early 2017 was at least as high as the peak TOC in late 2015.

The tributary sampling locations are all upstream of the Butte Fire burn area, while the MS RHW49 location is downstream of the burn area. When storms occur, they carry large quantities of debris and loose soil into the Mokelumne River, and burned areas tend to have increased quantities of loose debris. However, when sampled during storm events in 2015-2016, TOC was consistently higher on the Middle and South Forks than on the Main Stem, and the North Fork and Main Stem TOC were similar to one another (Figure 4-9b). The highest grab sample TOC results occurred during the first significant runoff event in four years, on December 22, 2015, with TOC of 6.4, 6.2, and 4.4 mg/L at the South, Middle, and North Forks, respectively, and TOC of 5.0 mg/L on the Main Stem at MS RHW49 (the highest MS RHW49 TOC in all five years of this update period). The area of the watershed impacted by fire was small relative to the watershed as a whole, and any impact on runoff water quality by the fire was not significant enough to see in the TOC results.

For most storm events that had both auto/composite samples collected through the storm hydrograph and grab samples collected within the day following peak runoff, the maximum auto/composite TOC was not much different than the grab TOC at each location (Figure 4-9b). This indicates that while TOC was elevated during high runoff periods, it did not rapidly change after reaching the peak, remaining elevated for at least a day following the peak runoff. The maximum TOC from the composited automated samplers was 7.3 mg/L on April 22, 2016 at MS RHW49. The automated sampling equipment had been removed from the North Fork by this time and no grab samples were collected there. No grab sample was collected during or after peak runoff for that storm. (The timescale in Figure 4-9b is too fine to make clear, but the grab samples collected in April 2016 and October 2016 were each collected a few days prior to storm events captured by the automated sampling equipment.)

Cryptosporidium and Giardia

Cryptosporidium and *Giardia* were sampled once per quarter during 2015 - 2019 on the Mokelumne River at MS RHW49. This monitoring is conducted for operational purposes; this location is not used for drinking water compliance. Out of twenty samples, *Cryptosporidium* was detected eleven times, at a maximum of 0.6 oocysts/L, and *Giardia* was detected six times at a maximum of 0.2 cysts/L as shown on Table 4-5. In contrast, *Cryptosporidium* and *Giardia* are rarely detected in the drinking water outtakes in Pardee Reservoir.

Table 4-5. *Cryptosporidium* and *Giardia* in the Upper Mokelumne River at MS RHW49, 2015-2019 (non-regulatory monitoring conducted for operational purposes)

Collection Date	<i>Cryptosporidium</i> Oocysts (#/L)	<i>Giardia</i> Cysts (#/L)	MDL ^a (#/L)
1/15/2015	ND	ND	0.1
4/9/2015	ND	ND	0.1
7/9/2015	ND	ND	0.1
10/8/2015	ND	ND	0.1
1/14/2016	ND	ND	0.1
4/20/2016	ND	ND	0.1
7/13/2016	ND	ND	0.1
10/11/2016	0.1	0.2	0.1
1/12/2017	0.3	0.1	0.1
4/13/2017	0.1	ND	0.1
7/13/2017	ND	ND	0.1
10/12/2017	0.2	0.2	0.1
1/11/2018	0.6	ND	0.1
4/12/2018	ND	ND	0.1
7/12/2018	0.2	ND	0.1
10/23/2018	0.1	0.1	0.1
1/9/2019	0.1	0.1	0.1
4/25/2019	0.1	0.2	0.1
7/11/2019	0.1	ND	0.1
10/30/2019	0.6	ND	0.1
# <i>Cryptosporidium</i> Samples	20	# <i>Giardia</i> Samples	20
# <i>Cryptosporidium</i> Detections	11	# <i>Giardia</i> Detections	6
Max <i>Cryptosporidium</i> Oocysts (#/L)	0.6	Max <i>Giardia</i> Cysts (#/L)	0.2

a) The DLR for *Cryptosporidium* and *Giardia* is 0.1 #/L, the same as the MDL for these samples

Other Parameters Monitored in the Upper Mokelumne River Watershed

Additional parameters are also monitored in the Upper Mokelumne River and tributaries for various monitoring programs. In addition to coliforms, turbidity, and TOC, MS RHW49 is sampled quarterly for metals, nutrients, SOC, and disinfection byproduct formation potential. In addition, special monitoring of metals and nutrients were sampled during storm events the winter following the Butte fire (2015-2016). Table 4-6 summarizes results of detected primary and secondary standard chemicals in the Upper Mokelumne River and its tributaries during 2015- 2019.

Although some IOC were periodically high in the tributaries, especially during storms, the same chemicals were much lower in Pardee Reservoir samples where all IOC were below the primary drinking water MCLs (Pardee Reservoir water quality is discussed further below). No regulated SOC were detected in the Upper Mokelumne River or its tributaries.

Comparison of River Water Quality to Reservoir Water Quality

Water quality in the Upper Mokelumne River and its tributaries is much more variable than water quality in Pardee and Camanche Reservoirs. Storm water runoff temporarily increases solids, minerals, and organic loading in the rivers. Turbidity, *E. coli*, total coliforms and IOC all periodically exceed drinking water MCLs, and occasionally exceed what the WTPs could easily treat. However, the large volume of water stored in Pardee Reservoir tends to temper spikes in turbidity and other parameters associated with runoff events in the river.

As watershed activities change and watershed management practices are modified, the District's sampling of tributary locations continues to be a valuable water quality information tool.

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Table 4-6. Upper Mokelumne River and Tributaries Monitoring, Detected IOCs and Parameters with Secondary Standards, 2015-2019 ^a

Water Quality Parameters	MCL	Units	No. of Samples	No. of Detections	Med.	Min.	Max.	MDL	DLR
Primary Standards – Inorganic Chemicals									
Aluminum (Al)	1,000	µg/L	127	123	149	ND	39,900	7.3-46.3	50
Antimony (Sb)	6	µg/L	111	5	ND	ND	7.3	0.02-0.3	6
Arsenic (As)	10	µg/L	116	90	0.34	ND	2.3	0.2-0.3	2
Barium (Ba)	1,000	µg/L	126	126	13	6.98	550	0.2-0.4	100
Beryllium (Be)	4	µg/L	133	11	ND	ND	1.21	0.1-1	1
Cadmium (Cd)	5	µg/L	111	72	0.015	ND	0.24	0.0061-0.05	1
Chromium (Cr)	50	µg/L	111	59	0.36	ND	7.8	0.08-0.61	10
Chromium-6 (Cr(VI))	10 ^b	µg/L	64	9	ND	ND	0.13	0.02-0.05	1
Cyanide (CN)	0.15	mg/L	79	3	ND	ND	0.013	0.003	100
Mercury (Hg)	2	µg/L	117	7	ND	ND	0.075	0.011-0.04	1
Nickel (Ni)	100	µg/L	109	101	0.5	ND	7.8	0.011-0.3	10
Nitrate+Nitrite (as N)	10	mg/L	66	62	0.034	ND	0.18	---	---
Nitrate (as N)	10	mg/L	66	63	0.032	ND	0.17	0.0009-0.007	0.4
Nitrite (as N)	1	mg/L	66	25	ND	ND	0.019	0.0005-0.0072	0.4
Secondary Standards									
Aluminum (Al)	200	µg/L	127	123	49	ND	39900	7.3-46.3	50
Specific Conductance	900	µS/cm	47	47	56.4	33.3	124.4	0.3	---
Copper (Cu)	1,000	µg/L	133	26	ND	ND	143.0	4.06-23.4	50
Iron (Fe)	300	µg/L	97	97	225.0	54.5	5550	0.52-5.41	100
Manganese (Mn)	50	µg/L	126	126	18.5	1.1	2480	0.083-0.52	20
pH	6.5-8.5	pH units	46	46	7.6	6.9	8.6	---	---
Silver (Ag)	100	µg/L	117	5	ND	ND	8.32	0.0081-0.081	10
Sulfate	250	mg/L	112	112	1.5	0.61	7	0.003-0.015	0.5
Total Dissolved Solids (TDS)	500	mg/L	86	84	43	17	82	5.5-22	---
Zinc (Zn)	5,000	µg/L	113	77	2.9	ND	29	0.52-4.16	50

a) Abbreviations: DLR = Detection Limit for Reporting, MDL = Method Detection Limit, NA = data not available, ND = not detected above the MDL (i.e. value is below method detection limit),

b) There is no current MCL for hexavalent chromium. The previous MCL of 0.010 mg/L was withdrawn on September 11, 2017

Pardee Reservoir

Pardee Reservoir water is a high-quality drinking water supply that provides raw water to the small system WTPs at PACT and PARA and to the large system WTPs in the East Bay via the Mokelumne Aqueducts.

Existing Raw Water Quality and Trends in Pardee Reservoir

Table 4-7 is a statistical summary of the raw water quality data of all parameters regulated by Title 22 and other pertinent parameters collected from Pardee Reservoir Tower (PATW), PACT WTP Influent (PACIN), PARA WTP Influent (PARIN), Pardee Dam (PADM), Pardee Reservoir Inflow (LOGBOOM) and the Mokelumne Aqueduct Tunnel at Shaft Pump (before any chemical addition) for the five-year period of the MRWSS 2020 Update. For each parameter, the number of samples, number of detections, the median, minimum, and maximum concentrations, and method detection limit are included along with the regulatory MCLs and DLRs, when applicable. The raw water quality was evaluated using MCLs as a benchmark and potential guide for treatment operations only.

Table 4-7. Pardee Reservoir Raw Water Monitoring, 2015-2019 ^a

Water Quality Parameters	MCL	Units ^b	No. of Samples	No. of Detections	Med.	Min.	Max.	MDL	DLR
Microbiological Constituents									
<i>Cryptosporidium</i>	TT ^c	#/L	22	0	ND	ND	ND	0.1	1
<i>E. coli</i> ^d	TCR ^e	MPN/100 mL	53	20	ND	ND	9.8	1	---
<i>Giardia</i>	TT ^c	#/L	22	0	ND	ND	ND	0.1	1
<i>Legionella</i>	TT ^c	---	0	---	---	---	---	---	---
Total Coliform ^d	TCR ^e	MPN/100 mL	52	52	6.1	4.1	2,400	1	---
Turbidity ^f	TT ^c	NTU	39	39	0.7	0.3	8.2	0.07-0.08	---
Viruses	TT ^c	---	0	---	---	---	---	---	---
Primary Standards – Inorganic Chemicals									
Aluminum (Al)	1,000	µg/L	12	11	41	ND	858	0.3-16.3	50
Antimony (Sb)	6	µg/L	11	1	ND	ND	0.031	0.02-0.2	6
Arsenic (As)	10	µg/L	11	8	0.45	ND	3	0.2-0.28	2
Asbestos	7	MFL	6	0	ND	ND	ND	0.2	0.2
Barium (Ba)	1,000	µg/L	11	11	9	7.42	45	0.024-0.322	100
Beryllium (Be)	4	µg/L	11	1	ND	ND	0.104	0.01-0.104	1
Cadmium (Cd)	5	µg/L	11	2	ND	ND	0.12	0.0061-0.05	1
Chromium (Cr)	50	µg/L	11	6	0.44	ND	2.8	0.08-0.61	10
Chromium-6 (Cr (VI))	---	µg/L	1	0	ND			0.05	---
Cyanide (CN)	0.15	mg/L	7	0	ND	ND	ND	0.0012-0.0039	100

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Table 4-7. Pardee Reservoir Raw Water Monitoring, 2015-2019 (continued)^a

Water Quality Parameters	MCL	Units ^b	No. of Samples	No. of Detections	Med.	Min.	Max.	MDL	DLR
Fluoride (F ⁻)	2	mg/L	218	218	0.030	0.023	0.051	0.0004-0.012	0.1
Mercury (Hg)	2	µg/L	11	0	ND	ND	ND	0.011-0.04	1
Nickel (Ni)	100	µg/L	9	9	0.32	0.17	4	0.011-0.2	10
Nitrate+Nitrite (as N)	10	mg/L	111	87	0.018	ND	0.149	---	---
Nitrate (as N)	10	mg/L	217	193	0.023	ND	0.55	0.0009-0.007	0.4
Nitrite (as N)	1	mg/L	111	10	ND	ND	0.027	0.0005-0.0072	0.4
Perchlorate (ClO ₄ ⁻)	6	µg/L	15	0	ND	ND	ND	0.5-0.9	4
Selenium (Se)	50	µg/L	11	0	ND	ND	0.69	0.17-0.69	5
Thallium (Tl)	2	µg/L	11	1	ND	ND	0.1	0.01-0.1	1
Primary Standards – Synthetic Non-Volatile Organic Chemicals (SOCs)									
Acrylamide	TT ^c	---	0	---	---	---	---	---	---
Alachlor	2	µg/L	7	0	ND	ND	ND	0.02-0.021	1
Atrazine (Aatrex)	1	µg/L	7	0	ND	ND	ND	0.025-0.026	0.5
Bentazon	18	µg/L	5	0	ND	ND	ND	0.14	2
Benzo(a)pyrene	0.2	µg/L	5	0	ND	ND	ND	0.011	0.1
Carbofuran	18	µg/L	5	0	ND	ND	ND	0.39-0.68	5
Chlordane	0.1	µg/L	5	0	ND	ND	ND	0.096-0.1	0.1
Dalapon	200	µg/L	5	0	ND	ND	ND	0.25	10
1,2-Dibromo-3-chloropropane (DBCP)	0.2	µg/L	5	0	ND	ND	ND	0.002-0.0062	0.01
2,4-Dichlorophenoxy-acetic acid (2,4-D)	70	µg/L	5	0	ND	ND	ND	0.056	10
Di(2-ethylhexyl) adipate	400	µg/L	4	0	ND	ND	ND	0.028-0.029	5
Di(2-ethylhexyl) phthalate	4	µg/L	2	0	ND	ND	ND	0.057-0.059	3
Dinoseb (DNBP)	7	µg/L	5	0	ND	ND	ND	0.057	2
Diquat	20	µg/L	5	0	ND	ND	ND	0.29-1.6	4
Endothall	100	µg/L	5	0	ND	ND	ND	1-1.1	45
Endrin	2	µg/L	5	0	ND	ND	ND	0.03-0.031	0.1
Epichlorohydrin	TT ^c	---	0	---	---	---	---	---	---
Ethylene Dibromide (EDB)	0.05	µg/L	5	0	ND	ND	ND	0.002-0.0031	0.02
Glyphosate	700	µg/L	5	0	ND	ND	ND	1.5-6	25
Heptachlor	0.01	µg/L	5	0	ND	ND	ND	0.0058-0.0060	0.01
Heptachlor Epoxide	0.01	µg/L	5	0	ND	ND	ND	0.0060-0.0098	0.01
Hexachlorobenzene	1	µg/L	5	0	ND	ND	ND	0.017-0.018	0.5

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Table 4-7. Pardee Reservoir Raw Water Monitoring, 2015-2019 (continued)^a

Water Quality Parameters	MCL	Units ^b	No. of Samples	No. of Detections	Med.	Min.	Max.	MDL	DLR
Hexachlorocyclopentadiene	50	µg/L	5	0	ND	ND	ND	0.018-0.019	1
Lindane (gamma BHC)	0.2	µg/L	5	0	ND	ND	ND	0.016-0.017	0.2
Methoxychlor	30	µg/L	5	0	ND	ND	ND	0.011	10
Molinate	20	µg/L	7	0	ND	ND	ND	0.025-0.026	2
Oxamyl (Vydate)	50	µg/L	5	0	ND	ND	ND	0.38-1	20
Pentachlorophenol (PCP)	1	µg/L	5	0	ND	ND	ND	0.014-0.1	0.2
Picloram	500	µg/L	5	0	ND	ND	ND	0.022	1
Polychlorinated Biphenyls (PCB's) as Decachlorobiphenyl	0.5	µg/L	5	0	ND	ND	ND	0.3	0.5
1,2,3-Trichloropropane	5	ng/L	18	0	ND	ND	ND	0.68-0.94	5
Simazine	4	µg/L	7	0	ND	ND	ND	0.027-0.028	1
2,4,5-TP (Silvex)	50	µg/L	5	0	ND	ND	ND	0.063	1
2,3,7,8-TCDD (Dioxin)	30	pg/L	5	0	ND	ND	ND	0.177-0.235	5
Thiobencarb	70	µg/L	7	0	ND	ND	ND	0.017-0.018	1
Toxaphene	3	µg/L	5	0	ND	ND	ND	0.48-0.51	1
Primary Standards – Radionuclides									
Gross Alpha	15	pCi/L	3	2	0.437 +/- 0.88	0.017 +/- 0.664	0.501 +/- 0.832	MDA95 1.04-1.26	3
Gross Beta/ Photon	50 (screening level)	pCi/L	1	0	0 +/- 0.931			MDA95 1.52	4
Radium 226+228	5	pCi/L	1	1	0.106+/-0.584			---	---
Radium-226	---	pCi/L	1	0	0.048+/-0.093			MDA95 0.47	1
Radium-228	---	pCi/L	1	1	0.058 +/- 0.491			MDA95 0.253	1
Strontium-90	8	pCi/L	1	0	0 +/- 0.634			MDA95 0.682	2
Tritium	20,000	pCi/L	1	0	0 +/- 263			MDA95 434	1,000
Uranium	20	pCi/L	1	1	0.192 +/- 0.376			MDA95 0.3	1
Disinfectant/Disinfection Byproducts Rule									
Bromate	10	µg/L	0	---	---	---	---	---	5 or 1
Chloramines as Cl ₂	4	mg/L	0	---	---	---	---	---	---
Chlorine as Cl ₂	4	mg/L	0	---	---	---	---	---	---
Chlorine Dioxide	0.8	mg/L	0	---	---	---	---	---	---

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Table 4-7. Pardee Reservoir Raw Water Monitoring, 2015-2019 (continued)^a

Water Quality Parameters	MCL	Units ^b	No. of Samples	No. of Detections	Med.	Min.	Max.	MDL	DLR
Chlorite	1	mg/L	0	---	---	---	---	---	0.02
HAA5 (as LRAA)	60 (LRAA)	µg/L	0	---	---	---	---	---	---
Total Trihalomethanes	80 (LRAA)	µg/L	9	0	ND	ND	ND	---	---
Bromodichloromethane	---	µg/L	9	0	ND	ND	ND	0.09-0.21	1
Bromoform	---	µg/L	9	0	ND	ND	ND	0.096-0.31	1
Chloroform	---	µg/L	9	0	ND	ND	ND	0.096-0.15	1
Dibromochloromethane	---	µg/L	9	0	ND	ND	ND	0.065-0.26	1
Primary Standards – Volatile Organic Chemicals (VOCS)									
Benzene	1	µg/L	9	0	ND	ND	ND	0.044-0.14	0.5
Carbon Tetrachloride	0.5	µg/L	9	0	ND	ND	ND	0.034-0.25	0.5
1,2-Dichlorobenzene (o-DCB)	600	µg/L	9	0	ND	ND	ND	0.082-0.23	0.5
1,4-Dichlorobenzene (p-DCB)	5	µg/L	9	0	ND	ND	ND	0.036-0.18	0.5
1,1-Dichloroethane (1,1-DCA)	5	µg/L	9	0	ND	ND	ND	0.1-0.21	0.5
1,2-Dichloroethane (1,2-DCA)	0.5	µg/L	9	0	ND	ND	ND	0.074-0.14	0.5
1,1-Dichloroethylene (1,1-DCE)	6	µg/L	9	0	ND	ND	ND	0.12-0.21	0.5
cis-1,2-Dichloroethylene (c-1,2-DCE)	6	µg/L	9	0	ND	ND	ND	0.14-0.25	0.5
trans-1,2-Dichloroethylene (t-1,2-DCE)	10	µg/L	9	0	ND	ND	ND	0.1-0.19	0.5
Dichloromethane (Methylene Chloride)	5	µg/L	9	0	ND	ND	ND	0.092-0.18	0.5
1,2-Dichloropropane	5	µg/L	9	0	ND	ND	ND	0.056-0.15	0.5
1,3-Dichloropropene (TOTAL)	0.5	µg/L	9	0	ND	ND	ND	---	0.5
Cis-1,3-Dichloropropene	---	µg/L	9	0	ND	ND	ND	0.065-0.23	---
Trans-1,3-Dichloropropene	---	µg/L	9	0	ND	ND	ND	0.051-0.18	---
Ethylbenzene	300	µg/L	9	0	ND	ND	ND	0.047-0.18	0.5
Methyl-tert-butyl ether (MTBE)	13	µg/L	9	0	ND	ND	ND	0.067-0.39	3
Monochlorobenzene (Chlorobenzene)	70	µg/L	9	0	ND	ND	ND	0.05-0.21	0.5
Styrene	100	µg/L	9	0	ND	ND	ND	0.075-0.19	0.5

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Table 4-7. Pardee Reservoir Raw Water Monitoring, 2015-2019 (continued)^a

Water Quality Parameters	MCL	Units ^b	No. of Samples	No. of Detections	Med.	Min.	Max.	MDL	DLR
1,1,2,2-Tetrachloroethane	1	µg/L	9	0	ND	ND	ND	0.097-0.18	0.5
Tetrachloroethylene (PCE)	5	µg/L	9	0	ND	ND	ND	0.049-0.2	0.5
Toluene	150	µg/L	9	0	ND	ND	ND	0.054-0.16	0.5
1,2,4-Trichlorobenzene	5	µg/L	9	0	ND	ND	ND	0.096-0.19	0.5
1,1,1-Trichloroethane (1,1,1-TCA)	200	µg/L	9	0	ND	ND	ND	0.1-0.19	0.5
1,1,2-Trichloroethane (1,1,2-TCA)	5	µg/L	9	0	ND	ND	ND	0.079-0.21	0.5
Trichloroethylene (TCE)	5	µg/L	9	0	ND	ND	ND	0.12-0.17	0.5
Trichlorofluoromethane (Freon 11)	150	µg/L	9	0	ND	ND	ND	0.065-0.22	5
1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon 113)	1,200	µg/L	9	0	ND	ND	ND	0.11-0.25	10
Vinyl Chloride	0.5	µg/L	9	0	ND	ND	ND	0.086-0.22	0.5
Xylenes (Total)	1,750	µg/L	9	0	ND	ND	ND	0.22	0.5
m+p-Xylene	---	µg/L	9	0	ND	ND	ND	0.14-0.37	---
o-Xylene	---	µg/L	9	0	ND	ND	ND	0.079-0.18	---
Secondary Standards									
Aluminum (Al)	200	µg/L	12	11	41	ND	858	0.3-16.3	50
Chloride (Cl)	250	mg/L	107	107	1.2	0.48	3.4	0.002-0.057	---
Color	15	color unit	1	1	4	1	---	Color	15
Specific Conductance	900	µS/cm	4	4	51.1	40.0	77.6	0.3	---
Copper (Cu)	1,000	µg/L	3	1	ND	ND	17.6	4.06-5.2	50
Foaming Agents (MBAS)	0.5	mg/L	1	0	ND			0.03	---
Iron (Fe)	300	µg/L	1	1	20.3			5.2	100
Manganese (Mn)	50	µg/L	3	3	6.5	3.8	284	0.083-0.104	20
Methyl-tert-butyl ether (MTBE)	5	µg/L	9	0	ND	ND	ND	0.067-0.39	3
Odor-Threshold	3	TON	1	0	ND			1	1
pH	6.5-8.5	pH units	35	35	7.3	6.7	7.9	---	---
Silver (Ag)	100	µg/L	3	0	ND	ND	ND	0.0081-0.02	10
Sulfate	250	mg/L	109	109	1.2	0.69	2.2	0.003-0.076	0.5
Thiobencarb	1	µg/L	7	0	ND	ND	ND	0.017-0.018	1
Total Dissolved Solids (TDS)	500	mg/L	108	108	31	17	59	5-11	---
Turbidity	5	NTU	39	39	0.7	0.3	8.2	0.07-0.08	---
Zinc (Zn)	5,000	µg/L	3	3	19	3.7	22.5	0.728-2	50

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Table 4-7. Pardee Reservoir Raw Water Monitoring , 2015-2019 (continued)^a

Water Quality Parameters	MCL	Units ^b	No. of Samples	No. of Detections	Med.	Min.	Max.	MDL	DLR
Other Constituents									
Total Alkalinity (as CaCO ₃)	---	mg/L	237	237	14	9.1	33	1.2 - 5	---
Bromide	---	µg/L	27	2	ND	ND	5	0.0006	---
Calcium (Ca)	---	µg/L	100	100	3,650	2,500	9,830	6.24 - 22.6	---
Ethyl-tert-butyl-ether	---	µg/L	9	0	ND	ND	ND	0.042-0.19	---
Total Hardness (as CaCO ₃)	---	mg/L	99	99	14	8	22	1.4 - 6	---
Magnesium (Mg)	---	µg/L	81	81	980	679	2,320	1.04 - 9.36	---
Orthophosphate (as P)	---	mg/L	102	11	ND	ND	0.029	0.0023-0.0099	---
Sodium (Na)	---	µg/L	107	107	1,920	1,040	3,770	3.12 - 11.4	---
Total Organic Carbon	---	mg/L	142	142	1.7	0.92	2.6	0.024-0.12	---

- a) Abbreviations: --- = not applicable, ND = not detected (i.e. value is below method detection limit), TT = Treatment Technique (see footnote c), TCR = Total Coliform Rule (see footnote d), MCL = Maximum Contaminant Level, MDL = Method Detection Limit, DLR = Detection Limit for Reporting.
- b) Units not defined in text: MFL= million fibers (asbestos) per liter, pCi/L = picocuries per liter, µS/cm = microsiemens per centimeter.
- c) Treatment Technique (TT)
- *Cryptosporidium*: 99% removal.
 - *Giardia lamblia*: 99.9% removal/inactivation
 - Viruses: 99.99% removal/inactivation
 - *Legionella*: No limit, but USEPA believes that if *Giardia* and viruses are removed/inactivated, *Legionella* will also be controlled.
 - Turbidity: performance standards per Title 22, Chapter 17 and “1998 Water Supply Permit” for the East Bay system.
 - Acrylamide: 0.05% monomer in polyacrylamide dose of 1 ppm
 - Epichlorohydrin: 0.01% residual of epichlorohydrin in dose of 20 mg/L.
- d) This table only shows total coliform and *E. coli* results from the Colilert 18 Q-T method (SM9223B), and excludes all results from MTF (SM 9221B and F). See Bacteriological Section for further information.
- e) Total Coliform Rule (TCR). Total coliform samples are collected from the treated water distribution system per a sampling plan approved by SRWCB-DDW (TCR is not applicable to raw water). When a sample is positive for total coliform, it must be further analyzed for *E. coli*, and repeat sampling must be conducted. The TCR was revised in April 2016, before which time analysis of fecal coliform could be conducted in lieu of *E. coli*.
- f) Turbidity in this table is from grab samples taken from the reservoir. It does not include routine turbidity samples taken from the WTP operators at the WTP influents. Turbidity from continuous online analyzers is shown in the Turbidity section.
- g) There is no current MCL for hexavalent chromium. The previous MCL of 10 µg/L was withdrawn on September 11, 2017. The DLR was 1 µg/L.

Turbidity

Pardee Reservoir has low turbidity water most of the time with occasional spikes of moderate to high turbidity. Online turbidity instruments are located at three monitoring stations: PARIN, PACIN, and the Mokelumne Aqueducts at Campo Seco. The latter is at the end of the Pardee Tunnel on the Mokelumne Aqueducts, two miles downstream of the shaft pump where Aqueduct Tunnel grab samples are collected. Unlike the grab sample location, Campo Seco is downstream of lime addition. However, the PACT WTP Intake is

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located near the Pardee Outlet Tower serving the Mokelumne Aqueducts, and turbidities at Campo Seco are similar to PACIN, verifying there is not a significant impact on turbidity due to the lime addition. The daily average turbidities from these monitoring stations are shown in Figure 4-10 alongside Mokelumne River flow MS RHW49.

The median of average daily turbidity values for the 2020 MRWSS Update period were 0.54 NTU, 0.52 NTU, and 0.62 NTU at PARIN, PACIN, and Campo Seco, respectively. More than eighty percent of the average daily turbidity readings from these three locations were less than 1 NTU.

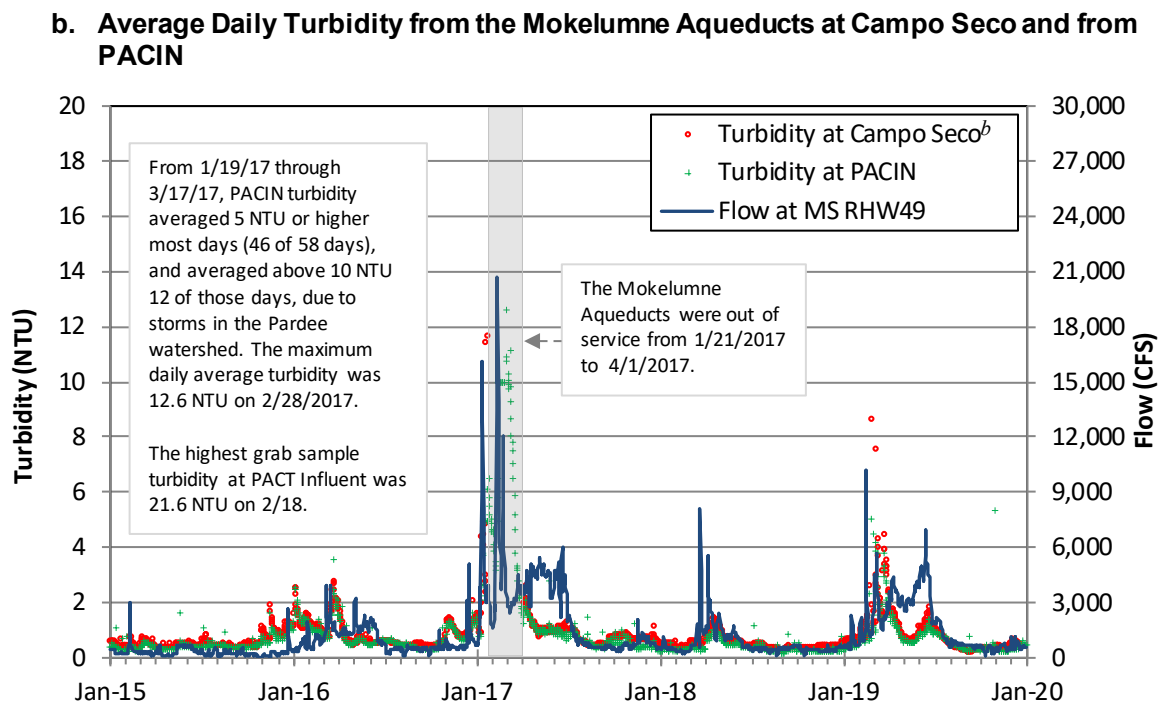
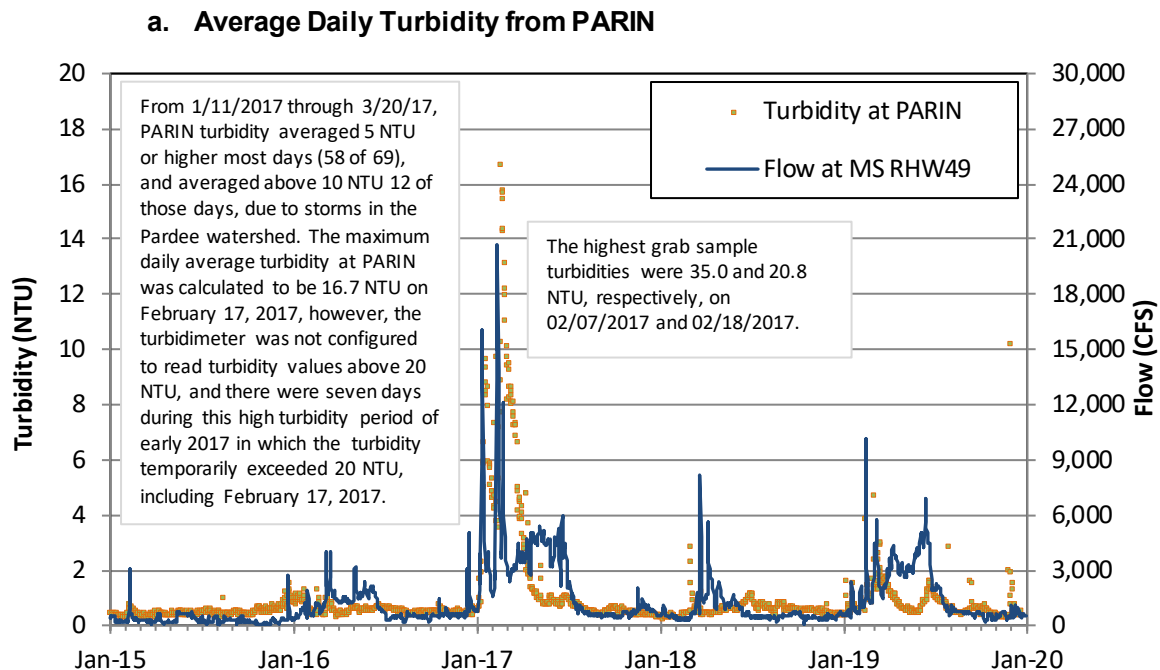
The turbidity profiles in Figure 4-10 resemble the flow profile at MS RHW49, with highs and lows occurring around the same time periods. During high runoff periods each winter, there were marked increases in turbidity at all three on-line turbidity monitoring stations. Occasionally, isolated high turbidities occurred briefly when runoff was not high. These were most likely due to operational reasons, such as pump start-ups or tower gate changes, and are not reflective of reservoir water quality.

The highest inflows to Pardee Reservoir were recorded in January and February 2017 monthly inflows of 250 and 380 TAF, respectively, due to heavy precipitation. PARIN turbidity (Figure 4-10a) rose above a daily average of 5 NTU on January 11, 2017 and peaked above 10 NTU for most of the next sixty-eight days, before falling and staying below 5 NTU on March 21, 2017. The highest maximum daily average turbidity at PARIN was calculated to be 16.7 NTU on February 17, 2017, however, the turbidimeter was not configured to read turbidity values above 20 NTU, and there were seven days during this period in which the turbidity temporarily exceeded 20 NTU, including February 17. In other words, the true maximum daily average was likely higher than 16.7 NTU. The highest grab sample turbidities measured by operators were 35 and 21 NTU, on February 7 and February 18, 2017, respectively.

Figure 4-10b shows that PACIN turbidity also rose significantly during and after the storms of early 2017. The peak average daily turbidity (12.6 NTU) and peak grab sample turbidity (21.6 NTU) were slightly lower than at PARIN, but still much higher than usual.

This 2017 turbidity event in Pardee Reservoir exceeded the water quality limits that the East Bay in-line filtration water treatment plants could reliably treat to meet regulatory standards. The Mokelumne Aqueducts were preemptively shut down for more than two months, the longest recorded shutdown duration for a water quality event, and the fourth since 1982. For these two plus months, water from Briones Reservoir supplied the in-line filter plants in the East Bay. For this period, turbidity data collected by the online instrument at Campo Seco were removed from Figure 4-10b, since they were not representative of reservoir water quality.

Figure 4-10. Average Daily Pardee Reservoir Turbidity from Online Analyzers with Average Daily Flow from the Mokelumne River at MS RHW49



- a) Campo Seco is at the end of the Pardee Tunnel on the Mokelumne Aqueducts, almost two miles downstream of the shaft pump where Aqueduct Tunnel grab samples are collected. Unlike the grab sample location, Campo Seco is downstream of lime addition.

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Table 4-8 compares average daily turbidity statistics from PARIN online turbidity analyzer, as well as total coliform and *E. coli* values throughout the reservoir (discussed below), during the MRWSS 2020, 2015, and 2010 Updates. The median daily turbidities were slightly higher in the MRWSS 2020 Update compared to the previous two updates and the maximum turbidities were significantly higher, due to the strong winter storms of early 2017.

Bacteriological Water Quality

The District collected total coliform and *E. coli* samples regularly from Pardee Reservoir at PACIN, PARIN, Aqueduct Tunnel, and PATW surface locations. Until mid-2019, most of these total coliform and *E. coli* samples were analyzed by Standard Methods (SM) 9221B and 9221F, respectively, known as the multiple tube fermentation (MTF) methods. However, it was discovered that these samples had not been consistently analyzed in strict accordance with EPA guidance for raw water analysis with MTF. In August 2019, the District switched to exclusive use of the SM9223B (Colilert 18 Q-T) method for samples from these locations. Therefore, most of the *E. coli* and total coliform data collected prior to mid-2019 during this update period are not included in this report. The only samples analyzed by Colilert 18 Q-T prior to mid-2019 were collected for the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) for the East Bay System. These were collected monthly from April 2015 through January 2017 from the Aqueduct Tunnel location.

Table 4-8 shows statistics for total coliform results for this MRWSS 2020 Update, as well as the two previous updates. The data in this table for the current update period only includes results from the Colilert 18 Q-T method, whereas most results from previous updates were from the MTF method. The median statistic appears to indicate an order of magnitude increase in total coliform results for this update period, however, this is likely due to the change in method. Colilert 18 Q-T avoids potential negative analytical interferences that can occur with MTF of raw water, and introduces potential positive interference of *Aeromonas* species. Table 4-8 does not indicate a significant change in *E. coli* concentration this update period over the previous two updates, despite the change in analytical method.

Figure 4-11 shows the same total coliform results reported for the MRWSS 2020 Update in Table 4-8, separated by sample location. Figure 4-11a shows total coliform results over time and Figure 4-11b shows the data percentiles. In general, PACIN had lower total coliform levels than the other locations. For example, the fiftieth percentile (median) total coliform result at PACIN (Figure 4-11b) was 20 MPN/100 mL, while all other monitoring locations (PARIN, PATW, and Aqueduct Tunnel) had fiftieth percentile levels just under 100 MPN/100 mL. The maximum total coliform results at both PARIN and Aqueduct Tunnel were greater than 2,400 MPN/100 mL (too numerous to count).

Figure 4-12 shows *E. coli* results analyzed with the Colilert 18 Q-T method for Pardee Reservoir, with results over time shown in Figure 4-12a and *E. coli* percentiles in Figure 4-12b (the same data summarized above in Table 4-8). The fiftieth percentile *E. coli* result was non-detect for all locations except PATW Surface, which had a 50th percentile of 1

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MPN/100 mL. The maximum *E. coli* result for all samples was 10 MPN/100 mL at the Aqueduct Tunnel location.

Table 4-9 shows one year of biweekly *E. coli* monitoring results for LT2ESWTR for PACT and PARA WTPs. These samples were all analyzed by MTF in accordance with EPA guidance. For the sake of simplicity, they are not included in Table 4-8 statistics and not shown in Figure 4-12, which only include Colilert 18 Q-T results. The mean *E. coli* concentrations for LT2ESWTR were 1 and 0.2 MPN/100 mL, at PACIN and PARIN, respectively.

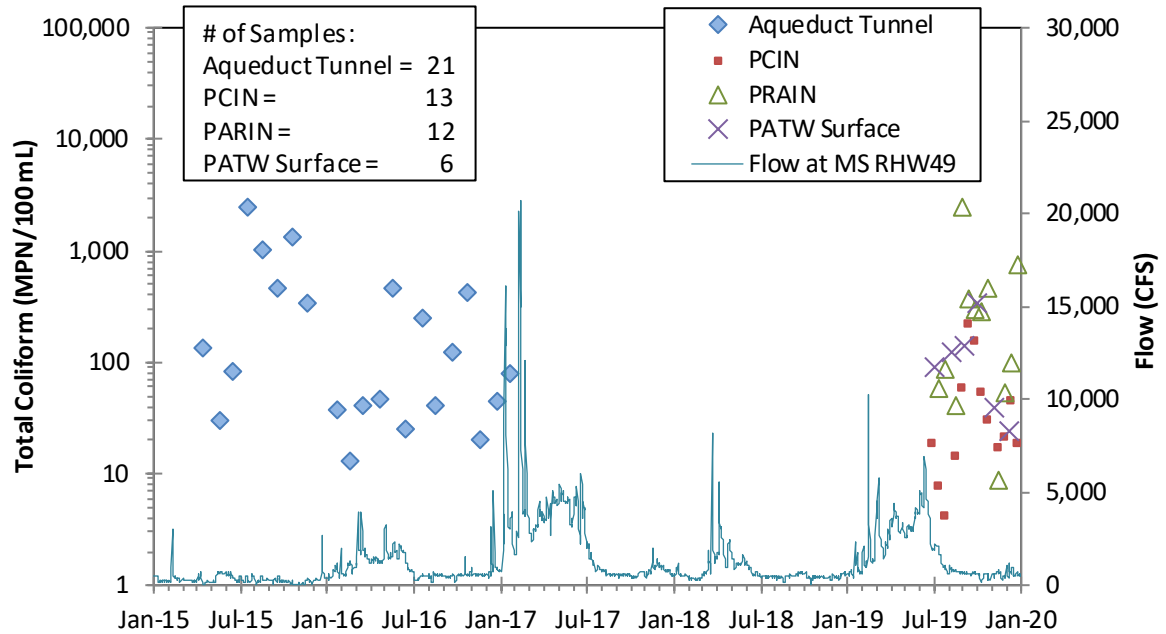
Table 4-8. Summary of Turbidity and Coliform data in Pardee Reservoir from MRWSS 2020, 2015 and 2010 Updates

MRWSS Update and Time Period	Statistic	Turbidity - Daily average at PARIN (NTU)	<i>E. coli</i> ^a (MPN / 100 mL)	Total Coliform ^a (MPN / 100 mL)
<u>MRWSS 2020 Update</u> (2015-2019)	<i>No. of Samples</i>	NA ^b	53	52
	Median	0.54	< 1 (ND)	68
	Max	≥ 16.7 ^c	9.8	>2400
<u>MRWSS 2015 Update</u> (2010-2014)	<i>No. of Samples</i>	NA ^b	247	247
	Median	0.49	< 2 (ND)	4
	Max	3.38	11	700
<u>MRWSS 2010 Update</u> (2005-2009)	<i>No. of Samples</i>	NA ^b	375	277
	Median	0.47	< 2 (ND)	4
	Max	5.76	13	>16,000

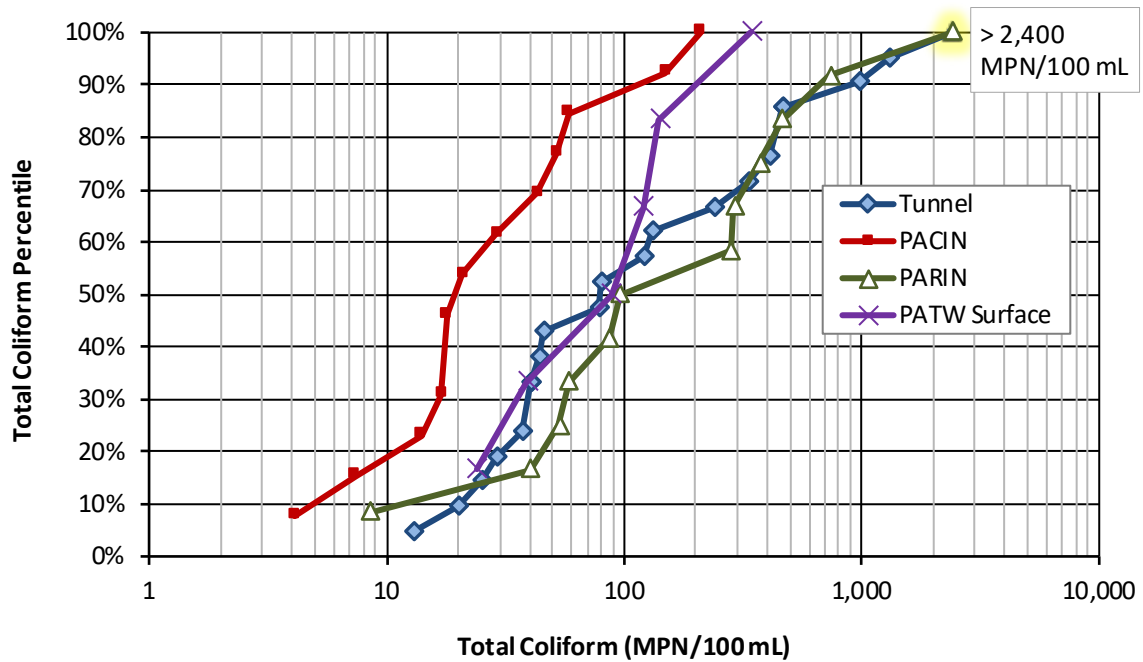
- The MRWSS 2020 Update only uses results from analysis with the Colilert 18 Q-T method (SM9223B) for total coliform and *E. coli*, whereas most results from previous updates were from MTF methods (SM9221B and SM9221F). See text for further information
- NA: not applicable. Data shown are statistics of the daily average turbidity data, obtained from an on-line instrument at Pardee Recreation Area WTP Influent, which monitors continuously.
- The highest maximum daily average turbidity at PARIN was calculated to be 16.7 NTU on February 17, 2017, however, the turbidimeter was not configured to read turbidity values above 20 NTU, and there were seven days during this high turbidity period of early 2017 in which the turbidity exceeded 20 NTU, including that day. In other words, the true maximum daily average was likely higher. The highest grab sample turbidities measured by operators were 35 and 21 NTU, on February 7 and February 18, respectively.

Figure 4-11. Total Coliform in Pardee Reservoir, 2015-2019 ^a

a. Total Coliform in Pardee Reservoir over Time with Average Daily Flow from the Mokelumne River at MS RHW49



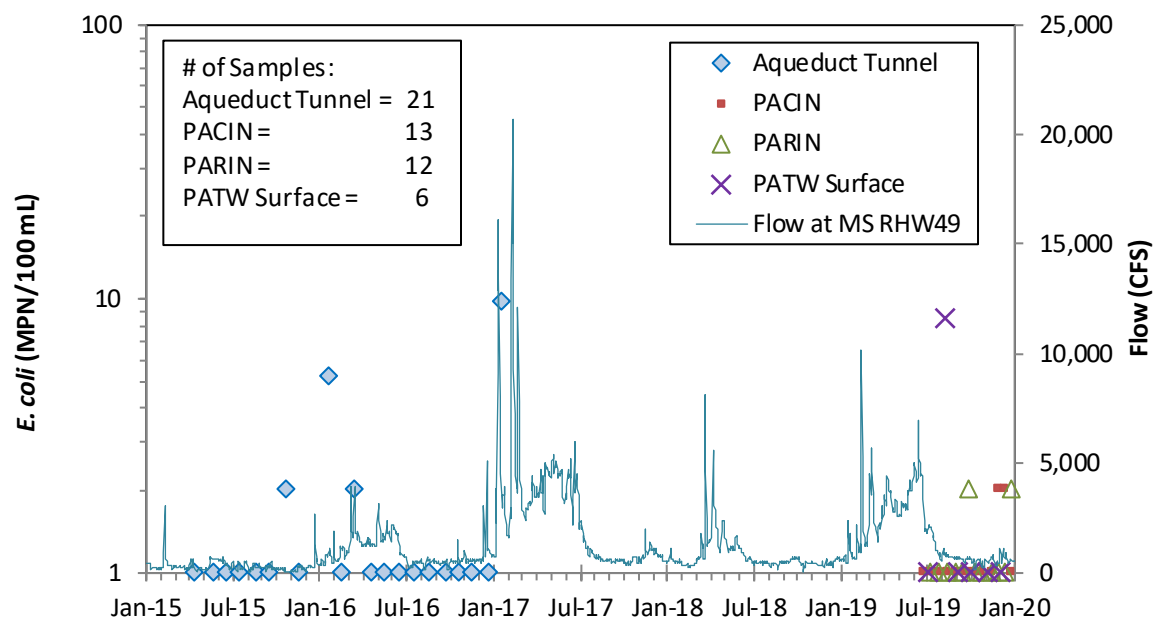
b. Total Coliform Percentiles in Pardee Reservoir



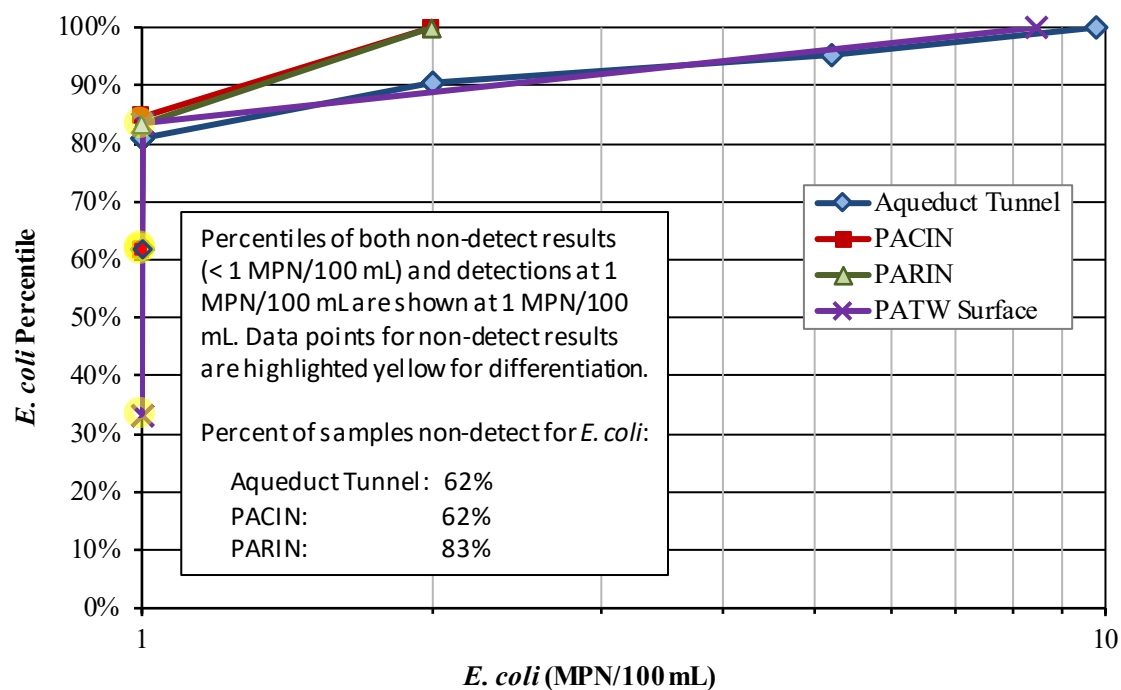
^a Only samples analyzed by Colilert 18 Q-T (SM9223B) are included in this figure. See text for further information.

Figure 4-12. *E. coli* in Pardee Reservoir, 2015-2019 ^a

a. *E. coli* in Pardee Reservoir over Time with Average Daily Flow from the Mokelumne River at MS RHW49



b. *E. coli* Percentiles in Pardee Reservoir



a) Only samples analyzed by Colilert 18 Q-T (SM9223B) are included in this figure. See text for further information.

Table 4-9. *E. coli* Monitoring Results for LT2ESWTR Round 2, Pardee Reservoir at PACIN and PARIN (2017 – 2018)^{a, b}

Collection Date	<i>E. coli</i> (MPN/100mL)		MDL (MPN/100 mL)
	PACIN	PARIN	
10/11/17	ND	ND	1.8
10/25/17	ND	ND	1.8
11/08/17	4.5	ND	1.8
11/22/17	ND	ND	1.8
12/06/17	7.8	1.8	1.8
12/20/17	2	ND	1.8
01/03/18	2	ND	1.8
01/17/18	ND	ND	1.8
01/31/18	ND	ND	1.8
02/14/18	ND	ND	1.8
02/28/18	ND	ND	1.8
03/14/18	ND	ND	1.8
03/28/18	2	ND	1.8
04/11/18	2	ND	1.8
04/25/18	ND	ND	1.8
05/09/18	ND	ND	1.8
05/23/18	2	ND	1.8
06/06/18	1.8	ND	1.8
06/20/18	ND	ND	1.8
07/04/18	ND	ND	1.8
07/18/18	ND	ND	1.8
08/01/18	ND	ND	1.8
08/15/18	ND	ND	1.8
08/29/18	ND	ND	1.8
09/12/18	2	2	1.8
09/26/18	ND	2	1.8
# Samples	26	26	
# Detections	9	3	
Average of Results ^b	1	0.2	

a) These samples were all analyzed by the MTF method (SM9221F), and thus are not included in Table 4-7 and 4-8 statistics and not shown in Figure 4-12. The MDL for this method was 1.8 MPN/100 mL, greater than the MDL of 1 MPN/100 mL for the Colilert 18 Q-T samples.

b) For LT2ESWTR, non-detect results are treated as zero when calculating the average result.

Giardia and Cryptosporidium

The District has monitored *Giardia* and *Cryptosporidium* in Pardee Tunnel at varying frequencies since 1991. LT2ESWTR required two rounds of monitoring to establish whether each drinking water source has an elevated *Cryptosporidium* risk. Starting in October 2006, monthly samples were collected at the Aqueduct Tunnel for two years as part of LT2ESWTR Round 1 for the East Bay water system, resulting in a Bin 1 classification (lowest risk classification). Since 2012, the District has been conducting baseline monitoring of *Cryptosporidium* and *Giardia*, on the Upper Mokelumne River at MS RHW49 as presented above.

LT2ESWTR Round 2 sampling was required during this MRWSS 2020 Update period. Samples were collected at the Aqueduct Tunnel from April 2015 to January 2017 for the East Bay water system. Table 4-10 summarizes LT2ESWTR Round 2 regulatory monitoring results. All *Cryptosporidium* and *Giardia* results were non-detect. There are no samples for February and March 2017, because the Mokelumne Aqueducts had to be shut down due to high turbidity in Pardee Reservoir following severe rainstorms. The LT2ESWTR Round 2 monitoring results confirmed that Pardee Reservoir has very low levels of *Cryptosporidium* and the District continues to be assigned a Bin 1 classification.

LT2ESWTR Round 2 sampling was also required for PACT and PARA WTPs. However, as small systems serving fewer than 10,000 people, they were not required to sample for *Cryptosporidium*. Instead, they sampled biweekly for *E. coli* (Table 4-9, above), allowable if *E. coli* concentrations were less than or equal to 10 MPN/100 mL, which they were. These two systems continue to be assigned a Bin 1 classification.

Regulated Inorganic Chemicals

All regulated inorganic chemicals at Pardee Reservoir raw water met the primary MCL standards (Table 4-7, above). The District's Title 22 monitoring plans (Appendix 4-1) require all regulated inorganic chemicals be sampled annually at PACIN and PARIN. Most regulated inorganic chemicals are monitored for compliance purposes in the treated water effluents of the three in-line filter plants; only asbestos, fluoride, and perchlorate must be monitored for the East Bay system in the raw water at PATW open gates (intakes to the Pardee Tunnel and Mokelumne Aqueducts) or the Aqueduct Tunnel location. Various regulated inorganic chemicals are also regularly or occasionally collected at these or other Pardee Reservoir locations for operational purposes. All results, compliance and discretionary, are included in Table 4-7.

Regulated Organic Compounds

During the period of the MRWSS 2020 Update, no regulated SOC's or VOC's were detected above the DLR. MTBE was detected in Pardee Reservoir in the past, but has not been detected since 2003. For compliance purposes for the East Bay system, VOC's are monitored annually and SOC's are monitored twice per year every three years at the PATW open gates or the Aqueduct Tunnel location. In addition, all regulated VOC's must be monitored once every six years at PACIN and PARIN, and atrazine and simazine (two SOC's) must be monitored at PARIN once every six years.

Table 4-10. Cryptosporidium and Giardia Results in Pardee Reservoir at Aqueduct Tunnel, LT2ESWTR Round 2 Monitoring Results (2015-2017)^a

Collection Date	<i>Cryptosporidium</i> Oocysts (# / L)	<i>Giardia</i> Cysts (# / L)	DLR (# / L)
4/14/2015	ND	ND	0.1
5/20/2015	ND	ND	0.1
6/16/2015	ND	ND	0.1
7/17/2015	ND	ND	0.1
8/18/2015	ND	ND	0.1
9/15/2015	ND	ND	0.1
10/20/2015	ND	ND	0.1
11/17/2015	ND	ND	0.1
12/15/2015	ND	ND	0.1
1/19/2016	ND	ND	0.1
2/16/2016	ND	ND	0.1
3/15/2016	ND	ND	0.1
4/19/2016	ND	ND	0.1
5/17/2016	ND	ND	0.1
6/14/2016	ND	ND	0.1
7/19/2016	ND	ND	0.1
8/16/2016	ND	ND	0.1
9/20/2016	ND	ND	0.1
10/18/2016	ND	ND	0.1
11/15/2016	ND	ND	0.1
12/20/2016	ND	ND	0.1
1/17/2017	ND	ND	0.1
# Samples	22	22	
# Detections	0	0	
Maximum	ND	ND	

a) Pardee Tunnel was shut down during February and March LT2ESWTR due to high turbidity results at Pardee Reservoir and affected East Bay WTPs received water from Briones Reservoir.

Radioactivity

Based on Title 22 and initial monitoring results, gross alpha is monitored at PACIN and PARIN once every nine years, and all regulated radiologicals are monitored at PATW open gates or the Aqueduct Tunnel once every nine years for the East Bay system. During the MRWSS 2020 Update, gross alpha was monitored at PATW, PACIN, and PARIN and

all results were below the DLR. All other radionuclides monitored at PATW were below their respective DLRs.

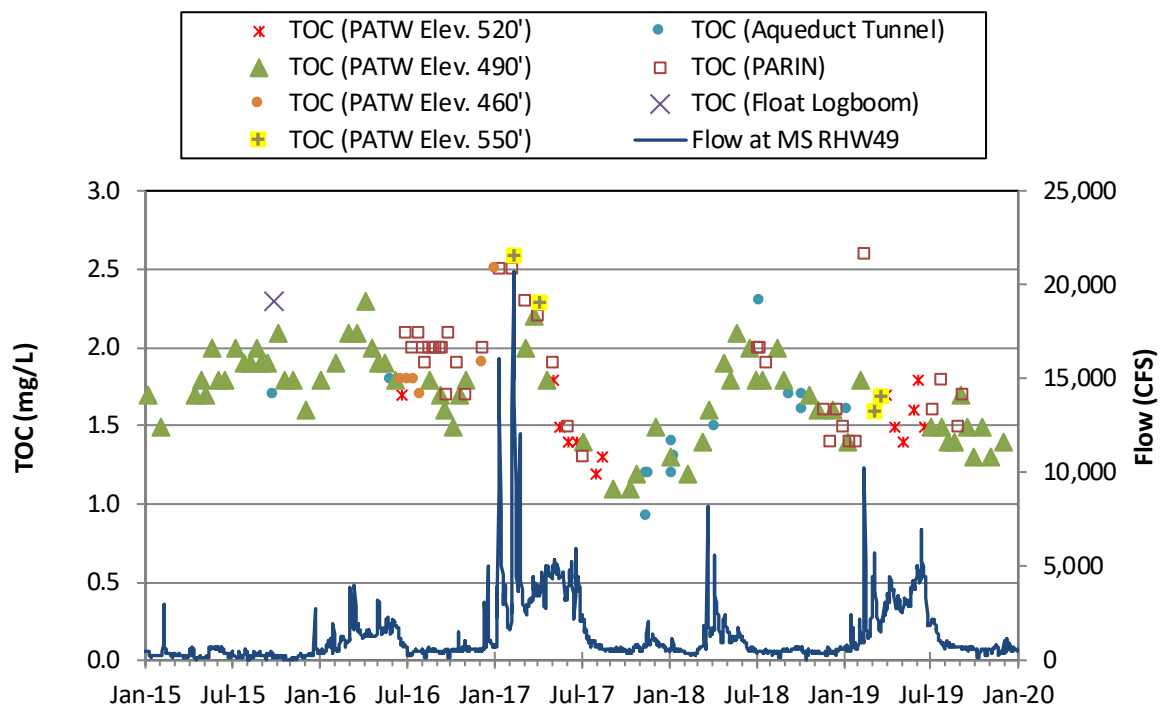
Disinfection By-Products

Disinfection byproducts are regulated in the distribution system under the Stage 2 Disinfectants/Disinfection By-Products Rule (S2DBPR). They are formed during water treatment through reactions between disinfectants and naturally occurring compounds in the water, such as natural organic matter and bromide. Thus, they are not expected to be present at significant concentrations in the raw water. Trihalomethanes were measured in Pardee Reservoir when other VOCs were analyzed, as a product of the same analytical method. As expected, none were detected in the MRWSS Update 2020 period.

Total Organic Carbon

TOC is a measure of the amount of natural organic matter present in the water, which is important in drinking water treatment for several reasons, including its potential to react with disinfectants during treatment. All TOC results from Pardee Reservoir are shown in Figure 4-13 by monitoring location, along with Mokelumne River flows. This is the same data previously summarized in Table 4-7. For the East Bay system, the District regularly monitors TOC at either the PATW open gates or the Aqueduct Tunnel. Included in Figure 4-13 are results from four quarterly samples collected for UCMR4 (May 2018 through January 2019 at the Aqueduct Tunnel). TOC samples are also collected at PARIN as part of the SWRCB-DDW-approved operations plan for the new GAC system at Pardee Recreation Area WTP. Other TOC samples are collected for various special studies and operational purposes.

Figure 4-13. TOC in Pardee Reservoir with Average Daily Flow from the Mokelumne River at MS RHW49 (2015 – 2019)



TOC results ranged from 0.9 to 2.6 mg/L. In general, elevated TOC concentrations occurred when the Mokelumne River flow was high, though TOC levels were significantly lower in Pardee Reservoir than in the river (Figure 4-9). Also, the TOC did not appear to significantly vary by location within the reservoir.

The maximum TOC result of 2.6-mg/L occurred twice. The first of these was sampled at PATW (elevation 550-feet) in February 2017, during a period of elevated TOCs at all locations sampled. These high TOC results occurred during historical precipitation events and extremely high Mokelumne River flows. Unfortunately, no samples were collected on the Mokelumne River in the period immediately following these high flows, though it is likely the TOC was also elevated in the river at this time.

The second of two TOC samples with the maximum result of 2.6 mg/L occurred at PARIN in February 2019, within a day of peak runoff for that season. Other samples that appear from Figure 4-13 to have been collected near in time to this high TOC, were either collected before the high flow period or a month later.

It should be noted that the peak winter TOC values were not long-lasting once river flows subsided each year. Following the maximum TOC of 2.6 mg/L in February 2017, TOC dropped fairly rapidly and the lowest TOCs of this update period occurred the next autumn, before rising again during rainfall in late 2017. However, the East Bay in-line filter plants had elevated DBP levels during the spring and summer of 2017, even as TOC levels decreased to typical levels. The peak TOC in 2019 was even more brief, with only one TOC value above 2 mg/L all winter, despite the single sample at PARIN of 2.6 mg/L being tied for maximum.

The median TOC result of 1.7 mg/L was slightly higher than the median values of previous MRWSS updates (1.5 mg/L, 1.6, and 1.2, respectively), likely due to heavier than usual precipitation and runoff in early 2017 and early 2019, following a sustained drought that ended the first year of this update period.

Taste & Odor and Plankton

During the MRWSS 2020 Update period, threshold odor number (TON) was monitored once at PACIN and the result was non-detect. For Pardee Recreation Area WTP and all East Bay WTPs, TON is also monitored on the treated water effluent. All results were below the secondary MCL except once at Lafayette WTP Effluent. This sample had a TON result of 8, characterized as having a chlorinous odor. Follow-up sample results were less than the MCL for TON.

Many taste and odor problems are associated with certain algal genera commonly found in Pardee Reservoir. Additionally, algae can cause filter clogging. Pardee Reservoir plankton samples are collected from the surface and from the level of the open gates of PATW at least monthly and more frequently when algal activity is high. Results of planktonic algae sampling at Pardee Reservoir are summarized in Table 4-11. This table is limited to algal genera known to potentially pose concerns for water quality and treatment, and to those

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detected at levels of ten thousand (10,000) algal cells per one hundred mL (#/100 mL) or higher in the past fifteen years. Typically, much higher levels are needed to cause treatment concerns. Table 4-11 also shows the potential water quality and treatment concerns associated with each species.

Table 4-11. Maximum Detections of Algal Genera during Current and Two Previous MRWSS Update Periods (2005-2020) ^a

Algae Class / Genus	Max Detected Level (#/100 mL)			Water Treatment Concern ^b	
	MRWSS 2020 Update (2015 - 2019)	MRWSS 2015 Update (2010 - 2014)	MRWSS 2010 Update (2005 - 2009)	Filter-Clogging	Potential Taste & Odor
<i>Bacillariophyceae</i>					
Aulacoseirae (formerly Melosira)	56,000	34,000	93,000	X	X
Cyclotella	12,000	24,000	49,000	X	X
Fragilaria	140,000	120,000	160,000	X	X
Nitzschia	6,900	14,000	16,000	X	
Synedra	31,000	6,400	ND	X	X
<i>Chlorophyceae</i>					
Pseudanabaena	34,000	ND	ND		X
Ulothrix	7,000	34,000	7,400		X
<i>Chrysophyceae</i>					
Dinobryon	97,000	51,000	140,000	X	X
<i>Cyanophyceae</i>					
Aphanothece	920,000	1,300,000	23,000	X	
Dolichospermum (formerly Anabaena)	130,000	140,000	160,000	X	X

a) Only genera known to be associated with water treatment concerns, and detected at least one time from 2005-2020 at levels above 10,000 #/100 mL are included.

b) Identification of genera linked to potential taste and odor and/or filter-clogging potential are based on District experience, as well as literature: Huntley (2018), Ansari et al. (2010), AWWA (2004), and AWWARF and Lyonnaise des Eaux (1987).

During the MRWSS 2020 Update, algae with the highest concentrations in previous updates were generally present in similar numbers during the MRWSS 2020 Update period. As in previous reporting periods, the level of potential taste/odor producers were present at levels thought to be too low for concern. Two genera with potential to cause taste and odor, Synedra and Pseudanabaena, were detected this update for the first time at levels above ten-thousand cells per 100 mL, though far below levels of concern, consistent with the absence of T&O complaints from customers.

Algae that can cause filter-clogging problems were identified at quantities of potential concern, especially Fragilaria, Aulacoseira (formerly classified as Melosira) and Aphanothece. The in-line filtration plants in the East Bay have experienced shorter filter

run times during algae blooms in Pardee Reservoir. During stratified reservoir conditions, the gates of Pardee tower can often be operated to minimize the impact of these blooms, subject to limitations of cold water pool storage requirements.

Other Secondary Standards

Aluminum and manganese results exceeded the secondary MCL standards in one sample from Pardee Reservoir. The maximum aluminum concentration of 858 ug/L, exceeding the secondary standard of 200 ug/L, was observed at the Pardee Reservoir inflow Logboom location during the Butte Fire monitoring program on September 29, 2015. At the same time and monitoring location, the manganese result was 284 ug/L, exceeding the secondary standard of 50 ug/L. Turbidity results also exceeded the secondary MCL standards of 5 NTU at Pardee Reservoir. PACT, PARA, Walnut Creek, Orinda, and Lafayette WTPs are all capable of reducing these metals and turbidity, and the treated water effluent concentrations have been well below the secondary MCL standards.

General Water Quality

Minerals and nutrients were detected at low to moderate concentrations in Pardee Reservoir. As Table 4-6 indicates, Pardee Reservoir is a soft water, with hardness ranging from 8 to 22 mg/L as CaCO₃ during MRWSS 2020 Update period. The pH ranged from 6.7 to 7.9 and total alkalinity was between 9 and 33 mg/L as CaCO₃.

Comparison of Raw/Treated Water to Standards

The data collected in Pardee Reservoir and summarized in this report show that the raw water meets most treated water quality standards. The only primary MCLs exceeded in the raw water are microbiological parameters, all of which are effectively removed through the process trains at PACT, PARA, Walnut Creek, Lafayette and Orinda WTPs.

Although elevated turbidity events occurred periodically at Pardee Reservoir, especially during extreme storm events such as those in early 2017 (Figure 4-10), more than eighty percent of the daily average raw water turbidity readings from PACIN, PARIN, and Campo Seco monitoring stations were less than 1 NTU. More importantly, the effluent turbidities at all District WTPs continuously met all turbidity regulations. Table 4-12 presents effluent turbidity statistics for 2015 through 2019 for all the District's WTPs served by Pardee Reservoir.

As shown in Table 4-12, all five WTPs receiving Pardee Reservoir water produce consistent, high-quality treated water. At all three East Bay in-line filter plants, more than 99% of treated water turbidity was below 0.085 NTU based on 1-minute interval readings. However, the high raw water turbidity in early 2017 prompted the District to preemptively shut down the Mokelumne Aqueducts and use Briones Reservoir water to supply the in-line filter plants in the East Bay. While optimization of coagulants can maintain low filter effluent turbidities during high raw water turbidity events, this typically results in shorter filter run times that cannot be maintained for extended periods of time without straining the waste-stream processes. Thus, the flexibility in source waters is an important factor contributing to the reliability of the large East Bay System.

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Table 4-12 shows maximum turbidity reading of 0.15 and 0.1 NTU at PACT and PARA effluent, respectively. At PACT and PARA WTPs, treated water turbidity was 0.05 NTU except for rare, brief periods, which are more likely attributable to instrumentation issues than water quality.

Table 4-12. Combined Effluent Turbidity Statistics for WTPs Served by Pardee Reservoir, 2015-2019

Period	Water Treatment Plant (WTP)	50%	90%	95%	97%	98%	99%	99.9%	Total # of 1-Minute Readings
2015-2019	Orinda WTP Combined Eff.	0.027	0.035	0.038	0.041	0.044	0.051	0.085	2,381,801
2015-2019	Walnut Creek WTP	0.03	0.038	0.041	0.042	0.043	0.045	0.057	2,625,135
2015-2019	Lafayette WTP	0.021	0.029	0.032	0.034	0.035	0.037	0.044	1,764,691
2015-2019	PACT WTP	Median Turbidity = 0.05, Maximum Turbidity = 0.15 NTU							
2015-2019	PARA WTP	Median Turbidity = 0.05, Maximum Turbidity = 0.1 NTU							

The small membrane filtration systems of PACT and PARA WTPs have significant treated water storage capacity, thus they only operate a fraction of each day. They have flexibility to cease operation and wait a day or more for improved raw water quality during short periods of extremely high turbidity. Both systems were able to maintain low plant effluent turbidities during January and February 2017. The maximum effluent turbidity during the 2017 event was 0.15 NTU at PACT on February 7, 2017, and the ninety-fifth percentile turbidity reading at PACT that month was 0.05 NTU. In January 2017, all PACT effluent turbidity samples were 0.05 NTU, and all PARA WTP effluent turbidity readings in both January and February 2017 were 0.05 NTU.

The District's annual CCRs include the treated drinking water quality data and are provided in Appendix 4-1 for the MRWSS 2020 Update period. The CCRs document water quality in compliance with the regulations, including distribution system water quality parameters.

Camanche Reservoir

Camanche Reservoir is predominantly used for flood control and to meet fish flow requirements defined in the District's water rights permit. One small system, CASS WTP, treats Camanche Reservoir water. The system serves about 200 permanent residents and a seasonal transient population, usually less than 1,000; therefore, the raw water quality monitoring requirements as defined under Title 22 for Camanche Reservoir are less extensive than those required for Pardee Reservoir. The results of this monitoring, along with other pertinent water quality parameters, are discussed below. Camanche North Shore (CANS) WTP treats groundwater and so is not included in this MRWSS.

In 2016, the old in-line filtration CASS WTP was replaced with an ultrafiltration (UF) membrane WTP. The new CASS UF WTP is hydraulically connected to both the former plant's raw water supply line from Camanche Reservoir, and to the Pardee Reservoir via

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pipelines from Mokelumne Aqueducts No. 2 and No. 3. Thus, CASSIN refers to the plant influent of both the old and new WTP, except where distinguished specifically. This section only includes data from CASSIN for the periods when the WTP (either old or new) was taking water from Camanche Reservoir.

Existing Raw Water Quality and Trends in Camanche Reservoir

Table 4-13 is a statistical summary of the raw water quality data of parameters regulated by Title 22 and other pertinent parameters collected from Camanche Reservoir and CASS WTP influent (CASSIN) for the period of the MRWSS 2020 Update. For each parameter, the number of samples, number of detections, and the median, minimum, and maximum concentrations are included, along with the regulated MCLs and DLRs when applicable. The raw water quality is evaluated using treated water MCLs as a benchmark and potential guide for treatment operations only.

Table 4-13. Camanche Reservoir Raw Water Monitoring, 2015-2019^a

Water Quality Parameters	MCL	Units ^b	No. of Samples	No. of Detections	Med.	Min.	Max.	MDL	DLR
Microbiological Constituents									
<i>Cryptosporidium</i>	TT ^c	#/L	0	---	---	---	---	---	1
<i>E. coli</i> ^d	TCR ^e	MPN/100mL	192	124	2	ND	2,400	1 - 1.8	---
<i>Giardia</i>	TT ^c	#/L	0	---	---	---	---	---	1
<i>Legionella</i>	TT ^c	---	0	---	---	---	---	---	---
Total Coliform	TCR ^e	MPN/100 mL	191	181	49	ND	≥17,000	1 - 1.8	---
Turbidity ^f	TT ^c	NTU	0	---	---	---	---	---	---
Viruses	TT ^c	---	0	---	---	---	---	---	---
Primary Standards – Inorganic Chemicals									
Aluminum (Al)	1,000	µg/L	5	5	130	33	298	0.3-7.28	50
Antimony (Sb)	6	µg/L	5	0	ND	ND	ND	0.14-0.2	6
Arsenic (As)	10	µg/L	5	5	0.33	0.27	0.69	0.2-0.23	2
Asbestos	7	MFL	0	---	---	---	---	---	0.2
Barium (Ba)	1,000	µg/L	5	5	18	16.9	28	0.024-0.208	100
Beryllium (Be)	4	µg/L	5	1	ND	ND	0.011	0.01-0.03	1
Cadmium (Cd)	5	µg/L	5	3	0.0077	ND	0.015	0.0061-0.012	1
Chromium (Cr)	50	µg/L	5	4	0.36	ND	1	0.11-0.61	10
Chromium-6 (Cr(VI))	10 ^g	µg/L	3	0	ND	ND	ND	0.05	1
Cyanide (CN)	0.15	mg/L	3	0	ND	ND	ND	0.0012-0.0039	100
Fluoride (F ⁻)	2	mg/L	5	5	0.034	0.032	0.045	0.0004-0.0088	0.1
Mercury (Hg)	2	µg/L	5	0	ND	ND	ND	0.011-0.04	1

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Table 4-13. Camanche Reservoir Raw Water Monitoring, 2015-2019 (continued)^a

Water Quality Parameters	MCL	Units ^b	No. of Samples	No. of Detections	Med.	Min.	Max.	MDL	DLR
Nickel (Ni)	100	µg/L	5	5	0.4	0.18	0.5	0.011-0.2	10
Nitrate+Nitrite (as N)	10	mg/L	5	5	0.024	0.007	0.086	---	---
Nitrate (as N)	10	mg/L	5	5	0.024	0.007	0.065	0.0009-0.0019	0.4
Nitrite (as N)	1	mg/L	5	2	ND	ND	0.021	0.0005-0.0023	0.4
Perchlorate (ClO ₄ ⁻)	6	µg/L	5	0	ND	ND	ND	0.5 - 0.9	4
Selenium (Se)	50	µg/L	5	0	ND	ND	ND	0.3-0.69	5
Thallium (Tl)	2	µg/L	5	0	ND	ND	ND	0.01-0.1	1
Primary Standards – Non-Volatile Organic Chemicals (SOCs)									
Acrylamide	TT ^b	---	0	---	---	---	---	---	---
Alachlor	2	µg/L	0	---	---	---	---	---	1
Atrazine (Aatrex)	1	µg/L	0	---	---	---	---	---	0.5
Bentazon	18	µg/L	0	---	---	---	---	---	2
Benzo(a)pyrene	0.2	µg/L	0	---	---	---	---	---	0.1
Carbofuran	18	µg/L	0	---	---	---	---	---	5
Chlordane	0.1	µg/L	0	---	---	---	---	---	0.1
Dalapon	200	µg/L	8	0	ND	ND	ND	0.53	10
Dibromochloropropane (DBCP)	0.2	µg/L	0	---	---	---	---	---	0.01
2,4-Dichlorophenoxy-acetic acid (2,4-D)	70	µg/L	0	---	---	---	---	---	10
Di(2-ethylhexyl)adipate	400	µg/L	0	---	---	---	---	---	5
Di(2-ethylhexyl)phthalate	4	µg/L	0	---	---	---	---	---	3
Dinoseb (DNBP)	7	µg/L	0	---	---	---	---	---	2
Diquat	20	µg/L	0	---	---	---	---	---	4
Endothall	100	µg/L	0	---	---	---	---	---	45
Endrin	2	µg/L	0	---	---	---	---	---	0.1
Epichlorohydrin	TT ^b	---	0	---	---	---	---	---	---
Ethylene Dibromide (EDB)	0.05	µg/L	0	---	---	---	---	---	0.02
Glyphosate	700	µg/L	0	---	---	---	---	---	25
Heptachlor	0.01	µg/L	0	---	---	---	---	---	0.01
Heptachlor Epoxide	0.01	µg/L	0	---	---	---	---	---	0.01
Hexachlorobenzene	1	µg/L	0	---	---	---	---	---	0.5
Hexachlorocyclopentadiene	50	µg/L	0	---	---	---	---	---	1
Lindane (gamma BHC)	0.2	µg/L	0	---	---	---	---	---	0.2

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Table 4-13. Camanche Reservoir Raw Water Monitoring , 2015-2019 (continued)^a

Water Quality Parameters	MCL	Units ^b	No. of Samples	No. of Detections	Med.	Min.	Max.	MDL	DLR
Methoxychlor	30	µg/L	0	---	---	---	---	---	10
Molinate	20	µg/L	0	---	---	---	---	---	2
Oxamyl (Vydate)	50	µg/L	0	---	---	---	---	---	20
Pentachlorophenol (PCP)	1	µg/L	0	---	---	---	---	---	0.2
Picloram	500	µg/L	0	---	---	---	---	---	1
Polychlorinated Biphenyls (PCB's)	0.5	µg/L	0	---	---	---	---	---	0.5
1,2,3-Trichloropropane	5	ng/L	5	0	ND	ND	ND	0.68-0.94	5
Simazine	4	µg/L	0	---	---	---	---	---	1
2,4,5-TP (Silvex)	50	µg/L	0	---	---	---	---	---	1
2,3,7,8-TCDD (Dioxin)	30	pg/L	0	---	---	---	---	---	5
Thiobencarb	70	µg/L	0	---	---	---	---	---	1
Toxaphene	3	µg/L	0	---	---	---	---	---	1
Primary Standards – Radionuclides									
Gross Alpha	15	pCi/L	1	1	1.07 +/- 0.603			MDA 0.679	3
Gross Beta/ Photon	50 (screening level)	pCi/L	0	---	---	---	---	---	4
Radium 226+228	5	pCi/L	0	---	---	---	---	---	---
Radium-226	---	pCi/L	0	---	---	---	---	---	1
Radium-228	---	pCi/L	0	---	---	---	---	---	1
Strontium-90	8	pCi/L	0	---	---	---	---	---	2
Tritium	20,000	pCi/L	0	---	---	---	---	---	1,000
Uranium	20	pCi/L	0	---	---	---	---	---	1
Disinfectant/Disinfection Byproducts Rule									
Bromate	10	µg/L	0	---	---	---	---	---	5 or 1
Chloramines as Cl ₂	4	mg/L	0	---	---	---	---	---	---
Chlorine as Cl ₂	4	mg/L	5	0	ND	ND	ND	0.05-0.08	---
Chlorine Dioxide	0.8	mg/L	0	---	---	---	---	---	---
Chlorite	1	mg/L	0	---	---	---	---	---	0.02
HAA5	60 (LRAA)	µg/L	10	0	ND	ND	ND	---	---
Dibromoacetic Acid	---	µg/L	10	0	ND	ND	ND	0.25	1
Dichloroacetic Acid	---	µg/L	10	0	ND	ND	ND	0.18	1
Monobromoacetic Acid	---	µg/L	10	0	ND	ND	ND	0.29	1

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Table 4-13. Camanche Reservoir Raw Water Monitoring, 2015-2019 (continued)^a

Water Quality Parameters	MCL	Units ^b	No. of Samples	No. of Detections	Med.	Min.	Max.	MDL	DLR
Monochloroacetic Acid	---	µg/L	10	0	ND	ND	ND	0.65	1
Trichloroacetic Acid	---	µg/L	10	0	ND	ND	ND	0.17	1
Total Trihalomethanes	80 (LRAA)	µg/L	10	0	ND	ND	ND	---	---
Bromodichloro-methane	---	µg/L	10	0	ND	ND	ND	0.09-0.21	1
Bromoform	---	µg/L	10	0	ND	ND	ND	0.096-0.31	1
Chloroform	---	µg/L	10	0	ND	ND	ND	0.096-0.15	1
Dibromochloro-methane	---	µg/L	10	0	ND	ND	ND	0.065-0.26	1
<i>Primary Standards – Volatile Organic Chemicals (VOCS)</i>									
Benzene	1	µg/L	0	---	---	---	---	---	0.5
Carbon Tetrachloride	0.5	µg/L	0	---	---	---	---	---	0.5
1,2-Dichlorobenzene (o-DCB)	600	µg/L	0	---	---	---	---	---	0.5
1,4-Dichlorobenzene (p-DCB)	5	µg/L	0	---	---	---	---	---	0.5
1,1-Dichloroethane (1,1-DCA)	5	µg/L	0	---	---	---	---	---	0.5
1,2-Dichloroethane (1,2-DCA)	0.5	µg/L	0	---	---	---	---	---	0.5
1,1-Dichloroethylene (1,1-DCE)	6	µg/L	0	---	---	---	---	---	0.5
cis-1,2-Dichloroethylene (c-1,2-DCE)	6	µg/L	0	---	---	---	---	---	0.5
trans-1,2-Dichloroethylene (t-1,2-DCE)	10	µg/L	0	---	---	---	---	---	0.5
Dichloromethane (Methylene Chloride)	5	µg/L	0	---	---	---	---	---	0.5
1,2-Dichloropropane	5	µg/L	0	---	---	---	---	---	0.5
1,3-Dichloropropene (TOTAL)	0.5	µg/L	0	---	---	---	---	---	0.5
Cis-1,3-Dichloropropene	---	µg/L	0	---	---	---	---	---	---
Trans-1,3-Dichloropropene	---	µg/L	0	---	---	---	---	---	---
Ethylbenzene	300	µg/L	0	---	---	---	---	---	0.5
Methyl-tert-butyl ether (MTBE)	13	µg/L	0	---	---	---	---	---	3

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Table 4-13. Camanche Reservoir Raw Water Monitoring, 2015-2019 (continued)^a

Water Quality Parameters	MCL	Units ^b	No. of Samples	No. of Detections	Med.	Min.	Max.	MDL	DLR
Monochlorobenzene (Chlorobenzene)	70	µg/L	0	---	---	---	---	---	0.5
Styrene	100	µg/L	0	---	---	---	---	---	0.5
1,1,2,2-Tetrachloroethane	1	µg/L	0	---	---	---	---	---	0.5
Tetrachloroethylene (PCE)	5	µg/L	0	---	---	---	---	---	0.5
Toluene	150	µg/L	0	---	---	---	---	---	0.5
1,2,4-Trichlorobenzene	5	µg/L	0	---	---	---	---	---	0.5
1,1,1-Trichloroethane (1,1,1-TCA)	200	µg/L	0	---	---	---	---	---	0.5
1,1,2-Trichloroethane (1,1,2-TCA)	5	µg/L	0	---	---	---	---	---	0.5
Trichloroethylene (TCE)	5	µg/L	0	---	---	---	---	---	0.5
Trichlorofluoromethane (Freon 11)	150	µg/L	0	---	---	---	---	---	5
1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon 113)	1,200	µg/L	0	---	---	---	---	---	10
Vinyl Chloride	0.5	µg/L	0	---	---	---	---	---	0.5
Xylenes (Total)	1,750	µg/L	0	---	---	---	---	---	0.5
m+p-Xylene	---	µg/L	0	---	---	---	---	---	---
o-Xylene	---	µg/L	0	---	---	---	---	---	---
<i>Secondary Standards</i>									
Aluminum (Al)	200	µg/L	5	5	130	33	298	0.3-7.28	50
Chloride (Cl)	250	mg/L	0	---	---	---	---	---	---
Color	15	color unit	0	---	---	---	---	---	---
Specific Conductance	900	µS/cm	0	---	---	---	---	---	---
Copper (Cu)	1,000	µg/L	0	---	---	---	---	---	50
Foaming Agents (MBAS)	0.5	mg/L	0	---	---	---	---	---	---
Iron (Fe)	300	µg/L	0	---	---	---	---	---	100
Manganese (Mn)	50	µg/L	0	---	---	---	---	---	20
Methyl-tert-butyl ether (MTBE)	5	µg/L	0	---	---	---	---	---	3
Odor-Threshold	3	TON	1	0	ND			1	1
pH	6.5-8.5	pH units	15	15	7.4	6.7	8.4	---	---
Silver (Ag)	100	µg/L	0	---	---	---	---	---	10

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Table 4-13. Camanche Reservoir Raw Water Monitoring, 2015-2019 (continued)^a

Water Quality Parameters	MCL	Units ^b	No. of Samples	No. of Detections	Med.	Min.	Max.	MDL	DLR
Sulfate	250	mg/L	0	---	---	---	---	---	0.5
Thiobencarb	1	µg/L	0	---	---	---	---	---	1
Total Dissolved Solids (TDS)	500	mg/L	0	---	---	---	---	---	---
Turbidity	5	NTU	0	---	---	---	---	---	---
Zinc (Zn)	5,000	µg/L	0	---	---	---	---	---	50
Other Constituents									
Total Alkalinity (as CaCO ₃)		mg/L	4	4	20	14	24	5	---
Bromide		µg/L	5	0	ND	ND	ND	0.0006	---
Calcium (Ca)		µg/L	0	---	---	---	---	---	---
Ethyl-tert-butyl-ether		µg/L	0	---	---	---	---	---	---
Total Hardness (as CaCO ₃)		mg/L	0	---	---	---	---	---	---
Magnesium (Mg)		µg/L	0	---	---	---	---	---	---
Orthophosphate (as P)		mg/L	0	---	---	---	---	---	---
Sodium (Na)		µg/L	0	---	---	---	---	---	---
Total Organic Carbon		mg/L	23	23	1.9	1.5	2.9	0.024-0.12	---

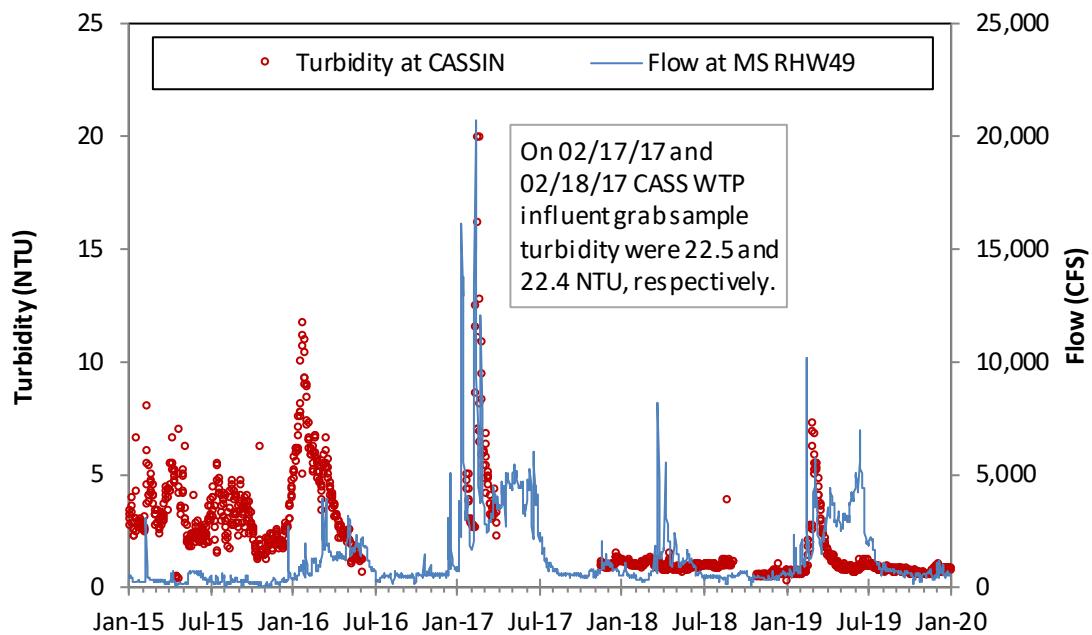
- a) Abbreviations: --- = not applicable, ND = not detected (i.e. value is below method detection limit), TT = Treatment Technique (see footnote c), TCR = Total Coliform Rule (see footnote d), MCL = Maximum Contaminant Level, MDL = Method Detection Limit, DLR = Detection Limit for Reporting.
- b) Units not defined in text: MFL= million fibers (asbestos) per liter, pCi/L = picocuries per liter, µS/cm = microsiemens per centimeter.
- c) Treatment Technique (TT)
- *Cryptosporidium*: 99% removal.
 - *Giardia lamblia*: 99.9% removal/inactivation
 - Viruses: 99.99% removal/inactivation
 - *Legionella*: No limit, but USEPA believes that if *Giardia* and viruses are removed/inactivated, *Legionella* will also be controlled.
 - Turbidity: performance standards per Title 22, Chapter 17 and “1998 Water Supply Permit” for the East Bay system.
 - Acrylamide: 0.05% monomer in polyacrylamide dose of 1 ppm
 - Epichlorohydrin: 0.01% residual of epichlorohydrin in dose of 20 mg/L.
- d) Unlike for Pardee Reservoir in Table 4-7, this table includes all total coliform and *E. coli* results from both the Colilert 18 Q-T method (SM9223B) and MTF methods (SM 9221B and F). See Bacteriological Section for further information.
- e) Total Coliform Rule (TCR). Total coliform samples are collected from the treated water distribution system per a sampling plan approved by SRWCB-DDW (TCR is not applicable to raw water). When a sample is positive for total coliform, it must be further analyzed for *E. coli*, and repeat sampling must be conducted. The TCR was revised in April 2016, before which time analysis of fecal coliform could be conducted in lieu of *E. coli*.
- f) Turbidity in this table is from grab samples taken from the reservoir. It does not include routine turbidity samples taken from the WTP operators at the WTP influents. Turbidity from continuous online analyzers is shown in the Turbidity section.
- g) There is no current MCL for hexavalent chromium. The previous MCL of 10 µg/L was withdrawn on September 11, 2017. The DLR was 1 µg/L.

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Turbidity

Camanche Reservoir raw water has very low turbidity water most of the time, with occasional short-duration spikes. Figure 4-14 shows daily average turbidity at CASSIN (online turbidity monitoring station) and the Mokelumne River flow into Pardee Reservoir (for approximate runoff conditions). Elevated turbidity events typically occur in the winter and/or spring with higher runoff. Significant turbidity events occurred in January 2016, February 2017, and March 2019, with maximum average daily turbidities of 11.7, 22.5, and 7.3 NTU, respectively.

Figure 4-14. Average Daily Camanche Reservoir Turbidity from Online Analyzer at CASSIN with Average Daily Flow in the Mokelumne River at MS RHW49 ^{a, b}



- a) This figure only includes data when CASS WTP (old and new) was drafting from Camanche Reservoir, and excludes data from periods when the plant was drafting from Pardee Reservoir.
- b) In October 2018, a new influent on-line turbidimeter replaced the old one at the CASS UF WTP.

As with Pardee Reservoir, the most significant turbidity event occurred in February 2017, following a series of extreme storms. The highest maximum daily average turbidity at CASSIN was calculated to be 17.5 NTU on February 17, 2017, however, the turbidimeter was not configured to read turbidity values above 20 NTU, and there were five days during this period in which the turbidity temporarily exceeded 20 NTU, including February 17. In other words, the true maximum daily average was likely higher than 17.5 NTU. The highest grab sample turbidities measured by operators were 22.4 and 22.5 NTU, on February 17 and 18, 2017, respectively.

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Table 4-14 shows median and maximum turbidity reading of MRWSS Updates of 2020 and 2015. The median of Camanche Reservoir daily average turbidity was 1.2 NTU which was similar to the median turbidity result of the 2015 MRWSS update, as measured at the CASS WTP influent online turbidimeter.

Table 4-14. Summary of Turbidity and Coliform data in Camanche Reservoir from MRWSS Updates 2020, 2015 and 2010

MRWSS Update and Time Period	Statistic	Turbidity- Daily average at PARIN (NTU)	<i>E. coli</i> ^a (MPN / 100 mL)	Total Coliform ^a (MPN / 100 mL)
<u>MRWSS 2020 Update</u> (2015-2019)	<i>No. of Samples</i>	NA ^b	192	191
	Median	1.2	2	49
	Max	≥ 17.5 ^c	2,400	≥ 17,000
<u>MRWSS 2015 Update</u> (2010-2014)	<i>No. of Samples</i>	NA ^b	228	229
	Median	1.1	2	17
	Max	5.4	1,100	> 16,000
<u>MRWSS 2010 Update</u> (2005-2009)	<i>No. of Samples</i>	NA ^b	302	252
	Median	0.96	2	29
	Max	3.9	9,000	16,000

- Unlike for Pardee Reservoir in Table 4-7, this table includes all total coliform and *E. coli* results from both the Colilert 18 Q-T method (SM9223B) and MTF methods (SM 9221B and F). See Microbiological Section below for further information. Most results from previous updates were from MTF methods only. See text for further information.
- NA: not applicable. Data shown are statistics of the daily average turbidity data, obtained from an on-line instrument at Pardee Recreation Area WTP Influent, which monitors continuously.
- The highest maximum daily average turbidity at CASSIN was calculated to be 17.5 NTU on February 18, 2017, however, the turbidimeter was not configured to read turbidity values above 20 NTU, and there were five days during this high turbidity period of early 2017 in which the turbidity exceeded 20 NTU, including that day. In other words, the true maximum daily average was likely higher. The highest grab sample turbidity measured by operators was 22.5 NTU on February 17, 2017.

Microbiological Water Quality

The District collects samples once every two weeks for total coliform and *E. coli* at CASSIN. As discussed previously, it was discovered that coliform samples had not been consistently analyzed in strict accordance with EPA guidance for raw water analysis with the MTF methods (SM 9221B and F), and in August 2019, the District switched to exclusive use of the Colilert 18 Q-T method (SM 9223B) at CASSIN. Unlike Pardee Reservoir, however, there were no samples prior to 2019 analyzed with Colilert 18 Q-T, leaving only 14 of 100 CASSIN samples analyzed with Colilert 18 Q-T. In addition, the Watershed and Recreation Division collects total coliform and *E. coli* samples every two weeks during the summer from the reservoir surface in the vicinity of the beaches (Beach Cove and Beach Area HB locations), and these continue to be analyzed with the MTF methods (one sample from each location was analyzed with Colilert 18 Q-T). Thus, all

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coliform data, regardless of method, is included in the figures and statistics for Camanche Reservoir in this MRWSS 2020 update.

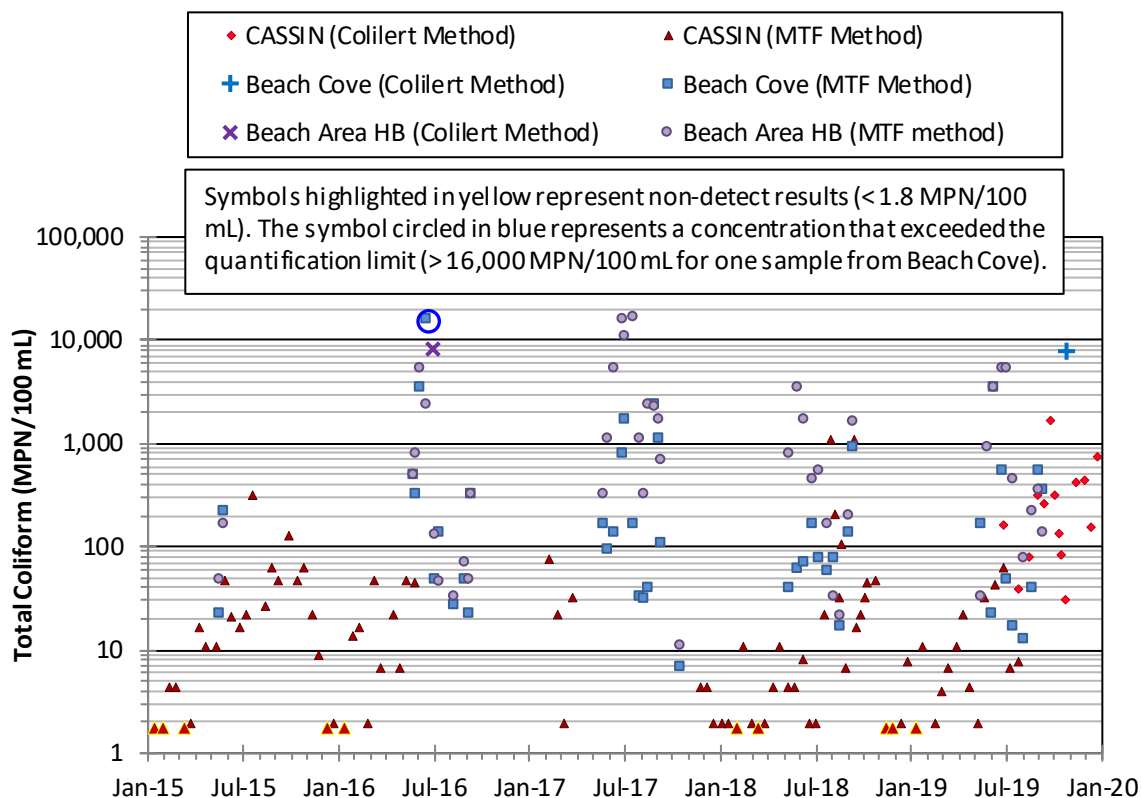
Table 4-14 shows the statistical summary for each microbiological parameter with all raw water sampling locations combined for the MRWSS 2020, 2015, and 2010 Update periods. The median total coliform concentration of MRWSS 2020 Update was 49 MPN/100 mL which was slightly higher, but within the same order of magnitude as previous updates. As with the previous update period, the maximum total coliform result could not be quantified because one sample exceeded the limit of the analysis, which was 16,000 MPN/100 mL for that sample. The maximum total coliform result that was quantified from this update period was 17,000 MPN/100 mL in a diluted sample. The median *E. coli* result has been 2 MPN/100 mL for the past three update periods (Table 4-14). The maximum *E. coli* result during the MRWSS 2020 Update was 2,400 MPN/100 mL, greater than the 2015 update period (much of which was during drought with little runoff), but less than the 2010 update period.

Figure 4-15a shows the results of total coliform sampling over time during the MRWSS 2020 Update. Total coliform exceeded 1,000 MPN/100 mL most summers (except 2015) at the beach reservoir surface locations during high recreational use. At CASSIN, the total coliform was typically lower because the plant intake is in a protected location and below the reservoir surface. It appears that the analytical method change from MTF to Colilert 18 Q-T in mid-2019 at CASSIN resulted in higher total coliform results, due to potential negative analytical interferences with the MTF method for raw waters, as well as potential positive interference of *Aeromonas* species with the Colilert 18 Q-T method. Figure 4-15b shows the total coliform percentiles for each location. The fiftieth percentile (median) total coliform at CASSIN was 14 MPN/100 mL; an order of magnitude lower than the fiftieth percentiles at Beach Cove and Beach Area HB (110 and 490 MPN/100 mL, respectively). Similarly, the ninetieth percentile total coliform at CASSIN was 210 MPN/100 mL, compared to 1,700 and 5,400 MPN/100 mL at Beach Cove and Beach Area HB.

Figure 4-16a shows the results of *E. coli* sampling over time during the MRWSS 2020 Update. Similarly to total coliform, the *E. coli* maxima also peaked during the summer, with peak results at the beach locations ranging from 100 MPN/100 mL to over 1000 MPN/100 mL. Unlike total coliform, there was no apparent increase in *E. coli* concentration due to the change in methods in 2019. At CASSIN, more than half of the *E. coli* results were non-detect or less than 1.8 MPN/100 mL, as illustrated by the cumulative percentile of data in Figure 4-16b. By comparison, only twenty percent of Beach Cove and twenty-two percent of Beach Area HB samples were non-detect for *E. coli*. Similarly, the ninetieth percentile *E. coli* result at CASSIN was 6.1 MPN/100 mL, compared to 87 and 330 MPN/100 mL at Beach Cove and Beach Area HB, respectively, a difference of more than an order of magnitude. The *E. coli* samples collected for Round 2 LT2ESWTR at CASSIN were well below 10 MPN/100 mL (Table 4-15), so *Cryptosporidium* monitoring was not required. CASS WTP has been assigned a Bin 1 classification and the District will not be required to meet additional removal requirements for *Cryptosporidium*.

Figure 4-15. Camanche Reservoir Total Coliform Results 2015-2019

a. Total Coliform Over Time



b. Total Coliform Percentiles

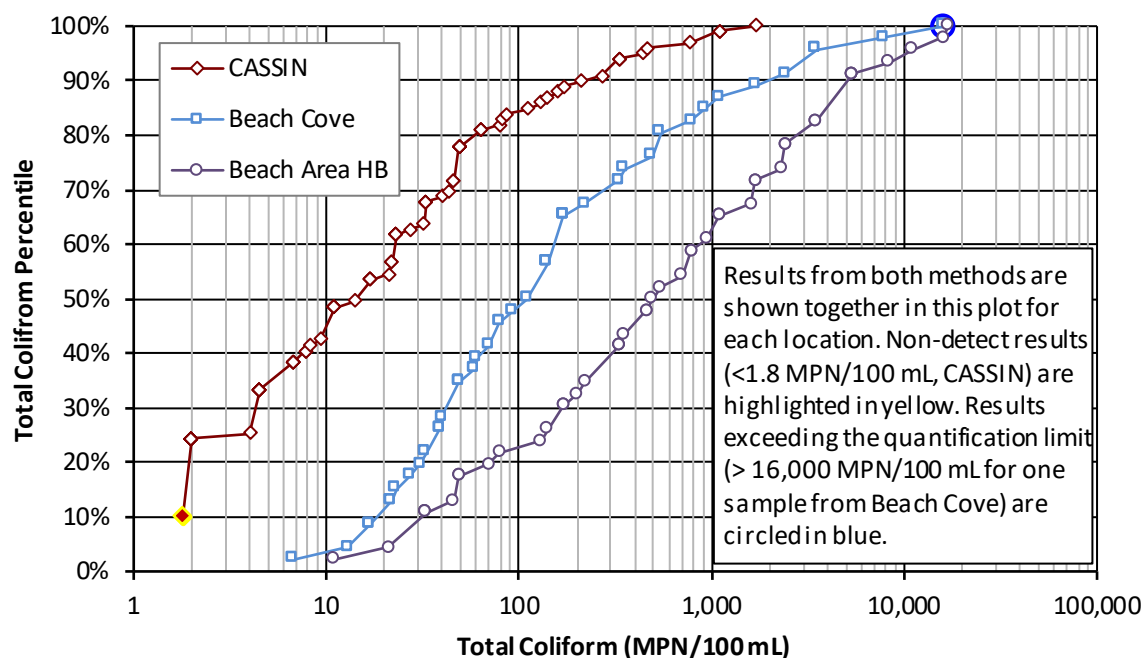
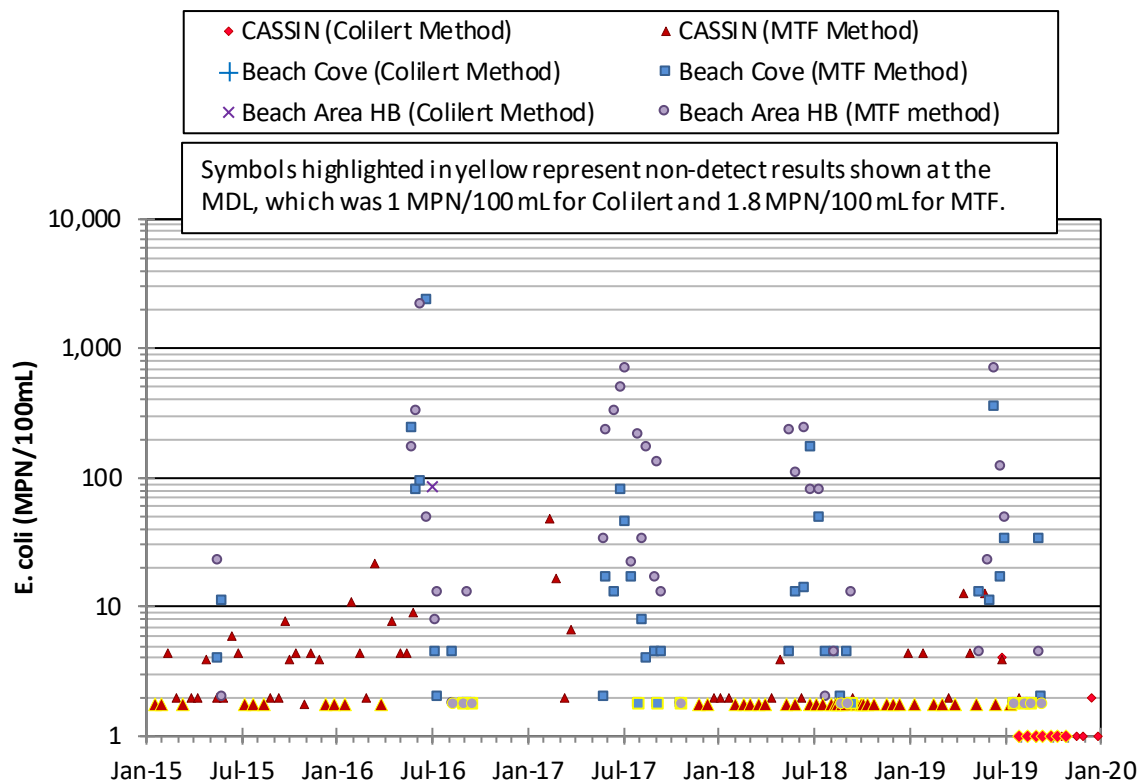


Figure 4-16. Camanche Reservoir *E. coli* Results 2015-2019

a. *E. coli* over Time



b. *E. coli* Percentiles

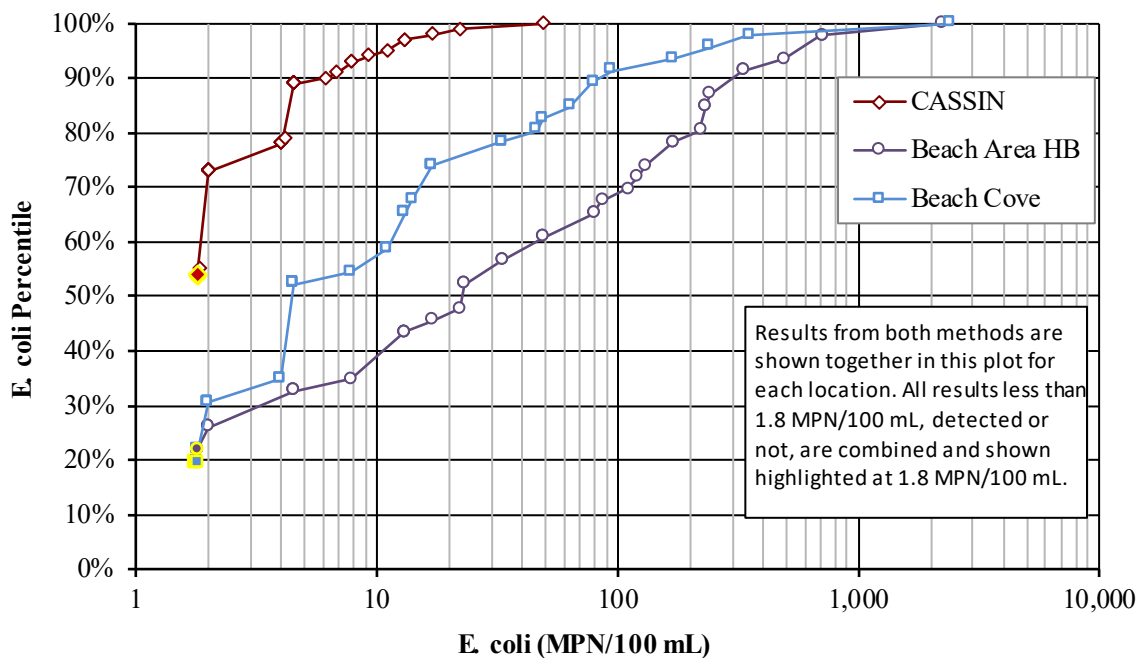


Table 4-15. *E. coli* Monitoring Results for LT2ESWTR Round 2, Camanche Reservoir at CASSIN (2017-2018) ^a

Collection Date	<i>E. coli</i> Results (MPN/100mL)	MDL (MPN/100 mL)
10/11/17	ND	1.8
10/25/17	ND	1.8
11/08/17	ND	1.8
11/22/17	ND	1.8
12/06/17	ND	1.8
12/20/17	2	1.8
01/03/18	2	1.8
01/17/18	2	1.8
01/31/18	ND	1.8
02/14/18	ND	1.8
02/28/18	ND	1.8
03/14/18	ND	1.8
03/28/18	ND	1.8
04/11/18	2	1.8
04/25/18	4	1.8
05/09/18	ND	1.8
05/23/18	ND	1.8
06/06/18	2	1.8
06/20/18	ND	1.8
07/04/18	ND	1.8
07/18/18	ND	1.8
08/01/18	ND	1.8
08/15/18	ND	1.8
08/29/18	ND	1.8
09/12/18	2	1.8
09/26/18	ND	1.8
# Samples	26	
# Detections	7	
Average of Results	0.6	

- a) These samples were all analyzed by the MTF method (SM9221F). These results are included in Table 4-10 and 4-14 statistics and shown in Figure 4-16.
- b) For LT2ESWTR, non-detect results are treated as zero when calculating the average result.

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Regulated Inorganic Chemicals

The maximum raw water concentrations of regulated inorganics in Camanche Reservoir raw water have been below the federal and state primary MCLs, based on annual Title 22 sampling at CASSIN. However, aluminum exceeded the secondary MCL standard of 200 ug/L, which is lower than the primary MCL for aluminum (1,000 ug/L). This is discussed in the section on Secondary Standards, below.

Regulated Organic Compounds

SWRCB-DDW approved a reduced monitoring waiver for the regulated SOC's in 2005, with the result that only atrazine and simazine are sampled once every nine years in Camanche Reservoir at CASSIN. Atrazine and simazine were sampled from CASSIN in July 2016 and were not detected, however CASS WTP was taking water from Pardee Reservoir at the time. Atrazine and simazine were last sampled in Camanche Reservoir in 2012 and were non-detect. The next sample collection for for these two SOC's from Camanche Reservoir is scheduled for 2021.

Initial quarterly monitoring of 1,2,3-trichloropropane at Camanche Reservoir started in the fourth quarter of 2017. Five samples were collected and all results were non-detect.

Camanche Reservoir was monitored for VOC's annually during the MRWSS 2020 Update period, and none were detected. MTBE was detected in Camanche Reservoir in the past, but has not been detected since 2003.

Radioactivity

Under Title 22, the District is required to monitor gross alpha particle activity at CASSIN once every nine years. Gross alpha was last sampled in 2019 and it was detected below the DLR. SWRCB-DDW will not require uranium or radium monitoring unless gross alpha particle activity exceeds 5 pCi/L. Small systems like CASS WTP are not required to monitor for strontium, tritium, or gross beta particle activity.

Disinfection By-Products

Disinfection byproducts are regulated in the distribution system under the S2DBPR and are not expected to be present at significant concentrations in the raw water. Trihalomethanes were measured in Camanche Reservoir when other VOC's were analyzed, as a product of the same analytical method. None were detected in the MRWSS Update 2020 period.

Total Organic Carbon

TOC samples were collected at CASSIN during the period of 2020 MRWSS update with the maximum and median concentrations of 2.9 mg/L and 1.9 mg/L, respectively.

Taste & Odor and Plankton

TON in CASSIN was monitored during the period of the 2020 MRWSS Update and the result was non-detect. The TON collected from the plant effluent ranged from non-detect to 8 TON, exceeding the secondary MCL of 3 TON.

Many taste and odor problems can be associated with certain algal species commonly found in Camanche Reservoir, however, since the reservoir is primarily used for flood

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control and fish flows, planktonic algae are not monitored as closely as in Pardee Reservoir. Algae have not been an issue for treatment performance and operation at CASS WTP.

In the summer of 2015, in response to observed fish kills and a visible blue-green algae bloom in the Rabbit Creek arm, samples were collected weekly in the creek arm and weekly at the influent and effluent of CASS WTP. The samples were sent to a contract lab for PTOX screening of all cyanotoxins, and automatic analysis of microcystin and cylindrospermopsin. Microcystin was extremely high (3,200 µg/L) in one creek arm sample collected July 29, 2015. This extremely high concentration was brief, however, as samples collected from the same location had microcystin levels of 7.0 µg/L the week before and 5.5 µg/L the week after. Also, at the time, the reservoir level was extremely low due to four years of drought, and a land mass separated the creek from the reservoir at the surface level. Weekly samples at CASS WTP influent and effluent, collected from July 1 through August 26, 2015, were all non-detect for both microcystin and cylindrospermopsin, and PTOX screens did not indicate the presence of any other cyanotoxin.

Secondary Standards

SWRCB-DDW no longer requires sampling for parameters with secondary standards be conducted at CASSIN. These are instead monitored at the plant effluent. However, some secondary parameters were monitored in the raw water for other purposes and are shown in Table 4-10. The only parameter detected above the secondary MCL was aluminum at 298 ug/L (secondary standard of 200 ug/L). However, both the old in-line filter CASS WTP and the new CASS UF WTP are effective at reducing aluminum in the water, and results from the plant effluent were below the DLR.

General Water Quality

Alkalinity was detected at 14 to 24 mg/L as CaCO₃ in Camanche Reservoir during the MRWSS 2020 Update Period. The median pH was 7.4.

Comparison of Raw/Treated Water to Standards

The data collected in Camanche Reservoir and summarized in this report show that the raw water already met most treated water quality standards. The only primary MCLs exceeded in the raw water were microbiological parameters and turbidity, which were effectively removed through the process train at CASS WTP. Aluminum exceeded the secondary standard of 200 ug/L in one sample at CASSIN, but was less than the DLR in all CASS WTP effluent samples. Odor concentrations occasionally exceeded secondary MCLs in the treated effluent, but the MCL exceedance for TON did not coincide with any odor complaints by consumers.

CASS WTP produced consistent, high quality treated water, regardless of seasonal variation in raw water turbidity as shown in Table 4-16, consistently surpassing 80 percent turbidity removal of the monthly average raw water turbidity. Similar to PACT and PARA WTPs, there is sufficient treated water storage capacity at CASS WTP to allow the plant to not operate for a day if raw water turbidity is extremely high, especially during winter when system demands are low.

Table 4-16. Combined Effluent Turbidity Statistics at CASS WTP, 2015-2019

	Turbidity (NTU)	
	Median	Maximum
Camanche South Shore WTP - Combined Filter Effluent	0.05	0.15

CASS WTP met all treated water regulatory standards as documented in the monthly reports to SWRCB-DDW except for S2DBPR as discussed below. The CCR for CASS WTP, included in Appendix 4-1, provides the ranges of all regulatory water quality parameters that were detected in the treated water effluent (Appendix 4-1). The data indicates that CASS WTP effectively treated Camanche Reservoir water.

Evaluation of the System's Ability to Meet the SWTR and DBPR

This section discusses the ability of the Upper Mokelumne River Watershed Area's water treatment and distribution systems to meet USEPA's SWTR, the Interim Enhanced Surface Water Treatment Rule (IESWTR), Long-Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR), LT2ESWTR, and the S2DBPR (see Table 4-1 for these acronyms). The evaluation includes the three small systems in the vicinity of Pardee and Camanche Reservoirs and the three large system in the East Bay, Walnut Creek, Orinda, and Lafayette WTPs. The three large system in-line WTPs treat Mokelumne River water transported from Pardee Reservoir through the Mokelumne Aqueducts to the East Bay. PACT and PARA WTPs treat Pardee Reservoir water, while CASS WTP treats Camanche Reservoir water. CANS WTP treats groundwater and is not included in this evaluation, since its supply is not under direct influence of surface water.

Treatment Requirements for SWTR, IESWTR

Multi-barrier treatment systems must be provided for approved surface waters, reliably achieving the following performance requirements:

SWTR:

- A total of 99.9 percent (three log) reduction of *Giardia* cysts through filtration and disinfection,
- A total of 99.99 percent (four log) reduction of viruses through filtration and disinfection,
- Residual disinfectant concentration in the plant effluent cannot be <0.2 mg/L for more than four hours, and
- Residual disinfectant concentration cannot be undetectable in greater than 5 percent of distribution system samples in a month, for any two consecutive months.

IESWTR and LT1ESWTR:

A total of 99 percent (two log) reduction of *Cryptosporidium* through filtration, provided TT performance parameters are met, as described below,

Performance Standards

SWTR, IESWTR, and LT1ESWTR established turbidity performance standards. The turbidity level of the combined filter effluent:

- Shall be less than or equal to 0.3 NTU in at least 95 percent of the measurements taken each month; except for Walnut Creek, Orinda, and Lafayette WTPs, which shall be less than or equal to 0.2 NTU in at least 95 percent of the measurements taken each month as a condition of the Water Supply Permit.
- Shall not exceed 5 NTU at anytime; except for Walnut Creek, Orinda, and Lafayette WTPs, which shall exceed 2.0 NTU at any time as a condition of the Water Supply Permit.
- Shall not exceed 1.0 NTU for more than one continuous hour;
- Shall not exceed 1.0 NTU at four-hour intervals; and
- Shall not exceed 1.0 NTU for more than eight consecutive hours; except Walnut Creek, Orinda, and Lafayette WTPs which shall not exceed 0.5 NTU for more than eight consecutive hours as a condition of the Water Supply Permit.

Monitoring Requirements

On-line instrumentation collects flow, pH, turbidity and chlorine residuals data on a continual basis. The District follows the sample monitoring program as specified in the annual SWTR Operations Plan for the East Bay in-line WTPs. Water quality monitoring for Pardee Center, PARA, and CASS Recreation Area WTPs is conducted in accordance with provisions of the individual Water Supply Permits.

Operating Criteria

For the East Bay in-line WTPs, the SWTR Operations Plan gives criteria for length of filter runs and describes backwash procedures for each plant. Filter backwash procedures stipulate the requirements the filters must meet when being placed back in service. Filtered water turbidity levels are measured continuously. The SWTR Operations Plan also lists treatment chemical supplies stored for use, and contacts for vendors whose products are used regularly. It outlines procedures for each plant in the event of disinfection failure, including shutdown of the plant if a chlorine residual of 0.2 mg/L cannot be met in the plant effluent.

Operational criteria for the PACT, PARA, and CASS Recreation Area WTPs are followed in accordance with their respective Water Supply Permits. Filtered water turbidity levels are measured continuously. Plant procedures are followed for chemical supplies and disinfection.

Reporting

To meet regulatory requirements, the District submits a monthly water quality report to the SWRCB-DDW. This report typically contains the following and other information as necessary:

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- Distribution System Bacteriological Test Results Report, including percentage of distribution samples with detectable residuals to comply with the SWTR.
- Monthly SWTR Summary of Monitoring
- Exception Report for three water systems of CASS, PARA, and PACT
- Monthly Fluoridation Report for the three WTPs of Orinda, Lafayette, and Walnut Creek
- Water Quality Complaints Summary

Performance this Update Period

The treated water from all six plants (CASS, PACT, PARA, Walnut Creek, Lafayette, and Orinda WTPs) met all turbidity requirements each month they were in operation. Also, in each WTP, the filters surpassed the operating criteria of 80 percent removal of the monthly average raw water turbidity. All operating criteria were met when filters were returned to service. The performance standard of maintaining a disinfection residual not less than 0.2 mg/L was achieved at each plant. Finally, distribution system monitoring complied with SWTR requirements - total coliform counts were zero in more than 95 percent of the monthly samples. Also, a detectable disinfection residual and/or HPC less than or equal to 500 cfu/ml was measured in more than 95 percent of the monthly samples.

As previously discussed, CASS WTP Effluent exceeded the secondary MCL standards for odor (TON) in nine quarterly samples during the 2020 MRWSS update, with the maximum TON of 8. These TON exceedances did not coincide with any odor complaints by consumers. In 2017, there was also one odor sample above the secondary MCL at Lafayette WTP Effluent. The result was a TON of 8 with a chlorinous odor characterization. All follow-up sample results were below the TON MCL value.

LT2ESWTR

The LT2ESWTR was promulgated in January 2006 to mitigate *Cryptosporidium* risks for large and small water systems. In adherence to LT2ESWTR, the District began two years of monthly monitoring in October 2006 for *Cryptosporidium*, *E. coli*, and turbidity in Pardee Reservoir for the large system East Bay in-line WTPs. *Cryptosporidium* was not detected, and Walnut Creek, Lafayette, and Orinda WTPs were assigned a Bin 1 classification and additional treatment was not required. Round 2 of LT2ESWTR monitoring began in April 2015 and completed in March 2017 and *Cryptosporidium* was not detected in any of the samples from Pardee Reservoir; therefore Walnut Creek, Orinda, and Lafayette WTPs remain in the Bin 1 classification.

During the MRWSS 2010 Update, *E. coli* samples were collected at least twice per month for 12 consecutive months from PACT, PARA, and CASS influents to represent each of these small water systems. Based on those results, PACT, PARA, and CASS were assigned a Bin 1 classification under LT2ESWTR, and the District was not required to meet additional monitoring or removal requirements for *Cryptosporidium*. Round 2 of LT2ESWTR monitoring for PACT, PARA and CASS influents began in October 2017 and completed in September 2018 on a bi-weekly schedule for 12 consecutive months. Based on these results, PACT, PARA, and CASS WTPs were assigned a Bin 1

classification, and the District is not required to meet additional monitoring or removal requirements for *Cryptosporidium*.

S2DBPR

S1DBPR required quarterly sampling of total trihalomethanes (TTHMs) and five haloacetic acids (HAA5s) at various locations in the distribution system and set MCLs at 80 µg/L and 60 µg/L, respectively. Under S1DBPR, MCL compliance was calculated using the running annual average (RAA) of all samples from all monitoring locations across the system. S2DBPR built on that rule by ensuring that samples are collected from areas of the distribution system most vulnerable to high DBPs. The rule required an initial distribution system evaluation (IDSE) in order to identify these areas. Sixteen sites in the large East Bay distribution system were chosen for S2DBPR, including areas served by Walnut Creek, Lafayette, and Orinda WTPs: four represent average residence times, six represent the highest TTHMs in the system, and six represent the highest HAAs in the system. Under S2DBPR, MCL compliance is calculated using the locational RAA (LRAA) for each monitoring location in the distribution system. The District samples quarterly at these locations to comply with S2DBPR. As documented in the monthly reports submitted to the SWRCB-DDW, the distribution system samples were always in compliance with S2DBPR.

Under S2DBPR requirements, the Camanche and Pardee water systems were not required to conduct IDSE monitoring due to small system waivers. THM and HAA5 monitoring was required annually in the distribution systems of PACT, PARA, and CASS. On July 15, 2015 CASS annual TTHM and HAA5 results were 98 and 65 ug/L, respectively. Subsequently, The District initiated quarterly monitoring immediately; and after four quarters of monitoring, the running annual average of HAA5 was 67 ug/L which exceeded the MCL of 60 ug/L. The District prepared and distributed a public notification on June 14, 2016, and implemented corrective actions to reduce HAA5 concentration at CASS Water System, including the replacement of anthracite filter media with GAC in the old in-line filter CASS WTP. Additionally, starting in July 2016, the District implemented monthly monitoring of TTHM and HAA5 to fully capture seasonal and monthly variations and to further evaluate its corrective actions.

GAC treatment was effective at lowering DBP levels. During the period of July 2016 to June 2017, running annual average of TTHM and HAA5 results based on monthly sample results were at 15 and 10 ug/L, respectively, and none of the monthly monitoring results exceeded MCLs. These values meet the requirements of Title 22 Section §64534.2 (a)(3), and CASS Water System was eligible to return to its normal annual monitoring since TTHM annual average result was <60 ug/L and HAA5 annual average result was <45 ug/L. However due to the plant upgrades at CASS Water System, the District proposed to the SWRCB-DDW to continue to monitor for TTHM and HAA5 on a quarterly basis. A post-membrane-filtration GAC system was installed at CASS UF WTP. All quarterly and locational running annual average results of THM and HAA5 have been well below the MCLs., The District continues to monitor for TTHM and HAA5 on a quarterly basis to monitor the performance of the GAC contactor.

Conclusion

Pardee Reservoir raw water quality is generally excellent and Camanche Reservoir raw water quality is very good. However the raw water turbidity did rise above 20 NTU with the heavy storm events of 2017 at both Pardee Reservoir and Camanche Reservoirs, and Camanche Reservoir turbidity also exceeded 10 NTU due to storms in 2016. The raw water turbidity and coliform levels were above the treated water MCLs, as is typical. The raw waters met all the primary treated water MCLs for inorganic chemicals, radioactivity and organic chemicals. During the MRWSS 2020 Update period, raw water aluminum exceeded the secondary MCL standards at Pardee and Camanche Reservoirs and manganese results at Pardee Reservoir exceeded secondary MCL standards. However these are removed through treatment at all District WTPs and both aluminum and manganese were below secondary MCLs in all WTP effluent samples.

In the past, elevated MTBE concentrations were detected in both reservoirs. However, due in part to District efforts, as well as a state ban on MTBE in gasoline, no MTBE has been detected in either reservoir since 2003.

The District's WTPs were effective and reliable at removing particulates and microorganisms. The high raw water turbidity in early 2017 prompted the District to preemptively shut down the Mokelumne Aqueducts and use Briones Reservoir water to supply the in-line filter plants in the East Bay. This was the longest recorded shutdown duration for a water quality event in Pardee Reservoir, and the fourth since 1982. While optimization of coagulants can maintain low filter effluent turbidities during high raw water turbidity events, this typically results in shorter filter run times that cannot be maintained for extended periods of time without straining the waste-stream processes. Thus, the flexibility in source waters is an important factor contributing to the reliability of the large East Bay System.

The small systems of PACT, PARA, and CASS WTPs have significant treated water storage capacity, thus only operate a fraction of each day. They have the flexibility to cease operation for a day or more if the raw water turbidity is extremely high, especially in winter when water demands are low and when high raw water turbidity events are likely to occur. All three small systems were able to maintain low effluent turbidities despite the high raw water turbidity events that occurred during this update period.

The monthly WTP reports submitted to SWRCB-DDW and CCRs indicate that the treated waters from these six WTPs met all water quality regulations, except for HAA5 in the CASS distribution system in 2016. CASS returned to full compliance in 2017, and all other S2DBPR monitoring results were below the MCL. Disinfectant residual and HPC data from the distribution systems showed that the District had no problems meeting the detectable disinfectant residual criteria. On the basis of LT2ESWTR Round 2 sampling, all systems were assigned Bin 1 classification and additional treatment for *Cryptosporidium* is not required.

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Section 5: Potential Contaminant Sources

Introduction

This section summarizes the potential contaminant sources identified in the previous MRWSSs (1995, updated 2000, 2005, 2010, and 2015), and expands on those accounts using data made available in the update period between 2015 and 2019. Agencies with jurisdiction in the watershed were solicited for data to assess each potential contaminant source. Sources from these agencies and from within EBMUD were interviewed and reviewed to determine the status and development of contaminant sources.

This section first presents the potential contaminant sources found in the two watersheds covered in this report (Upper Mokelumne River and Camanche watersheds), and then ranks the significance of the potential contaminant sources,

Upper Mokelumne River Watershed

Potential contaminant sources found in the Upper Mokelumne River Watershed (upstream of Pardee Dam) are discussed in the following categories:

- EBMUD Facilities (all sources and categories combined)
- Water Resources Development
- Sanitation Facilities
- Hazardous Materials
- Urban Area Runoff
- Rural Area Runoff
- Utilities - Hydroelectric Power
- Transportation Corridors
- Agriculture
- Wildlife and Livestock
- Recreation/Public Access
- Mines
- Geologic Hazards
- Fires and Fuels management
- Logging
- Pesticides
- Unauthorized Activities

District Facilities

District facilities within the Upper Mokelumne River Watershed include the Pardee Reservoir, PARA, Pardee Center, and the Pardee Dam, Spillway and Powerhouse. The potential contaminant sources from each of these facilities are discussed in this section.

Pardee Reservoir

Recreation at Pardee Reservoir is strictly controlled by the District in accordance with the provisions of the District's Water Supply Permits, Concession Contract Agreements, and the licensing requirements from FERC. Although boating is allowed at the reservoir, body contact with the water is not allowed. The reservoir is patrolled regularly to limit incidents of illegal body-contact and trespassing.

Adequate sanitation facilities for boaters using Pardee Reservoir are necessary to protect public health. EBMUD has addressed the problem by maintaining a combination of floating and shoreline toilets to meet visitor use demands. EBMUD staff regularly pump out the toilets following practices that minimize the chance of spillage, and then dispose of the effluent at the PARA WWTP. The facilities are maintained and inspected on a regular basis.

Pardee Recreation Area

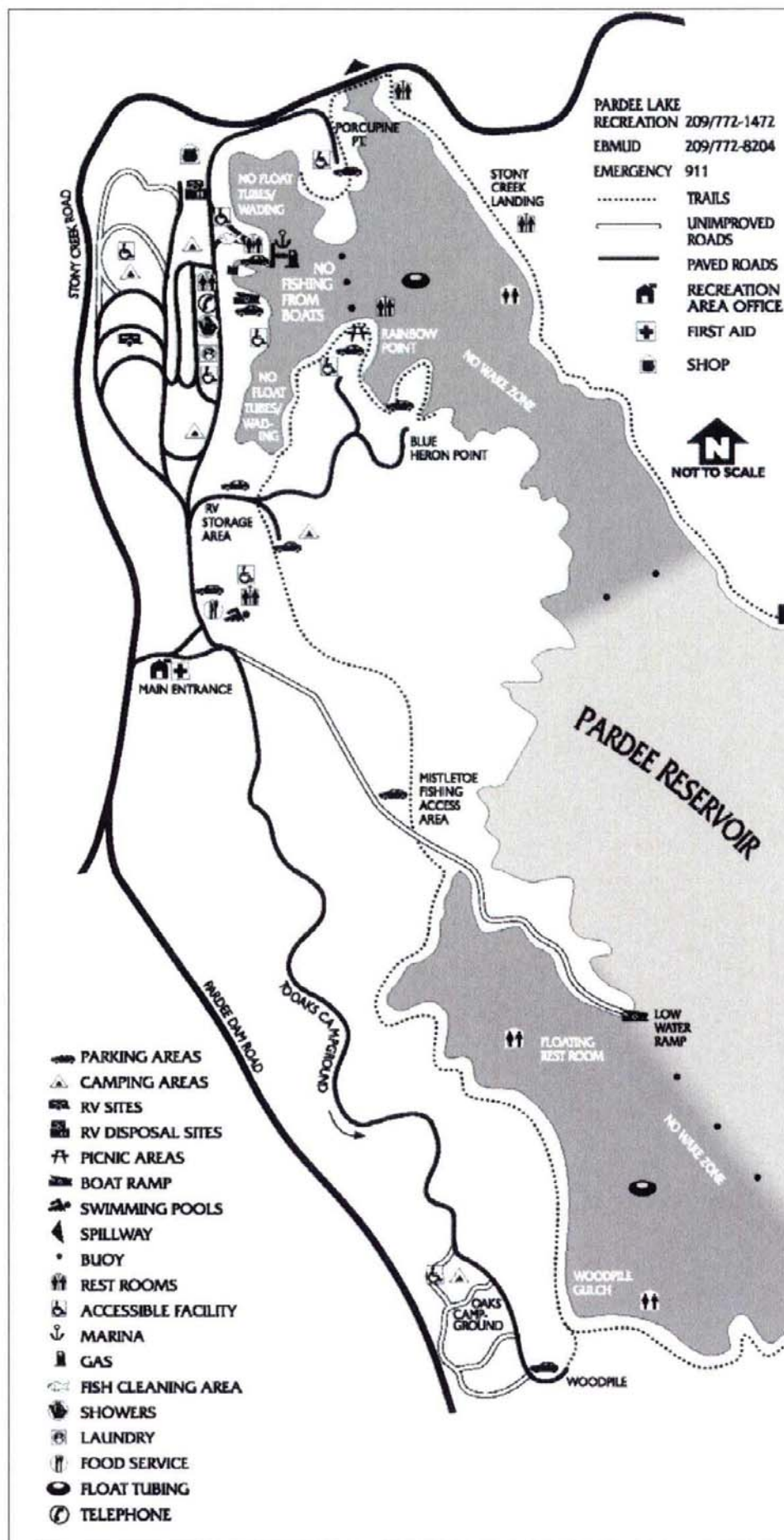
Pardee Recreation Area (PARA) is located in a rural area on the north shore of Pardee Reservoir in Amador County. The main roads into the area are Stoney Creek Road and Pardee Dam Road. There are no major businesses, care facilities, highways, hospitals, or schools in the immediate area. Predominantly undeveloped watershed and agricultural lands surround the facility.

PARA encompasses approximately 289 acres. PARA closed temporarily from July 2015 to February 2016 for remodeling and renovations. Table 5-1 summarizes the facilities at the PARA and Figure 5-1 shows the general area layout. The remaining acreage is undeveloped watershed. Beginning in 2009, the marina boat fueling facilities became on-shore only. The PARA water and wastewater treatment plants are maintained and operated by EBMUD. All other facilities are maintained and operated by the concessionaire, Pardee Lake Recreation.

Table 5-1. Pardee Reservoir Recreation Facilities ^a

Facility	Existing Size or Quantity
Tent Campsites	94
RV campsites (short term)	12
RV campsites (seasonal)	56
Picnic Tables	143
Roads (paved)	3 mi
Roads (unpaved)	1.5 mi
Hiking trails	4.1 mi
Total day-use parking spaces	455
Parking stalls for boat & trailer or RV	137
Drinking fountains	33
Hydrants	20
Swimming pools	2
Fish cleaning facilities	1
Above ground fuel tanks	2
RV dump stations	1
Restrooms (portable)	48
Total buildings	12
Restroom/shower buildings	4
Toilets	11
Urinals	5
Sinks	15
Shower Heads	10
Laundry locations	1
Dryers	2
Washers	2
Park headquarters	1
Entrance kiosks	1
Pool buildings	1
Coffee shops	1
Pump houses	1
Maintenance Shops	1
EBMUD boat houses	1
Marina	1
Slips	70
Boat launch ramps	2 Locations
Main - Elevation (540-572)	10 lanes
Low Water – Elevation (495-535)	2 lanes
Public Telephones	0

Figure 5-1. Pardee Recreation Area Map



Recreation

The recreation area is closed during the winter months, which is generally from the end of October until the first Friday in February. When the recreation area is open, recreation is restricted to hiking, picnicking, camping recreational vehicle (RV) park, fishing, and boating. No bodily contact activities are allowed.

Table 5-2 summarizes visitor use at PARA between 2015 and 2019. There was an average of 63,300 visitors per year at PARA, down from 80,500 visitors per year during the previous update period. Fishing is a major activity at Pardee Reservoir; since there is a national trend of reduced interest in fishing as a recreational activity, this may explain at least part of the decline in visitor numbers. During this update period there were no sewer overflows.

Table 5-2. Visitor Use Pardee Recreation Area (2015-2019)

Month	Number of Visitors				
	2015	2016	2017	2018	2019
Jan	0	0	0	0	0
Feb	7,367	0	7,233	5,714	7,042
March	8,784	5,308	9,677	8,134	8,253
Apr	10,126	9,231	13,952	6,552	8,134
May	12,253	10,033	13,930	6,731	7,305
Jun	9,610	7,309	10,937	6,783	8,365
Jul	0	7,860	11,751	6,773	8,478
Aug	0	6,236	8,402	6,307	6,658
Sep	0	5,513	6,502	4,985	5,113
Oct	0	4,450	6,734	4,651	4,886
Nov	0	1,284	808	0	492
Dec	0	0	0	0	0
Total	48,140	57,224	89,926	56,630	64,726

Water Supply

PARA is served by the Pardee Recreation WTP which is described in Section 2.

Hazardous Material Storage

The WTP for Pardee Reservoir Recreation Area uses sodium hypochlorite for disinfection. The sodium hypochlorite (12 percent concentration) is stored in a 20-gallon bulk storage tank with spill containment. Any spills are contained within the WTP building. An inventory of hazardous materials stored on site is performed annually and reported in the Pardee Recreation Environmental Emergency Response and Release Prevention Plan (ER Plan). A table of hazardous materials, as listed in the 2014 ER Plan, is reproduced here in Appendix 5-1.

Three underground storage tanks (UST) were removed from above the marina store at PARA in 1997, as detailed in the MRWSS 2010 update. After a period of groundwater monitoring for hydrocarbons, the site closure was approved in June 2005 by the RWQCB.

Sanitation Facilities

Operation of the District's PARA WWTP is conducted under permit with the RWQCB. The wastewater is routed to a primary treatment pond followed by a polishing pond. Table 5-3 summarizes the WWTP characteristics. Appendix 5-2 provides an overview of the monitoring program for the PARA wastewater ponds.

Table 5-3. Non-Discharging Small Community Wastewater Systems, Upper Mokelumne River Watershed^a

Sub-Watershed	Facility Name	Operating Agency	Treatment Type	Type of Development	Effluent Disposal	Design Capacity (gpd)	Avg. Flow (gpd)
Middle Fork	West Point WWTP	Calaveras County Water District	Aerobic and anaerobic digestion and UV disinfection	120-acre community (165 connections as of 2019)	Sand filters, UV disinfection, holding ponds and a sprayfield.	58,000	25,000
EFFLUENT RESTRICTIONS: Monthly Mean – 40 mg/L BOD5, 0.2 mL/L/hr settleable solids, 23 MPN/100 ml total coliform. Daily Max: 80 mg/L BOD5, 0.5 mL/L/hr settleable solids, 230 MPN/100 ml total coliform							
South Fork	Wilseyville Camp Sewer Treatment Plant	Calaveras County Water District	Aerated Lagoon	28 residential connections and one commercial connection	Storage pond, with 10-acre spray field used occasionally	9,000	6,000
	Mokelumne Hill WWTP	Mokelumne Hill Sanitary District	Two aerated lagoons, chlorination tank	Community of Mokelumne Hill (about 280 connections)	Storage pond, and spray disposal field	150,000	60,000
EFFLUENT RESTRICTIONS: Monthly Mean – 40 mg/L BOD5, 0.5 mL/L/hr settleable solids. Daily Max: 80 mg/L BOD5, 1.0 mL/L/hr settleable solids							
Main Stem	Pardee Center WWTP	EBMUD	Extended aeration package plant	Residential, office, shop and recreational facilities for EBMUD employees	Percolation pond on Camanche Watershed	3,000	~1,000
EFFLUENT RESTRICTIONS: Monthly Mean – 40 mg/L BOD5, 40 mg/L suspended solids, 0.5 mL/L/hr settleable solids. Daily Max: 80 mg/L suspended solids, 80 mg/L BOD5, 1.0 mL/L/hr settleable solids							
	Pardee Recreation Area WWTP	EBMUD	Multiple-stage oxidation/evaporation ponds	80 recreational vehicle units and a recreational center including restaurant	Evaporation spray irrigation fields outside watershed ^b	38,100	5,000

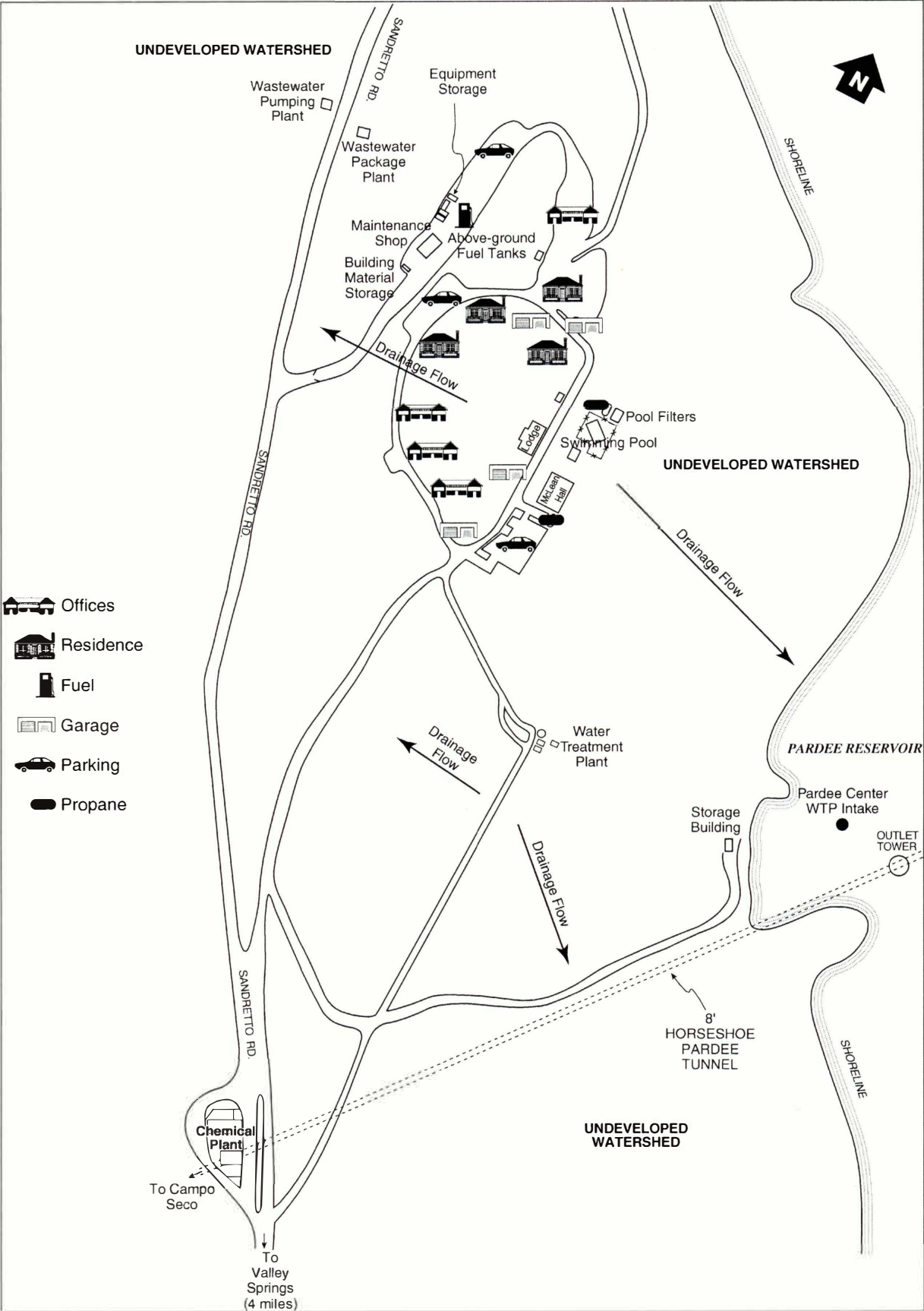
a) Source: Central Valley Regional Water Quality Control Board

b) Surface water at treatment site drains to the Lake Amador watershed via Carson Creek.

Pardee Center

Pardee Center is located on the west shore of Pardee Reservoir, primarily in Calaveras County (Figure 5-2). The main roads into the area are Pardee Dam Road and Sandretto

FIGURE 5-2. Pardee Center Area Map



Section 5. Potential Contaminant Sources

Road. There are no major businesses, care facilities, highways, hospitals, or schools in the immediate area. Undeveloped watershed and agricultural land surround the facility. Pardee Center is a District facility consisting of administrative offices, a chemical feed facility, equipment storage areas, a fuel-dispensing station, maintenance shops, a swimming pool, two residences, a WTP, a WWTP, and two small parking areas.

Chemical Feed Facility

The main Pardee Center Chemical Plant feeds liquid calcium hydroxide (liquid lime) into the Mokelumne Aqueducts for pH adjustment. Prior to June 2012, sodium hypochlorite was fed into the aqueducts at this location for disinfection (now dosed near Walnut Creek WTP).

Water Supply

Pardee Center is served by the Pardee Center WTP which is described in Section 2. The WTP uses nano-filtration membranes in the treatment process. Pardee Center WTP uses sodium hypochlorite for disinfection.

Hazardous Materials

The chemical feed facility stores liquid sodium hypochlorite (12 percent concentration) in three 10,000-gallon bulk storage tanks, two tanks in service and one empty in standby. The liquid calcium hydroxide is stored in two tanks, one in service and one empty in standby. The Pardee Center WTP transfers sodium hypochlorite from the chemical feed facility to the WTP in 5-gallon carboys. The sodium hypochlorite is then stored in a 15-gallon container, diluted down to an approximately one percent solution. Soda ash is used for WTP effluent pH adjustment and corrosion control and is mixed in a 12-gallon container. Any spills are contained locally in the treatment building. An inventory of hazardous materials stored on site is performed annually and reported in Pardee Center ER Plan.

For a summary of the Pardee Lime Facility NPDES Industrial Storm water Permit from the RWQCB, see the 2010 MRWSS update.

Sanitation Facilities

The Pardee Center WWTP is operated under permit with the RWQCB. Table 5-3 summarizes the WWTP characteristics. Effluent from the WWTP is conveyed into a holding/settling tank with a capacity of about 1,000 gallons for additional treatment. The effluent from the tank is routed to a 2,900-gallon sump before disposal to a percolation pond. Any drainage from overflows (none have occurred in the past) would flow to the Pardee Spillway, which drains to Camanche Reservoir. Appendix 5-2 contains discharge permit monitoring requirements for Pardee Center WWTP.

The WWTP was last rehabilitated in 2008. Cleaning and CCTV inspection of wastewater mains is used as a preventative maintenance effort prevent sewer overflows.

Pardee Dam, Spillway and Powerhouse

Hydropower Generation

Potential contaminants associated with hydroelectric operations in general are discussed in the Hydroelectric Section.

Recreation Use at Middle Bar

The section of the river between the Electra Powerhouse and the Middle Bar Bridge is known as the Electra Run. It is a very popular area for kayakers and whitewater rafters. The Middle Bar takeout facility includes a 20-space paved parking lot, a two-station, handicapped-accessible toilet, and a short-surfaced trail to the river's edge. No permits, fees, or access passes are required for the public use of these facilities.

The Mokelumne Coast to Crest Trail (MCCT) passes by both Camanche and Pardee Reservoirs, ending about one mile east of the Middle Bar Bridge on the Calaveras side of the Mokelumne River. Trail use requires an EBMUD permit and is open to pedestrians and equestrians.

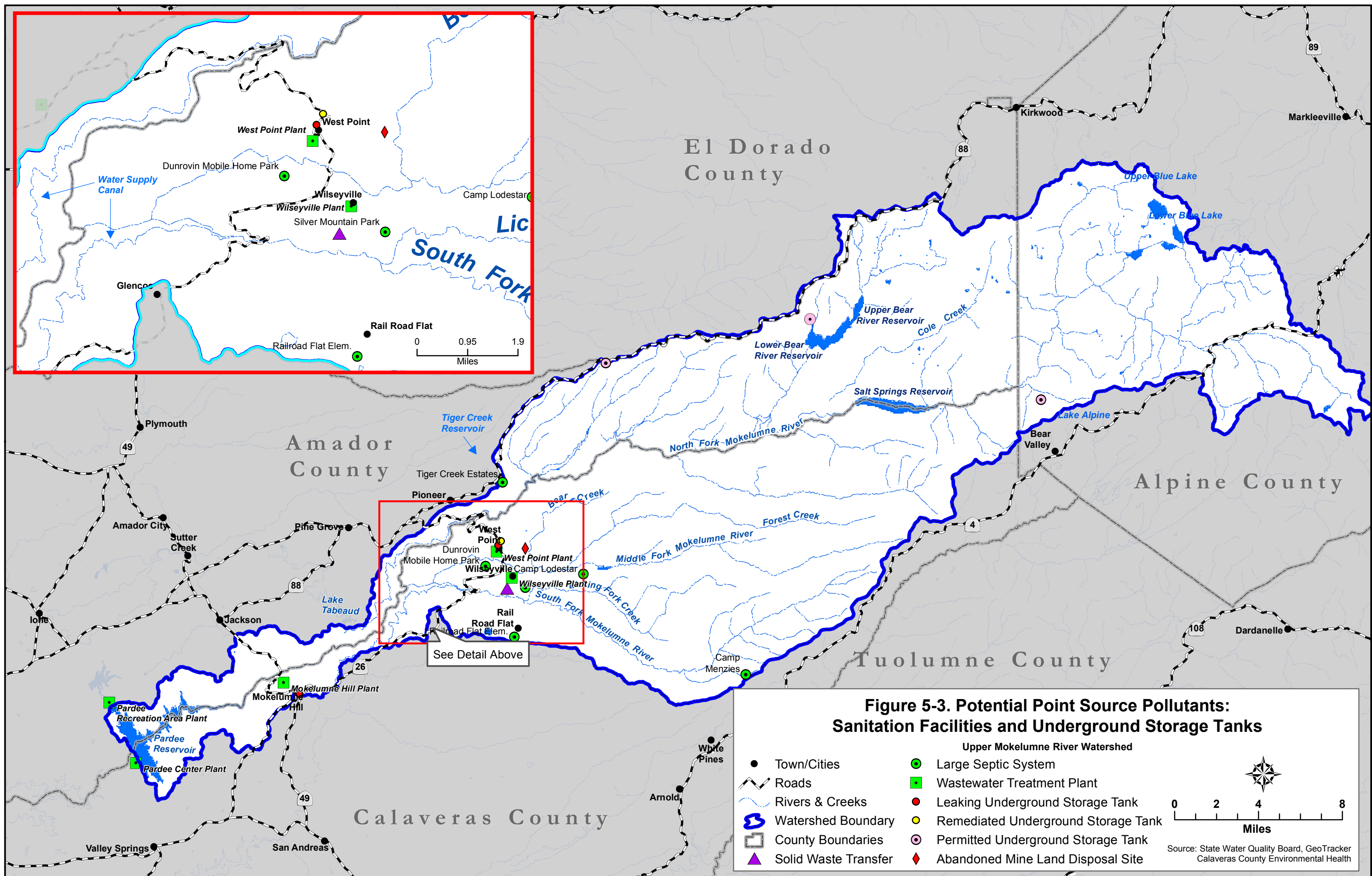
Water Resources Development

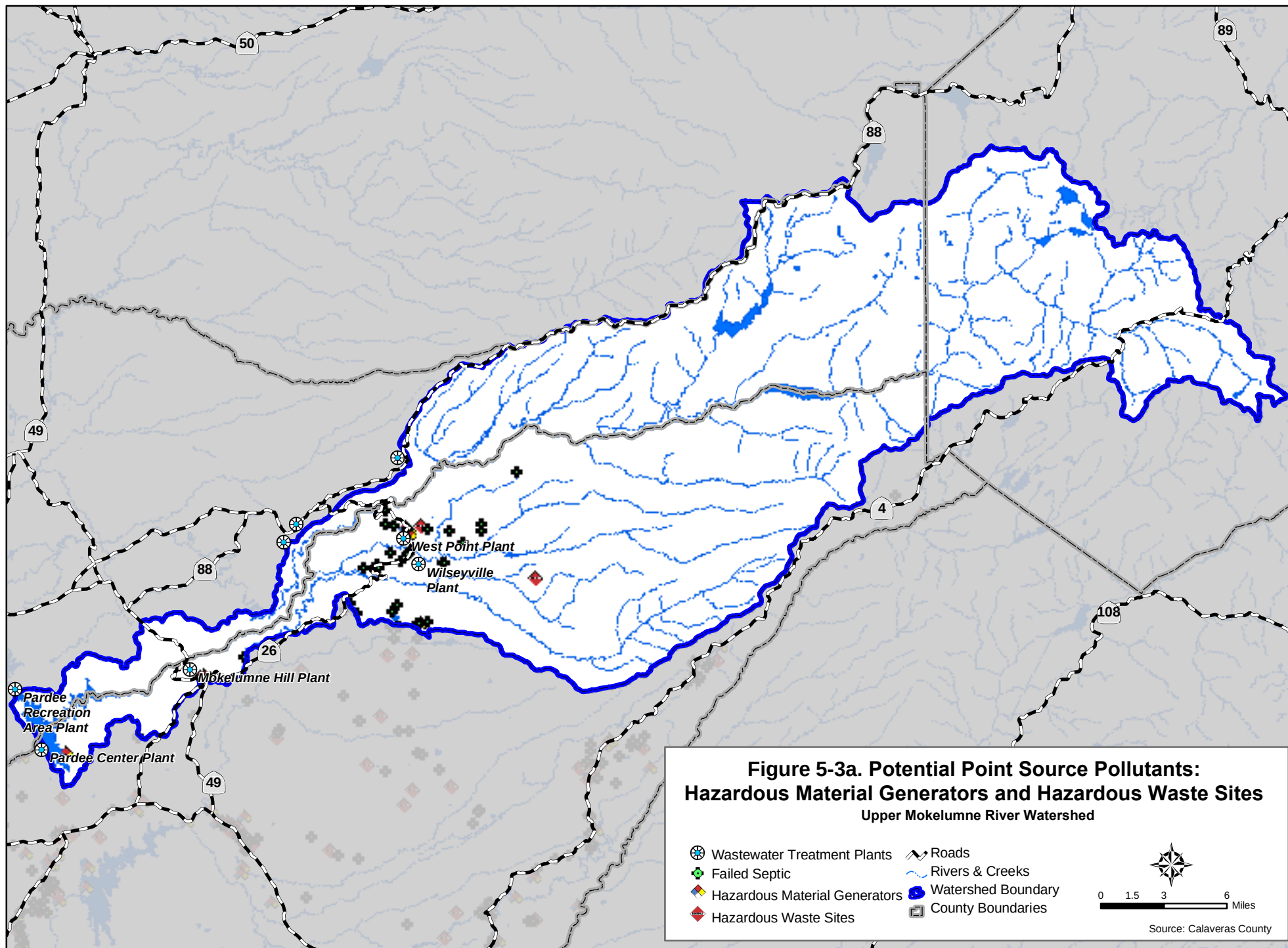
Existing hydropower and water supply projects on the Mokelumne River were described in Section 2.

Thousands of acres of PG&E land along the Mokelumne River have been transferred to new owners or managers as part of PG&E's 2003 bankruptcy settlement. See Section 6, PG&E Land Conservation Commitment Stewardship Council for a detailed discussion of scope and timeline.

Sanitation Facilities

The sanitation facilities in the Upper Mokelumne River Watershed include wastewater collection and treatment systems, septic tanks, and leach field systems. These are shown in Figures 5-3 and 5-3a. Chemical toilets are largely associated with recreational activities and are discussed in the Recreation section.





Wastewater Collection and Treatment Systems

Table 5-3 summarizes information on the five small community wastewater systems in the Upper Mokelumne River Watershed and Figure 5-3 shows their locations. As noted on the table, no direct discharges occur to any surface waters of the watershed; effluent restrictions for each wastewater treatment facility also are listed in the table. Each of the wastewater disposal systems has a non-discharging system permit from the CVRWQCB. The RWQCB has primary responsibility for monitoring, inspection, and enforcement proceedings for each of the five systems.

There is a risk of sewage overflows from wastewater treatment and disposal facilities using land disposal sites. Wastewater collection systems constitute another potential source of contamination by microbiological constituents. The systems may be vulnerable to spills in the event of pipe failures, accidental breaches due to adjacent construction activities, or overflows induced by wet weather infiltration.

AWA operates several wastewater systems that serve the small communities north of Tiger Creek Reservoir, one of which is in the Upper Mokelumne River Watershed. The Tiger Creek Estates system consists of multiple septic systems emptying into a common tank, which feeds a leach field or spray disposal field. Pardee Center and PARA wastewater systems are discussed in more detail under EBMUD Facilities earlier in this section and in Section 2.

The Mokelumne Hill Sanitary District (MHSD) and WWTP are located near the Mokelumne River just above Pardee Reservoir and Highway 49 as described in Section 2. Section 6 describes the 2011-2014 MHSD reviews by Calaveras Local Agency Formation Commission (LAFCo). In summary, Calaveras LAFCo evaluated MHSD and found it lacking in several areas and made recommendations for improvements. Since then, MHSD has secured a number of grants to fund many operational improvements including fire and fuel management, improved road systems, automation of spray field operation, reestablish of gravity feed collection system, control of nonpoint sources of pollution, and creation of more green infrastructure projects.

A survey of incident reports from EBMUD's Regulatory Compliance Office and the State Office of Emergency Services (Cal OES) showed no wastewater spills were reported in the 2020 MRWSS update period.

Septic Systems

Outside of the handful of areas with WWTPs and sewer systems, the majority of developed lands within the Upper Mokelumne River watershed use septic systems to manage residential sewage. .

Large Septic Systems.

Table 5-4 summarize the six large capacity septic systems with leach fields located in the Upper Mokelumne River Watershed, shown in Figure 5-3. Four of the large septic systems were identified by the Calaveras County 2004 Ground Water Protection Program (listed as Class V injection wells): two are privately run mobile home parks; one is an

Section 5. Potential Contaminant Sources

elementary school; and one is a Girl Scout camp. One of the large capacity septic and leach field systems is operated by A WA at the Tiger Creek Estates off Highway 88. Another is located at a camp and retreat center in the Middle Fork Watershed.

Table 5-4. Non-Discharging Large Septic Systems, Upper Mokelumne River Watershed^a

Sub-Watershed	Facility Name	Operating Agency	Location	Treatment Type	Type of Development	Effluent Disposal
North Fork	Tiger Creek Estates	Amador Water Agency	Pioneer / Buckhorn	Septic System	5 residential connections, 3 standby	Leech field
Middle Fork	Dunrovin Mobile Home Village	Private Mobile Home Park	West Point	Septic System (multiple tanks)	30 residential connections	Leech field
South Fork	Silver Mountain Park	Private Mobile Home Park	Sequoia National Park	Septic System		Leech field
South Fork	Railroad Flat Elementary	Private	Railroad Flat	Septic System		Leech field
South Fork	Camp Menzies (Girl Scouts)	Private	Off Highway 4	Septic System	Seasonal camp	Leech field

a) Sources: Calaveras County Groundwater Protection Program 2004, Amador Water Agency Wastewater Systems in Amador County map.

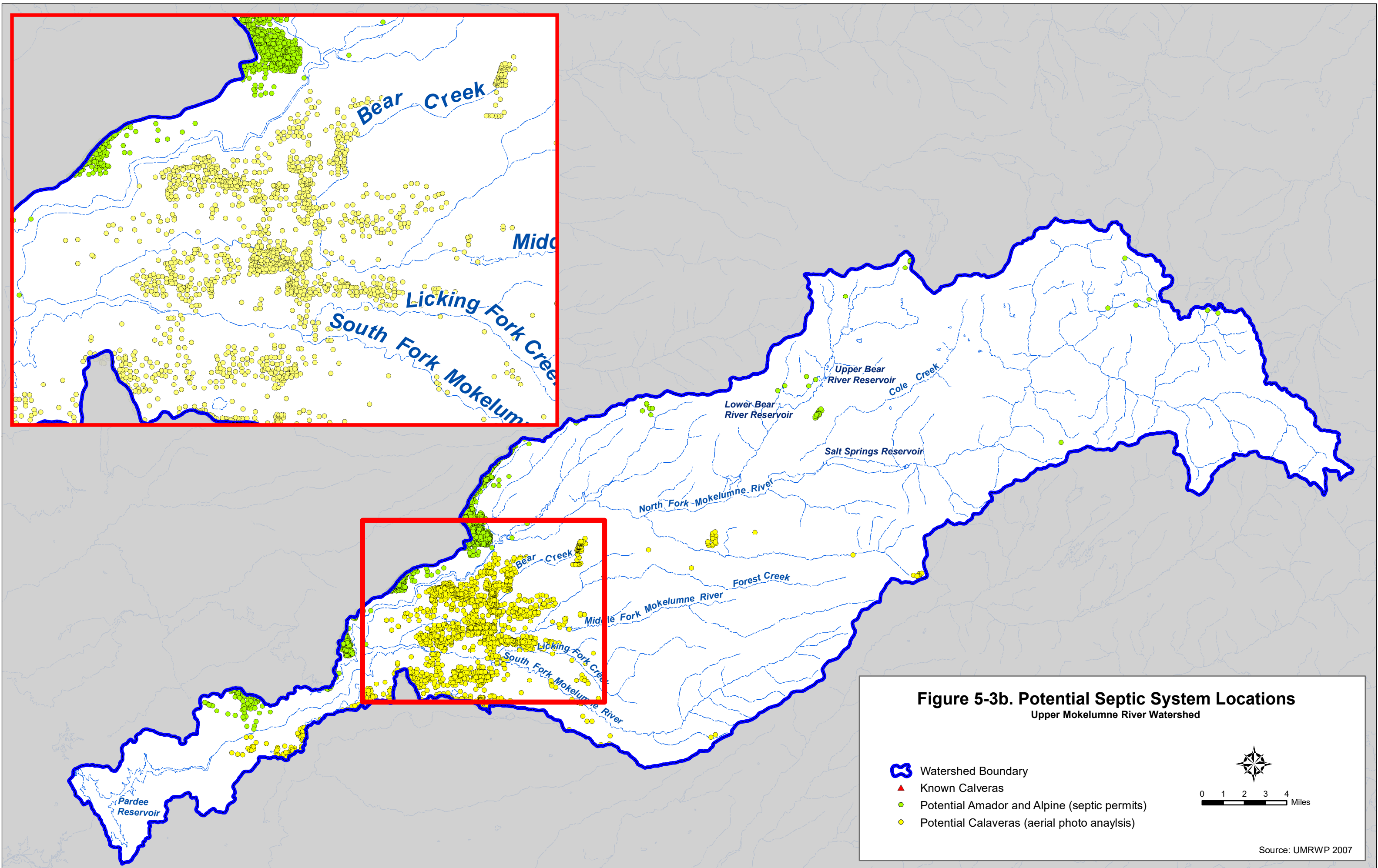
Residential Septic System Estimates

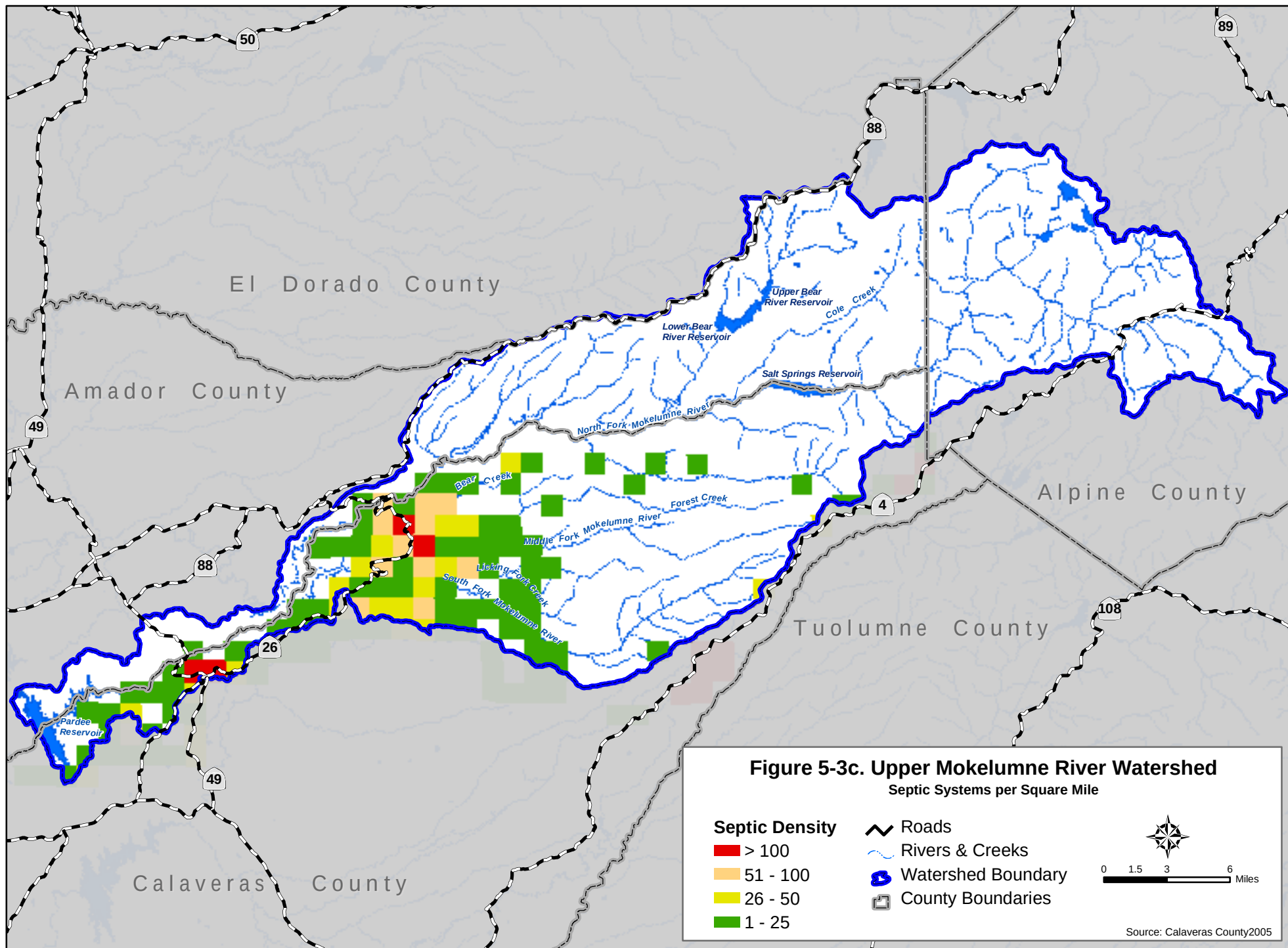
In 2007, the Upper Mokelumne River Watershed Assessment and Planning Project (UMRWAP) estimated that there were roughly 3,200 individual residential septic systems in the Upper Mokelumne River Watershed. The

UMRWAP concluded that many septic systems in the watershed are old, were designed for seasonal use without permits, and are a likely source of pathogen contamination, especially in the Middle and South Fork rivers. Section 6 provides a more detailed discussion of the UMRWAP.

Figure 5-3b shows the locations of both known septic systems and potential septic systems, as developed under the 2007 UMRWAP. Figure 5-3c shows the approximate number of septic systems per square mile. Estimates for potential individual residential septic systems were based on the following information:

- UMRWAP Estimate: 1,501 potential Calaveras County unpermitted septic systems, based on occupied land parcels outside of centralized sewage collection areas.
- Calaveras County, Environmental Health Department: 157 permitted septic systems
- Amador County, Environmental Health Department: 1,525 submitted septic permits
- Alpine County: 7 permitted septic systems





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During the 2020 MRWSS update period, no significant septic survey projects were proposed or funded. The water quality projects from the MAC IRWP adopted on January 25, 2019 do not focus on septic systems. See Section 6 for additional MAC IRWP project information.

Regulatory Compliance

The counties are responsible for septic system regulatory compliance, including design criteria and standards and permits. They issue permits for septic system repairs and new construction, inspect new construction sites for compliance and investigate reports of failed septic systems. The RWQCB is responsible for ensuring that the counties take appropriate steps to prevent non-point sources of pollution such as septage from impairing surface or groundwater bodies.

The USFS is not required to comply with county septic tank requirements, because local jurisdictions have no authority over federal lands. Currently, the Eldorado National Forest (NF) requires owners of existing cabins with special use permits to obtain a county permit when a septic system is repaired or installed. If it is not possible to install or repair an existing cabin septic system to compliance with current code, then a forest system vault system is allowed.

North Fork

Only small portions of the North Fork sub-watershed are suitable for septic tank systems due to the generally excessive steepness of the terrain and the unsuitability of much of the granitic batholith bedrock underlying most of the higher elevations. According to data collected as part of the UMRWAP, there were 1,438 septic systems in the North Fork sub-watershed as of 2006. Many of the septic tanks located in Amador County are along Highway 88 (Figure 5-3b), on the ridge separating the Mokelumne and Cosumnes River drainages. Figure 5-5 shows pockets of loosely populated areas along this ridge.

National Forest Special Use Permits. Approximately 48 recreational residences with individual septic systems are located on Eldorado NF lands in the Bear River Reservoir Tract (located on the south side of Lower Bear River Reservoir, above the Bear River Group Campground and the Camp Winton Boy Scout camp). The residences are privately owned, and improvements are allowed by special use permits on USFS lands. The individual special use permits have 20-year terms and were last renewed in 2005. As part of the special use permit renewal process, the owners submit condition checklists, including septic condition. County permits are required by USFS local offices for all needed septic repairs. The residential residences are almost exclusively summer cabins, on lots that average 100 feet by 150 feet in size.

The Bear River Lake Resort is located on the northwest side of Lower Bear River Reservoir on private land owned by PG&E. Services include cabins, a campground, and a marina. Sewage holding tanks are used, and the septage is regularly pumped out and hauled away for disposal.

Some residences served by septic tanks are also situated on Stanislaus NF land off Highway 4 in the vicinity of Bear Valley, and between Bear Valley and Salt Springs

Reservoir. However, most of the Mt. Reba-Bear Valley resort area residences and much of the ski area are located outside the watershed boundary.

Middle Fork

Most of the septic tank-served residential areas of the Middle Fork sub-watershed are situated around the outskirts of the sewered communities of West Point and Wilseyville. A 2000 WSS performed for CCWD and CPUD (Tetra Tech, 2000) noted elevated coliform in river flows and cited the Lynn Park Acres subdivision, with several homes adjacent to the river on septic systems, as a potential contaminant source. CCWD maintains some septic systems in this sub-basin and no overflows were reported by CCWD between 2015 and 2019. The 1995 GIS analysis yielded an estimate of 1,522 persons in 856 households on septic systems. According to the UMRWAP, there are 931 septic systems in the Middle Fork sub-watershed.

In 2019, the existing West Point sewer plant (which served 165 connections with an 83 gpm capacity) consolidated with the smaller Wilseyville sewer plant while operating within existing capacity. The project included construction of a small lift station, a new 3-inch 3,800-foot sewer main, community septic tank to remove solids and equalize flows, septage/sludge facilities, synthetic liner installations in the existing storage ponds, electrical/instrumentation upgrades, a new 3-inch 3,500-foot pipeline to transfer effluent to the existing Wilseyville pond, and a sprayfield for auxiliary storage and disposal.

South Fork

Most of the unsewered development in the South Fork sub-watershed is concentrated in the lower half of the basin. A previous CCWD/CPUD WSS (Tetra Tech 2000) noted three residences adjacent to the CPUD pumps station on Licking Fork, and five other residences around Jeff Davis Reservoir, and classified the threat potential from septic systems as “low.” According to the UMRWAP, there are 502 septic systems in the south fork sub-watershed.

Main Stem

Most of the septic systems are concentrated in several areas south of Highway 88, including the unincorporated community of Clinton. Other developed areas occur along Route 26, to the north of Mokelumne Hill, and to the southeast of Pardee Reservoir. According to the UMRWAP, there are 317 septic systems in the Main Stem sub-watershed.

Solid Waste Disposal Sites

The State Solid Waste Management Board has the overall responsibility for regulation and management of solid wastes within the watershed. The only solid waste handling site located within the Upper Mokelumne River Watershed is the Wilseyville Transfer Station, in the South Fork sub-watershed, about one-third mile south of Wilseyville. The transfer station location is shown in Figure 5-3. This small transfer station is staffed by two employees and operates four days a week: Friday, Saturday, Sunday, and Monday. There is a main facility and a Wilseyville Transfer Station Annex (Wood and Yard Waste Site). About ten tons of municipal solid waste is transferred each operating day. The transfer

station is too small to warrant a wastewater treatment facility. There have not been any complaints of odor or other problems at this facility.

Hazardous Materials

Underground Storage Tanks

Underground Storage Tanks (USTs) present a low threat as a contaminant source for surface water due to their very low density, sufficient distance from streams, and stringent requirements for containment at storage facilities. The majority of USTs within the watershed area contain fuel and other petroleum products including gasoline, diesel fuel, and liquefied petroleum gas, such as propane.

USTs in the Upper Mokelumne River Watershed are reported in the California RWQCB Geotracker database along with one abandoned mine land disposal site. USTs primarily pose a potential threat to groundwater and/or soils. The following types of USTs (leaking, remediated and permitted) are summarized in Table 5-5 and located on Figure 5-3:

- **Leaking USTs (LUSTs):** Currently one site is located within the Upper Mokelumne Watershed. Located in West Point and Mokelumne Hill, the status of these sites is site assessment and interim remedial action.
- **Remediated LUSTs:** Two remediated LUST cleanup sites are reported on Table 5-5. The Bear Valley Mountain Resort site was completed and closed in January 2018. The West Point Exxon site was completed and eligible for closure as of December 2019.
- **Abandoned Mine Land Disposal Site:** One abandoned mine land disposal site is also listed in the State Geotracker database. The Blazing Star Mine in West Point was in active operation recently enough to have had a RWQCB discharge permit; it remains in the Geotracker database now that operations have ceased, and it has been abandoned by the owners. The CVRWQCB monitors abandoned mine-related water quality threats and works on remediating priority sites. Currently, there are no priority mine sites undergoing remediation in the Upper Mokelumne River Watershed.
- **Permitted USTs:** Three permitted USTs are currently in use in the Upper Mokelumne River watershed. One is located off Highway 4 at the Bear Valley Ski Area. Two are located off Highway 88, one at the Caltrans-Peddler Hill Maintenance Yard and another at the Bear River Lake Resort.

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Table 5-5. Underground Storage Tanks, Upper Mokelumne River Watershed^a

Name	Address	City	County	Substance	Potential Threat	Status	Last Update
Leaking Underground Storage Tanks (LUST) Cleanup Sites							
Sierra Trading Post #8	8026 Hwy 49	Mokelumne Hill	Calaveras	Heating/ Fuel Oil; Diesel	Aquifer used for drinking water supply	Open - site assessment & interim remedial action	2/4/2013
Remediated LUST Cleanup Sites^b							
Bear Valley Mountain Resort	End of Hwy 207	Bear Valley	Alpine	n/a	Under investigation	Closed – 1/11/2018	1/11/2018
West Point Exxon	347 Main St	West Point	Calaveras	Gasoline	Aquifer used for drinking water supply	Open – eligible for closure as of 12/12/2019	12/12/2019
Permitted Underground Storage Tanks							
Bear Valley Ski Area	Bear Valley Ski Area	Bear Valley	Alpine	Gasoline	Soil	Closed – all 4 sites closed in late 1997	1997
MBP Linden	8203 Hwy 26	Stockton	San Joaquin	Gasoline	Aquifer used for drinking water supply	Closed – 6/21/2006	2006
Bear River Lake Resort ^c	40800 Hwy 88	Pioneer	Amador	Diesel	Groundwater used for non-potable means	Closed – 9/17/2008	2008
Caltrans-Peddler Hill Maint ^c	41951 Highway 88	Pioneer	Amador	Waste Oil / Motor / Hydraulic / Lubricating	Aquifer used for drinking water supply	Closed – 6/16/2009	2009
Star Gas	22645 HWY 26	West Point	Calaveras	Gasoline	Soil	Closed - 7/12/2012	6/27/2013
Abandoned Mine Land Disposal Site							
Blazing Star Mill / Mine	0 Jurs Rd	West Point	Calaveras	n/a	n/a	Open	1/1/1965 ^d

a) Source: California State Water Quality Control Board Geotracker Database, <https://geotracker.waterboards.ca.gov/>, Reports by listed Counties. See Figure 5-3 for locations.

b) Sites included if leak discovered or site remediation completed 2015 - 2019.

c) Site LUST has been fully remediated and new tank is now permitted. Site is listed only under Permitted Tanks.

d) Default date in Geotracker database (indicates no action yet taken).

Other Hazardous Chemicals

As previously reported, PG&E has replaced the polychlorinated biphenyl (PCB) transformers in its powerhouses with mineral oil-filled distribution transformers, thus greatly reducing the risk of hazardous PCBs explosions and spills.

During this update period, there were five Cal OES spill reports for the Upper Mokelumne River Watershed shown in Table 5-6. Two spills involved small quantities of lubricating oil (1/16th gallon) spilling into either the Mokelumne River or Pardee Reservoir. The third spill was of an oil spill in a creek near Railroad Flat Rd in Calaveras County. The fourth spill was a marijuana-related spill of unknown quantity near Lynn Boulevard in Calaveras County. The fifth spill was a diesel spill (30-40 gallons) in Mokelumne River near Highway 26 in Calaveras County.

Hazardous materials stored on District facilities are discussed under *EBMUD Facilities* in this section.

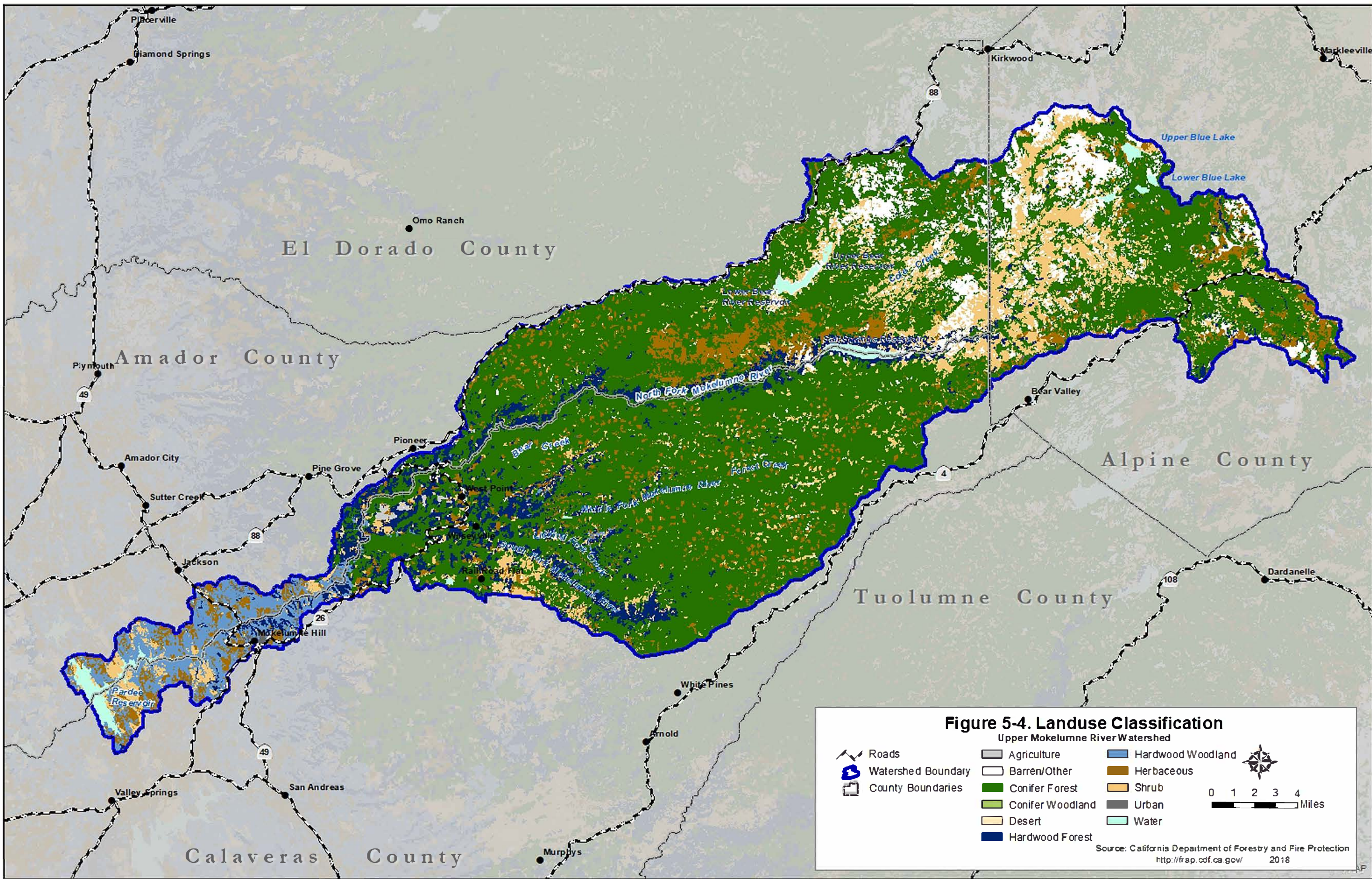
Table 5-6. Office of Emergency Management Spills, Tributary to Pardee Reservoir, 2015-2019 ^a

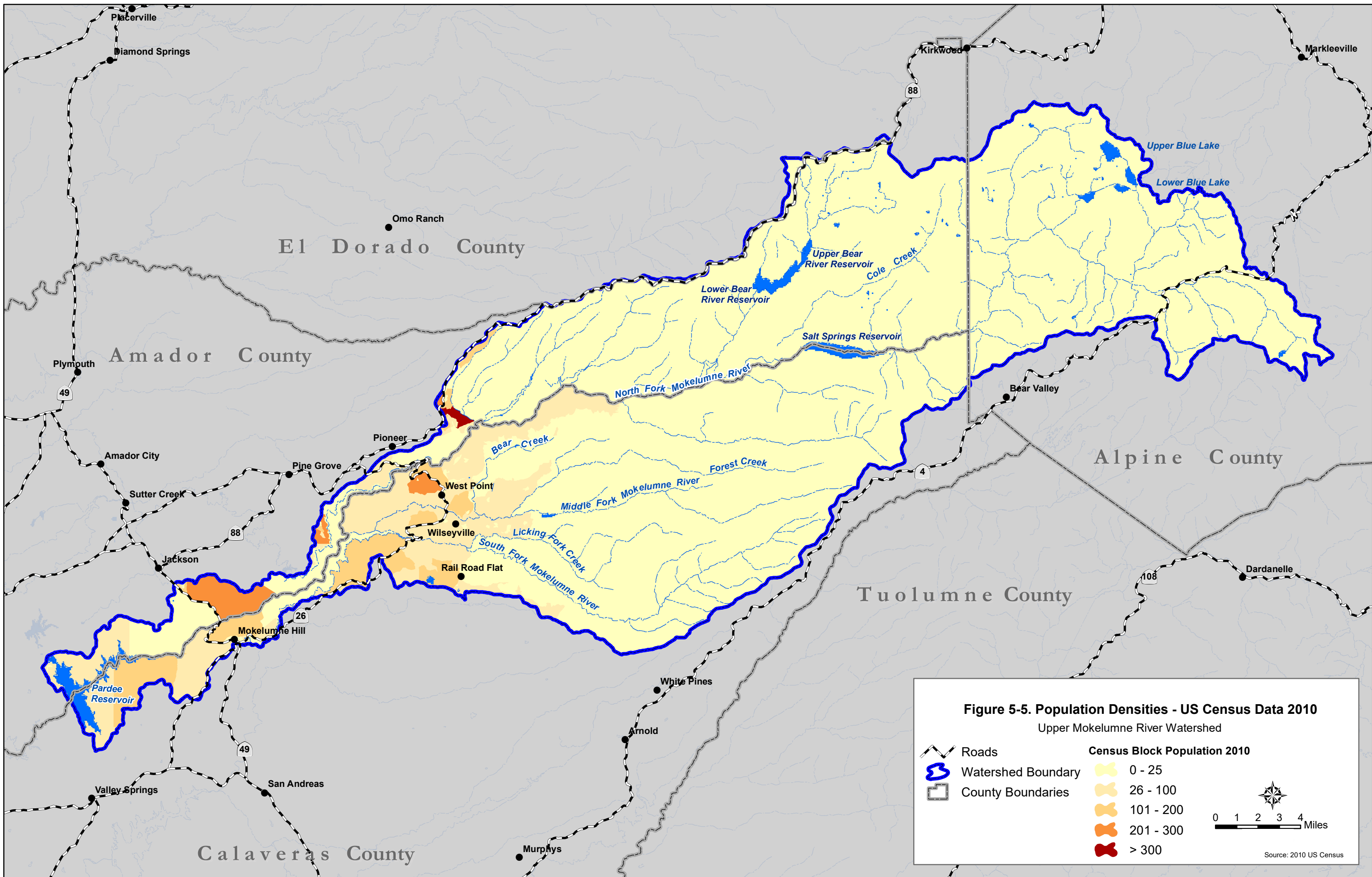
OES Spill Report Number	Date	County	Location	Agency Reporting	Type of Spill	Amount Spilled (gal)	Contained Before Entered Waterway	Water Way Entered
16-2649	05/04/2016	Amador	29000 Tiger Creek Rd, Pioneer	PG&E	Lubricating Oil	1/16	No	Mokelumne River
17-1174	02/07/2017	Calaveras	Bridge near Railroad Flat Rd, close to 1940 Railroad Flat Rd	Calaveras County Sheriff	Oil	UNK	No	South Fork of Mokelumne River
17-5467; 17-5469	08/02/2017	Calaveras	4477 Lynn Blvd; 4220 Tree Lane	Anonymous	UNK, related to growth of marijuana	UNK	UNK	Mokelumne River
18-7158	10/22/2018	Calaveras	Pardee Reservoir Spillway	EBMUD	Oil	1/16	No	Pardee Reservoir
19-7099	11/05/2019	Calaveras	WB Hwy 26 near Sky High Drive	CHP	Diesel	30-40	UNK	UNK

a) Hazardous Materials Spill Report (accessed 2020). California Emergency Management Agency.
[https://w3.calema.ca.gov/operational/mal haz.nsf/\\$defaultview](https://w3.calema.ca.gov/operational/mal haz.nsf/$defaultview)

Urban Area Runoff

This section describes potential contaminant sources from urban areas within the Upper Mokelumne River Watershed. Figure 5-4 shows landuse classifications in the watershed, and Figure 5-5 shows population densities according to the 2010 census data. Urban land uses include single-family residential, multi-family residential, and commercial and public facilities (excluding parks and recreational facilities such as golf courses). The significant





urban areas present include the unincorporated communities of Mokelumne Hill, West Point, Wilseyville, parts of Glencoe and the northern part of Railroad Flat in Calaveras County, and Pine Grove, Pioneer, Buckhorn, and the southern portion of the City of Jackson in Amador County. The potential contaminants associated with urban areas include pesticides, fertilizers, paints, wood preservatives, surface runoff from streets and driveways, construction sediments and wastes, domestic animal wastes, and automobile-related sources.

New developments can have a variety of effects on the watershed with water quality implications including increased urban runoff, increased wastewater flows, loss of vegetation, and increased erosion (especially during construction activity and when attention to road and culvert maintenance is inadequate).

Although urban development continues in the watershed, the rate has remained slow over the past five years, keeping pace with the economy as it continues to pick up. As shown in Figure 5-5, in the more populous areas, including Mokelumne Hill and West Point, there were approximately 200-300 people per census block. In the less populated areas along Highway 26, there were population densities of between 26-100 or 101-200 people per census block.

Stormwater Drainage Overflows. There are few areas from which significant quantities of urban runoff directly enter the Mokelumne River system. Communities and developing areas in the watershed utilize ditches and intermittent natural stream channels as conveyance courses for their minor quantities of stormwater drainage.

Calaveras County

Between 2000 and 2010, populations decreased slightly for the main communities in the Mokelumne River watershed: Mokelumne Hill (646, down from 774), Railroad Flat (475, down from 549), and West Point (674, down from 746). Calaveras County growth typically occurs in the southern part of the county that drains into the Stanislaus Watershed (Copperopolis and Angels Camp).

Between 2010 and 2018, Calaveras County experienced an average annual population decline of 0.01%, bringing the population from 45,578 to 45,157. Calaveras County's General Plan Housing Element projects a 2.18% percent growth rate between 2020 and 2025, and a need for 1,096 residential units to fill the need of the unincorporated county's population growth.

Amador County

Amador County's General Plan Housing Element 2014-2019 noted that, overall, the county population has grown by 6 percent between 2013 and 2020, resulting in a population of 37,123 in 2013 to 39,352 in 2020. A substantial portion of the county's future growth is expected to occur in cities, most of which are located outside of the Mokelumne River Watershed. Within the unincorporated areas, Amador County's General Plan projects that growth will be in existing communities.

Section 5. Potential Contaminant Sources

The population is expected to further increase by 14.6 percent between 2020 and 2060 to 45,116. Nearly all the domestic water in Amador County is supplied by the Amador Water Agency (AWA). In 2011, AWA developed the 2010 Urban Water Management Plan (UWMP), which projected that at the county level, there would be no raw water supply constraints to housing development beyond 2020 demand. However, residential development could be restricted by the 6 MGD capacity at Tanner Water Treatment Plant in Sutter Creek. The current usage is 5.6 MGD, but AWA anticipates current capacity will be available to meet future demands.

In the southern portion of the City of Jackson, development accelerated in the period 2000-2004, slowed during 2005-2009, essentially stopped during the 2010-2014 economic downturn, and has been on a slow recovery since then. There were no new subdivision applications submitted to Amador County in 2015-2019. Within the Mokelumne Watershed, only one subdivision was permitted in the 2005-2019 period: Jackson View Estates, a 127-unit single family residential (SFR) development permitted along Scottsville Drive in Jackson City, with approximately 100 units built as of 2020. There were plans for another nearby development near French Bar Road and Highway 49, but the permitting process was terminated due to the developer's bankruptcy.

Construction-Related Stormwater Runoff

The RWQCB regulates runoff from construction sites, outlines BMPs for runoff management/monitoring, and can require a Stormwater Pollution Prevention Plan (SWPPP). City and county public works staff generally oversee construction sites and report violations.

Rural Area Runoff

The potential contaminant sources and water quality concerns associated with rural area runoff are similar to those associated with urban area runoff, and the residential component of rural areas is considered to produce the most significant impacts from this land classification. For this update, changes in residential development are discussed under *Urban Area Runoff*. Septic systems, agriculture, and wildlife and livestock are potential contaminant sources associated with rural areas.

Utilities - Hydropower Generation

While there are a number of agencies with hydroelectric facilities in Upper Mokelumne River Watershed, including the District, PG&E's facilities are the most extensive. Of particular importance is PG&E's Project 137. Project 137 encompasses PG&E's hydroelectric facilities and related reservoirs, tunnels, and power plants in the Upper Mokelumne River Watershed. These facilities were described in Section 2. The potential contaminant sources associated with the PG&E facilities can also be applied, to a lesser extent, to the smaller hydroelectric operations owned by other utilities in the Upper Mokelumne River Watershed.

Section 5. Potential Contaminant Sources

The major PG&E power facilities include dams, powerhouses and power lines carried on towers and poles. Administrative facilities, switching centers, and service centers may be located at or away from the powerhouses. These centralized facilities generally include office space, vehicle equipment storage, and repair and maintenance shops. Appurtenant facilities include small staging areas, valve houses, air valve housing for siphons, remote platforms for storing cloud-seeding equipment, and helicopter pads. In addition to the many roads - both paved and unpaved - and vehicular traffic associated with PG&E facilities, occasionally helicopters and boats are used.

Hydroelectric operation of PG&E's reservoirs may impact stream flow and water quality characteristics downstream of its facilities. Variations in stream flow due to power generation and/or reservoir release practices may impact stream bank erosion, sediment transport, and water quality. During the 2020 MRWSS update period, PG&E hydroelectric facilities did not report any Cal OES Hazardous Material Spills.

Canal Maintenance

PG&E removes attached algae from its extensive canal and flume system so that it does not impede flow through the canal system or clog the turbines and penstocks. This algae growth indicates biostimulation from the input of nutrients, and the growth-enhancing effects of elevated water temperatures attained in the canals and flumes. PG&E's maintenance process consists of draining the canals and running a truck-mounted water jet with high velocity nozzles directed to blast the algae loose. Most of the nutrients along with the algal biomass as it is blown out of the canal.

Transportation Corridors

Major transportation corridors within the Upper Mokelumne River Watershed can be seen in Figure 5-3. The primary water quality concern is surface runoff from roads and parking areas. Contaminants associated with transportation corridors include automobile-related petroleum hydrocarbons and metals, turbidity from erosion caused by rapid runoff, inadequate or failed stormwater collection systems, construction and maintenance activities, pesticides applied along road shoulders, and chemicals from accidental spills and illegal dumping. The types of contaminants associated with these sources include lead, copper, nickel and zinc as typical metals.

In December 2019, an initial study on the \$3.9 million Mokelumne River Bridge upgrade (on State Route 49 between Jackson and Mokelumne Hill) with a proposed negative declaration was prepared by the California Department of Transportation (Caltrans). The purpose was to upgrade the bridge by replacing non-standard bridge rails with new rails that meet current standards and widening shoulders to enhance the mobility of pedestrians and bicyclists. The study anticipated that there would be no significant effects on cultural resources and greenhouse gas emissions. A timeline for construction has not been determined.

Paved road construction and reconstruction projects are usually constructed during the dry season, repaved before prolonged wet weather sets in, and must meet stringent BMP

Section 5. Potential Contaminant Sources

requirements. Erosion associated with paved roads is generally insignificant when compared to unpaved roads; however, surface runoff is of a greater concern with paved roads.

The 2019-2020 Caltrans Stormwater Management Program District 10 Work Plan (California Department of Transportation, 2018) identified sections of highway in the Upper Mokelumne River Watershed that are “prone to erosion and sediment discharge.” These include sections of Highway 26 along the North Fork of the Mokelumne River, and Highway 49 along the main stem of the Mokelumne River. There is no specific remediation plan yet identified.

Risks Due to Public Access. No railroads, and only two major highways, traverse the watershed, and they are used only rarely to transport hazardous substances, except for local use. Interstate 80 and Highway 50 are the preferred trans-Sierra and interstate routes due to their lower summit elevations, wider rights-of-way, and less serpentine routes (as compared to Highways 88 and 4 through the watershed). Interstate 5 and Highway 99 are the preferred north-south routes compared to Highway 49 (through the watershed) for similar reasons. Other than transportation within the watershed, there is little hazardous waste transport activity.

The risk of highway accidents or public access in the sub-watersheds resulting in hazardous materials contamination of Pardee Reservoir is considered very low. Nonetheless, the potential consequences of a disastrous spill in the Mokelumne River, and ultimately Pardee Reservoir, warrant future vigilance by Caltrans and the CHP regarding hazardous materials transport policies in the watershed to make sure that the risk of contamination remains acceptably low.

Potential secondary risks of hazardous materials contamination originate from more routine releases such as leaking or overheated radiators and spillages at refueling stations; however, the chances of residues from such minor spills reaching the Pardee Reservoir in any detectable quantities are exceedingly low due to the generally adequate distances between the highways and the Mokelumne River and its tributary streams.

Agriculture

Agricultural activity has minimal impact on water quality in the Upper Mokelumne Watershed due to the small size and quantity of farms. In general, agricultural land is not of primary interest as a source of microbiological contamination, but could contribute particulates, pesticides, and nutrients and metals from fertilizers. Land use classifications in Figure 5-4 include lands classified as Agricultural by the CAL FIRE 's Resource Assessment Program (FRAP). Farms in the Calaveras County portion of the watershed are located primarily near the communities of Wilseyville and West Point. Wine grapes and walnuts are the primary crops grown. In Amador County, there are small farms growing primarily wine grapes, but there are no significant agricultural areas in Amador County that fall within the watershed.

Wildlife and Livestock

While livestock is a significant contributor of animal waste in the Upper Mokelumne River Watershed, birds and mammals can also introduce microorganisms into Pardee and Camanche Reservoir and its tributaries through direct contact or animal waste. Deer, beavers, muskrats, skunks, coyotes, California ground squirrels, gulls, and geese are common species occurring in the Upper Mokelumne River Watershed. Significant pathogens associated with animal waste include *Cryptosporidium parvum*, *Giardia lamblia*, *Salmonella*, *E. coli* and avian influenza.

Livestock grazing activities can affect public water supplies in several significant ways:

- (1) Introduce and transmit disease-causing microorganisms into raw drinking water supplies;
- (2) Elevate nutrient loads;
- (3) Increase erosion;
- (4) Compact soils and thereby decrease ground water recharge, and
- (5) Disturb riparian corridors and tributary stream banks by animals gaining access to water supplies.

Grazing on Private Lands

Numerous private landowners manage ranches dedicated to horses, cattle, and sheep. A small percentage of the pastures are irrigated, where water supplies permit, and the rest are utilized as dry pasturage. No significant penning or product processing areas were identified on the watershed, and the calving/lambing and transport loading areas were judged to have no special overall significance due to their small total area.

Between EBMUD lands near Pardee Reservoir and the NFs in the upper watershed is private land, where grazing and livestock ranching is known to occur. PG&E and SPI have agreements to lease land for activities including grazing. Since permits are not required to raise livestock on privately owned land, County or State agencies do not keep records. The county agricultural commissioner tracks how cattle are sold, which give some indication of the amount of grazing activity in the county, though not specific to the Upper Mokelumne River Watershed. In Calaveras County, two cattle ranches were identified in the past: the Garamendi/McSorley Ranch in Mokelumne Hill and the Hertlein Ranch in West Point. There are no major feedlots within the Upper Mokelumne River Watershed, nor is there any agency, besides the RWQCB, that has the authority to oversee livestock waste management.

Grazing on NF Lands

Both the Eldorado and Stanislaus NFs are used extensively as open rangeland subject to federal leasing agreements. As shown in Figure 5-6, there are 12 permitted grazing allotments within the Upper Mokelumne River Watershed that are managed by the Eldorado and Stanislaus NFs. The allotments located on the north side of the North Fork Mokelumne River are permitted by the Eldorado NF, while those on the south side are permitted by the Stanislaus NF. Some of the 12 grazing allotments are entirely within the

Section 5. Potential Contaminant Sources

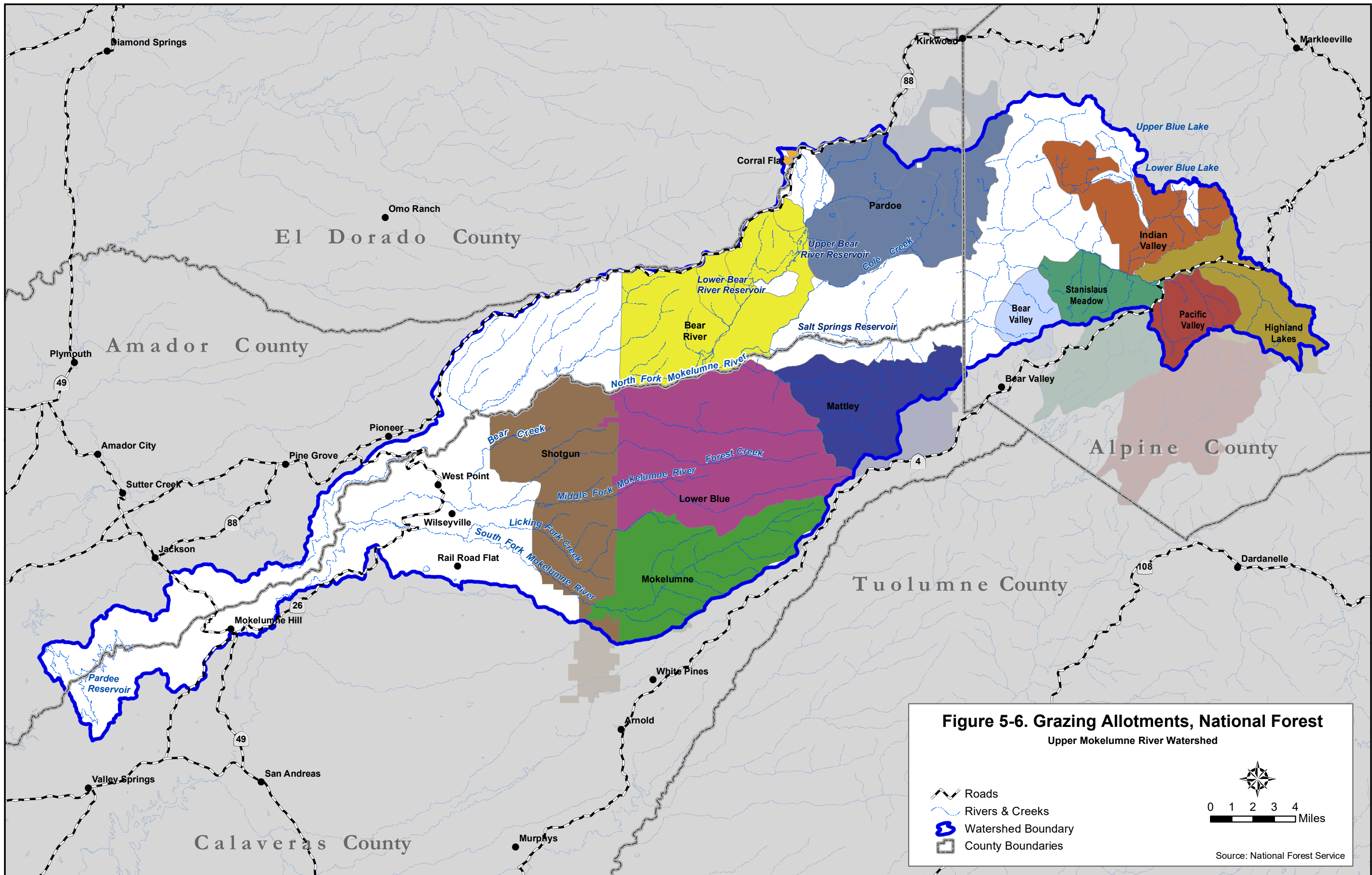
Upper Mokelumne River Watershed, and some allotments are partially in and partially out of the watershed.

The Indian Valley grazing allotment is still listed in the Eldorado National Forest Land and Resource Management Plan and is still included in the count, even though it has not been an active grazing allotment since 1989. A National Environmental Policy Act (NEPA) analysis would need to be completed prior to grazing or closing this allotment, and the currently active allotments have priority for funding.

The maximum number of cattle allowed by the National Forest is determined when the grazing allotments are renewed, once every ten years. The allowable grazing season is also detailed in the permit, subject to adjustment by forest service staff during the spring survey. Annual fall surveys are conducted to monitor the effects of grazing and to measure the residual dry matter on the pastures. If adverse effects are observed, then the grazing allotment permit would be reviewed.

When private land is adjacent to or surrounded by NF land and the land is not fenced, it is common for the cattle to roam freely between NF and private land. Private landowners, including SPI and PG&E, negotiate separate private grazing contracts for grazing on their land and set the number of cattle allowed. The NF grazing permit lists (but does not review) the permitted numbers of cattle on adjacent private lands. The permitted grazing allotment also details the allowable grazing season, which can be adjusted.

Table 5-7 shows the total permitted numbers of livestock (cows and calves) allowed on each of the 12 NF permitted grazing allotments. Also listed are the permitted number allowed by the private agreements on the adjacent unfenced private lands. The permitted numbers have remained steady during 2000-2020 time period. Permitted numbers are listed as cow/calf pairs, and each pair is counted as 1.32 Animal Unit Months (AUMs), which equals one animal grazing for one month. The table lists the percentage of the allotment that is within the Upper Mokelumne River Watershed; presumably the livestock would be split proportionally.



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Table 5-7. Livestock Grazing Allotments in Stanislaus and El Dorado National Forests, Upper Mokelumne River Watershed ^a

Permitted Allotment	National Forest	Acres ^b NF Land	Acres ^b Private Land	Permitted Number C/C ^c NF Land	Permitted Number C/C ^c Private Land	Allotment Percentage in Watershed ^d	Grazing Season	AUMs ^e
Bear River	El Dorado	23,053	7,373	168	42	100%	06/15 – 09/30	(788) [197]
Corral Flat	El Dorado	221	131	8	12	100%	07/11 – 09/30	(29) [42]
Pardee	El Dorado	35,416	1,665	224	44	83%	07/16 – 10/10	(846) [166]
Indian Valley	El Dorado	14,607	Vacant since 1992 Last grazed 1989	185	85	100%	07/21-9/20	n/a
Shotgun	Stanislaus	4,410		35	236	88%	5/1– 9/15	100
Lower Blue	Stanislaus	17,820		69	269	100%	5/1 – 9/15	411
Mattley	Stanislaus	15,156		132	39	77%	6/16 – 9/15	523
Bear Valley	Stanislaus	23,066		145	0	82%	7/1 -9/30	574
Stanislaus Meadow	Stanislaus	17,890		100	0	41%	7/1 – 9/30	396
Pacific Valley	Stanislaus	28,096		215	0	25%	7/1 – 9/30	911
Highland Lakes ^f	Stanislaus	13,946		215	0	90%	7/1 - 9/30	851

a) Sources: Eldorado and Stanislaus National Forests

b) Livestock move freely between NF and private land (adjacent and unfenced).

c) C/C = Cow and calf pairs. Each pair contributes 1.32 AUMs

d) Allotment is partially in and partially out of the Upper Mokelumne River watershed

e) Animal Unit Months (AUMs) of forage = Animal units times number of months. (AUMs on National Forest Land) [AUMs on private land]

f) Highland Lakes allotment data include permitted numbers and season assigned to an adjacent allotment, the Murray Canyon allotment.

Grazing on District Lands

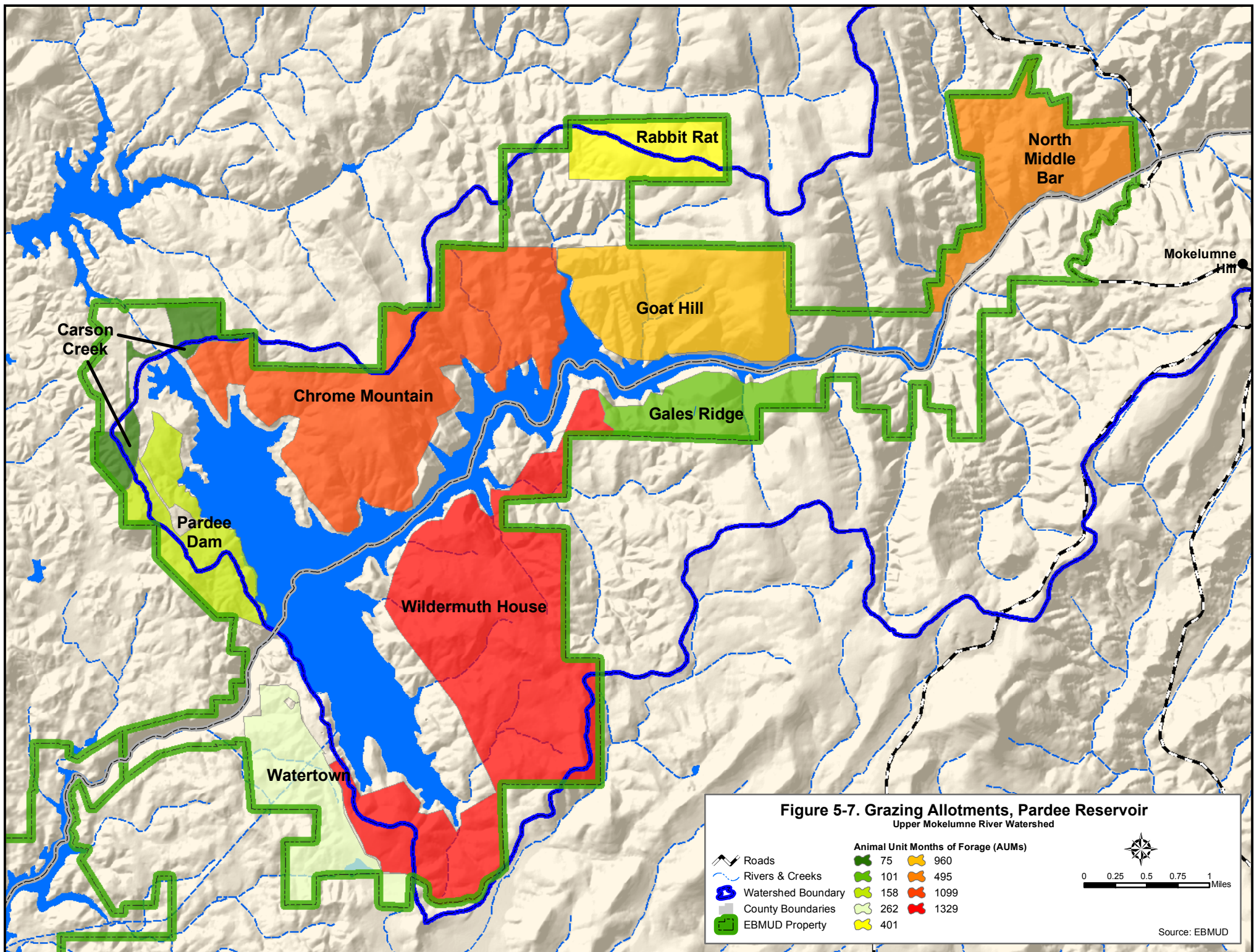
At this time, the District has nine grazing leases in the Main Stem sub-watershed, covering 12,983 acres. The leases allow for the utilization of 7,482 AUMs. Wells, springs, ponds and municipal water sources provide stock water. Table 5-8 lists the grazing leases currently in place in the Pardee Watershed, and Figure 5-7 shows the locations. Section 6 summarizes the District's Mokelumne Rangeland Management Plan, which was released in 2013. The District develops annual grazing plans in conjunction with lessees, indicating BMPs to minimize adverse impacts from grazing activities and stipulating the allowable AUMs for specific ranges. The stocking levels are dependent on rainfall and subsequent forage production each year. Tenants are required to distribute or rotate their livestock among the pastures to minimize overgrazed areas and reduce overall fire hazards. Annual fall surveys are conducted to monitor the effects of grazing and to measure the residual dry matter on the pastures.

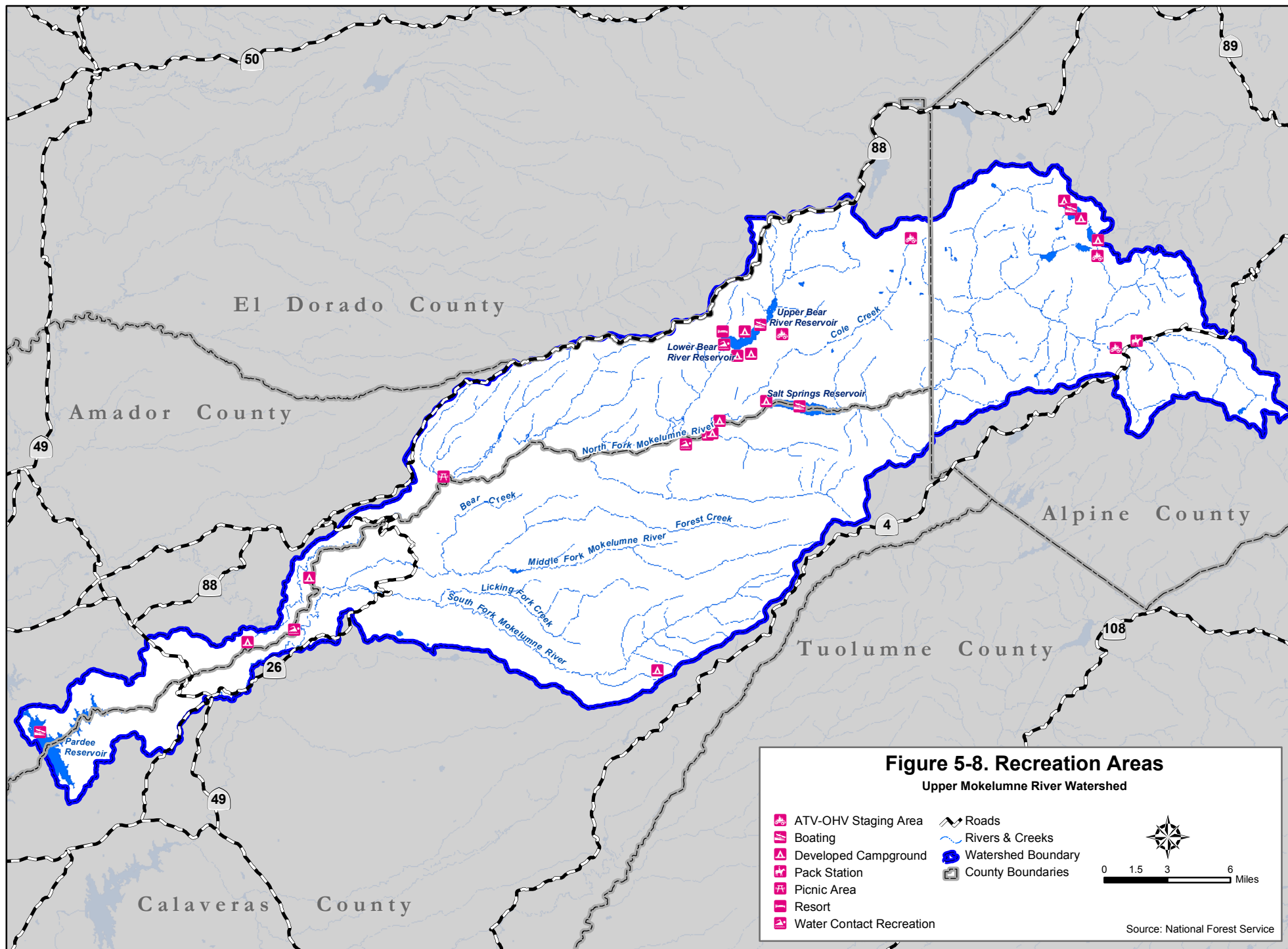
Table 5-8. EBMUD-Managed Grazing, Pardee Reservoir Area

Name	Approximate Acreage	2019 Estimated AUM's	Lease Expiration
Wildermuth House	2400	1346	October 31 2020
Pardee Dam	466	194	October 31 2020
Watertown	580	239	October 31 2020
Carson Creek	245	348	October 31 2020
Chrome Mountain	1717	1010	October 31 2020
Rabbit Flat	401	246	October 31 2020
Goat Hill	950	576	October 31 2020
Gales Ridge	392	183	October 31 2020
North Middle Bar	762	533	October 31 2020
Mokelumne Hill	84	40	Annual

Recreation

Numerous activities are included under the heading of recreation for the Upper Mokelumne Watershed: camping, backpacking, pack animal-assisted hiking, hunting, equestrian activities, boating, fishing, day-use activities, hiking, bicycling, picnicking, skiing, swimming, whitewater rafting, and OHV use. Figure 5-8 provides some of the more heavily used recreation sites. Recreation associated with the District's facilities within the Upper Mokelumne Watershed is addressed under the section entitled *EBMUD Facilities*. The potential impacts on water quality from recreation include erosion, vandalism, sanitation facilities, and introduction of human and animal wastes.





Body-Contact Recreation

Most of the body-contact water recreation sites within the watershed are on the North Fork and Main Stem sub-watersheds. Some of the main body-contact water recreation sites are shown in Figure 5-8. Table 5-9 summarizes managed recreation sites and lists the activities. Along the North Fork popular areas include the Bear River Resort and group facilities, Blue Lakes, and Bear River South Shore. Moore Creek and White Azalea also receive significant amounts of public usage. White water recreation opportunities exist from the Bear River confluence down to the Tiger Creek Afterbay. The first run (Class III-V), which extends from Bear River to Devil's Nose, is suitable for intermediate to advanced kayakers and rafters. The second run (Class V), from Devil's Nose to Tiger Creek, is recommended only for expert boaters.

Since the 2000 MRWSS, relicensing negotiations for PG&E's Project 137 resulted in many additional recreation enhancements along the North Fork. The enhancements include a minimum number of white water releases during the white water boating season (May through September), and development of white water boating access facilities, including vault and portable toilets, parking areas, barrier rocks for resource protection, and signage for the Tiger Creek, Ponderosa Way, Devil's Nose, and Electra Runs. The license agreement also provided for funding of two river rangers during the white water boating season.

Along the Main Stem, the Elektra run is a Class II+ (Class III above 1,500 cfs) run that extends from Electra Powerhouse to below Highway 49 Bridge. The Electra Run is a stretch on the Mokelumne River heavily used by rafters, canoeists, inner tubers, and kayakers. As discussed in EBMUD Facilities, a boating take-out for this run was constructed near the Middle Bar Bridge in 2003. In 2012 another new public boating take-out was constructed at Big Bar just upstream of the Highway 49 Bridge. The Big Bar take-out facility includes a paved parking lot and toilet facilities. No permits, fees, or access passes are required for the general public use. No consistent records or detailed estimates are kept for the numbers of white-water recreational boaters or rafters on any of the river reaches.

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Table 5-9. Upper Mokelumne River Watershed – U.S. Forest Service Recreational Activities ^a

Recreation Sites	Elev. (ft)	Months of Use	Family Camp Units	Group Camp Units	Picnic Units (day use only)	Store Within 5 miles	Toilets Flush/ Valve	Stream or Lake Water	Forest Service Camp-ground	Group Camp-ground	Picnic Areas	Picnic Area other than Forest Service	Hiking	Observation Point	Fee	Boating	Boat Ramp	Fishing	Swimming	Drinking Water	Rec. Vehicle
El Dorado National Forest																					
Bear Creek	3,200	5/01-10/01			3	NO	V	YES			X										
Bear River Group	6,000	6/15-10/15		3		YES	V	NO		X			X		X	X	X	X	X	X	
Lumberyard	6,500	6/01-10/31	8			YES	V	NO	X											X	X
Mokelumne	3,200	5/01-11/15	8			NO	V	YES	X									X	X		
Peddler Hill	6,800	6/01-11/15				NO		NO						X							
Salt Springs	3,900	5/01-11/15			4	NO	V	NO			X					X		X			
Shot Rock	7,500	6/15-11/15			3	NO	V	NO			X			X							
South Shore	5,900	6/01-11/15	22			YES	V	NO	X				X	X	X	X	X	X	X	X	X
Tragedy Springs	7,900	6/15-10/15			3	YES	V	NO	X											X	
White Azalea	3,500	5/01-11/15	6			NO	V	YES	X									X	X		
Stanislaus National Forest																					
Bloomfield	8,000		10				V											X	X		X
Moore Creek	3,200	5/01-11/15	8			NO	V	YES	X									X	X		X
Hermit Valley	7,500		6				V											X	X		X

a) From MRWSS 1995 Update.

Non-Body Contact Recreation

Privately-owned boats that can introduce various contaminants from different recreational water bodies are a serious concern for EBMUD. Boating policies continue to be enforced at EBMUD's recreation facilities to prevent invasive species such as Quagga or Zebra Mussels from being introduced into Pardee and Camanche Reservoirs. EBMUD's boat inspection program includes two parts: a history survey, followed by a physical inspection. Boats that fail either the survey or the inspection cannot be legally launched in EBMUD's reservoirs.

Non-body contact recreational activities in the watershed consist of fishing, camping, hunting, boating, alpine skiing, cross-country skiing, hiking/backpacking, snowmobiling, off-highway vehicle (OHV) (e.g., motorcycles, all-terrain vehicles, four-wheel drives, SUVs) use, wildlife observation, nature photography and mountaineering. Most of the activities occur on public lands or at public recreation facilities above 2,000 feet in elevation, in the snowbelt, and where summertime temperatures are cooler.

BLM lands are not managed for recreation, and use consists primarily of hiking, hunting, fishing and wildlife viewing along and near unpaved roads throughout its 171,700 acres of lands.

Pollution controls within NF lands are primarily the responsibility of the USFS. The controls are implemented through the standards, policies and guidelines established in the Land and Resources Management Plans of each NF. The controls are enforced by the Forest Supervisors and the individual Ranger District offices in accordance with their individually established procedures.

Schaads Reservoir is the only significant recreational site located in the Middle Fork sub-watershed. The 1,800 AF reservoir is owned by CPUD and utilized by CCWD as a drinking water source. Fishing and camping are allowed at Schaads, but swimming is prohibited.

There are no significant recreational facilities located in the South Fork sub-watershed. With the exception of recreation areas below Electra Powerhouse, all recreational facilities located within the Main Stem sub-watershed occur on EBMUD lands and are addressed under the section entitled *EBMUD Facilities*.

The intensity of body-contact and non-body-contact recreation and use is indicated by the number of recreational sites reported by Eldorado and Stanislaus National Forests, PG&E, and EBMUD.

MCCT. The eastern-most leg of the MCCT was completed in 2012 and extends from Middle Bar almost to Big Bar. This segment was completed and opened to the public in 2009. During the 2020 MRWSS update period, a new 2.4 mile segment called John Bull Loop Trail was added. The new loop starts 1.5 miles east of the Campo Seco Staging Area and takes visitors northwest from Lawry Flat and through the rolling hills overlooking Pardee Reservoir.

OHV Use

OHV use continues to be a widespread and sometimes damaging recreation activity within the Upper Mokelumne River Watershed but the damage may continue to decrease over the next few years as the recent NF and BLM OHV policies continue to be implemented. The NF Travel Management Rule and the updated BLM Sierra Resource Management Plan now ban previously-allowed unlimited off-road travel and only allow OHV use on designated roads and trails (defined by Motor Vehicle Maps). Section 6 provides a detailed discussion on the NF and BLM travel management changes.

The BLM and Eldorado NF Motor Vehicle Maps were released in 2007 and 2009 respectively, showing allowable OHV roads and trails. Public outreach is ongoing and signs have been posted, but the enforcement staff are still in an educational mode regarding enforcing prohibited off-road travel. Similarly, Stanislaus NF released their Motor Vehicle Maps in 2010 and made map copies available to the public in 2011. Stanislaus NF reports that monitoring and enforcement activities are currently effective for controlling OHV damage. NF staff have always been able to cite OHV users for excessive environmental damage, and so it may take a number of years to see the net effect of the regulation changes.

Erosion from unpaved roads and trails can be a major source of sediments and contaminants. Public and minimally patrolled lands are especially vulnerable to damage. Roads are more susceptible to damage during winter, so designated roads or trails are commonly closed from January 1st through March 31st. Some OHV staging areas are shown on Figure 5-8.

The USFS reports that current areas of high OHV activity include the Cabbage Patch and Mattley Meadow area off Highway 4, and the area between Lower Bear River Reservoir and Salt Springs Reservoir. Control measures been fairly effective, including reconstruction, signing, and intensified enforcement of OHV regulations.

Within the Middle Fork, South Fork, and Main Stem sub-watersheds, access control has been somewhat effective at keeping OHVs off vulnerable earthen roads. Despite some local evidence of damage, the Upper Mokelumne River Watershed in general appears to be in good condition. Private landowners are increasingly turning to fencing and gating to prevent damaging intrusions of OHVs.

On SPI lands, unpaved roads have been closed to control erosion. Gates have been installed on nearly all access roads. SPI has noted an increasing amount of OHV traffic in the past decade. SPI is also working to control access by increasing patrolling, better signing, and increased enforcement by public law enforcement agencies.

Mines

Mines and quarries are potential contaminant sources for turbidity, radionuclides, general minerals, metals, oil, grease and hydrocarbons depending upon type of materials being processed and the size of operation. A number of closed and abandoned historic mines are located in the Upper Mokelumne River Watershed, as shown in Figure 5-9. There are no active mines in the Upper Mokelumne River Watershed, per the California Department of Conservation interactive map. Currently there are no apparent water quality concerns in the watershed associated with mine drainage waters. See Section 6 for a discussion on mine regulation and reclamation.

The 2000 MRWSS reported the last active mines in the watershed and detailed a 1997 incident affecting Gwin Mine when heavy rains caused a hydraulic discharge at the main shaft. No further activity has been reported since that time. Gwin Mine is located several miles southwest of Mokelumne Hill, just upstream of Pardee Reservoir.

Geologic Hazards

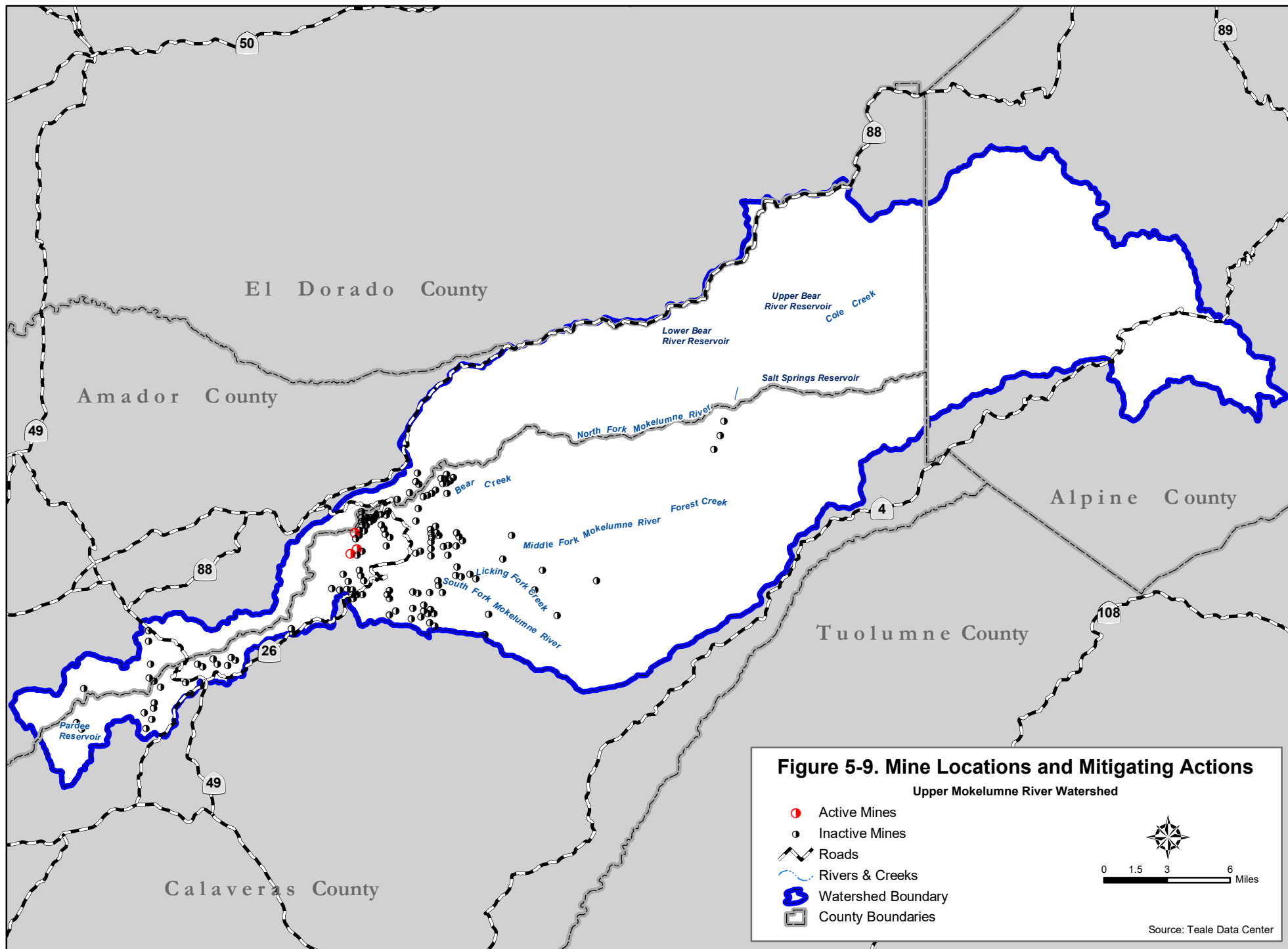
Geologic hazards include erosion and landslides, which can increase turbidity and nutrient loads to a water supply. The greatest impacts from soil erosion occur near the reservoir where even small rainfall events can transport the sediments over a short distance. Section 6, subsection *EBMUD: Erosion Control* discusses various EBMUD erosion control projects. For example, erosion, changing water levels and wind-driven waves slowing threaten to undermine the perimeter access road around the edge of Pardee Reservoir.

In the past, landslides triggered by heavy rainfall events have resulted in elevated turbidity loads to Pardee Reservoir. A landslide above Salt Springs Reservoir in January 1997 created a turbidity plume that forced a shutdown of the aqueduct. Turbidity exceeded 100 NTU and would have overwhelmed EBMUD's inline WTPs in the East Bay, so the WTPs instead relied on local East Bay reservoir storage for several months. Earthquakes can also trigger landslides, but as noted in the Section 3, the area has little recent history of fault movement. Many of the past documented instances of erosion and landslides have occurred on the

North Fork and Main Stem of the Mokelumne River. Locations of historic gully and erosion as of 1974 were documented in the MRWSS 2000 Update.

Fire and Fuels Management

Water quality can be impaired by increased runoff and erosion and hydrophobic soil conditions caused by fires. Fuel management measures such as pesticide application, mechanical vegetation removal, and grazing can also impact water quality, as discussed in the *Pesticides and Wildlife and Grazing* sections. Fires greater than 20 acres that occurred in the Upper Mokelumne Watershed during the update period as recorded by the California Department of Forestry and Fire Protection (CAL FIRE) and/or EBMUD staff are mapped on Figure 5-10. Statistics for these and other smaller fires are summarized in Table 5-10.



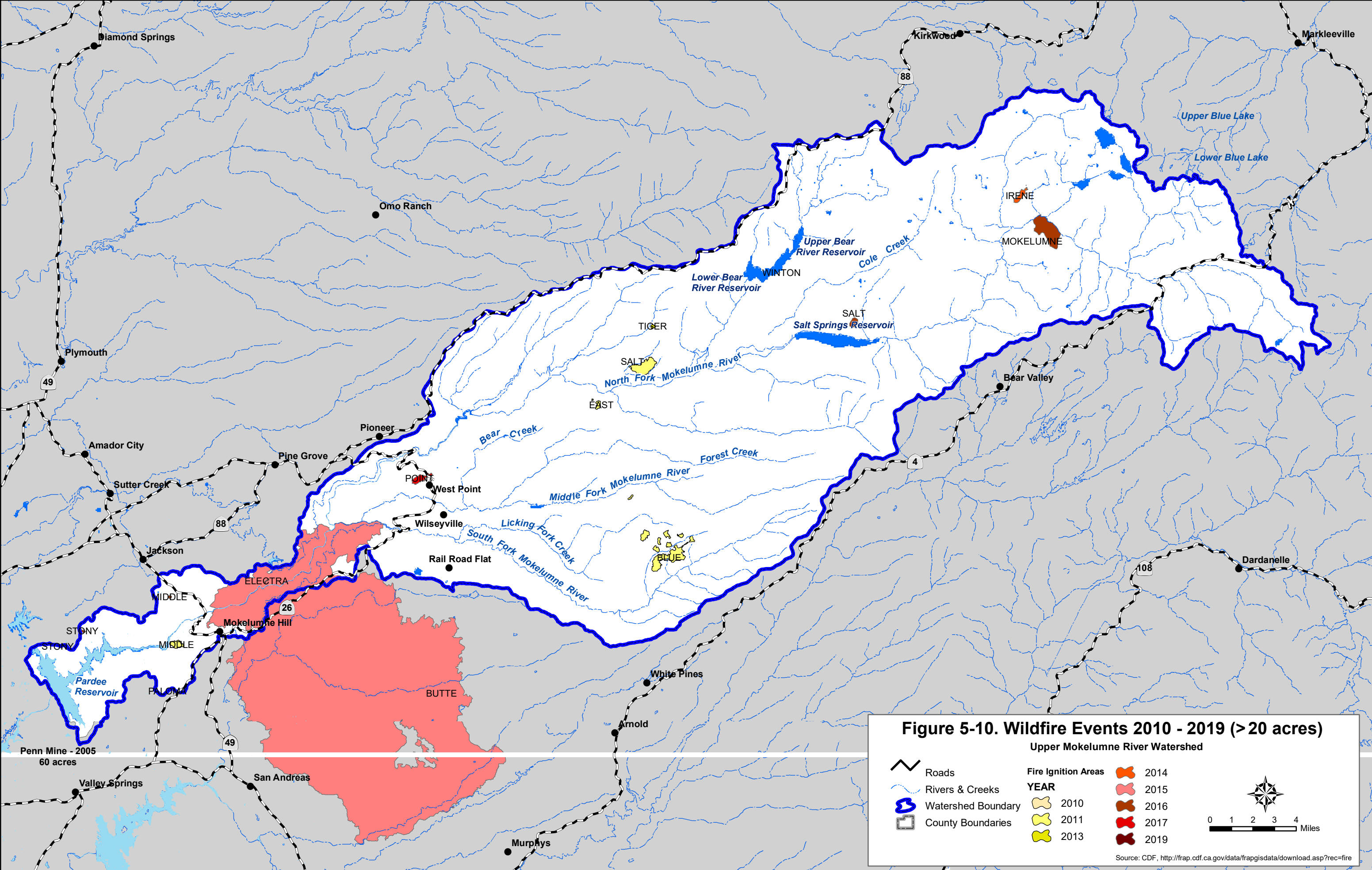


Table 5-10. Wildfires in the Pardee Reservoir Watershed (>0.5 acre)

Date	Location	CAL FIRE Name ^a	Size (acres)
9/9/15	East of Jackson	Butte	70,868
7/11/16	Middle Bar Rd. ½ SW of Hwy. 49 – Amador Co.		13.3
5/17/17	Goodell Rd. – Calaveras Co.		5.5
10/9/17	Hwy 26 and Higdon Rd, West Point – Calaveras Co.	Point	130
8/15/19	Pardee Dam Rd. – Amador Co.		1.1
9/25/19	Electra Rd and Highway 49, east of Jackson – Amador County	Electra	10
11/25/19	Paloma Rd. – Calaveras Co.		4

a) Source: California Department of Forestry and Fire Protection (CAL FIRE) Incidents website (accessed 2020). www.fire.ca.gov/incidents.

Fire danger is greatest on lands that are not managed to reduce fuel supplies, provide fire breaks, or afford ready access by fire fighters and their equipment. This is most extreme in remote canyons and on the steep, densely vegetated canyon walls. Clear cut and select cut timber harvesting serves to temporarily lower fire danger by reducing fuel supplies, increasing the spacing between fuels, and ensuring for the routine presence of short response-time work crews within the forested areas. Most fires are discovered and extinguished during their early, manageable stages by on-site logging personnel, backed up by on-call California Department of Forestry and Fire Protection, and USFS fire fighters.

Official fire management and control responsibility in the NFs belongs to the USFS. Responsibility on private lands is shared by the CAL FIRE, local fire districts, and private landowners. Prescribed burns are regularly conducted, especially on federal lands, to prevent or eliminate excessive accumulations of fuel and to open up firebreaks. This measure is being implemented to reduce the probability of catastrophic fires in the future. The latest California Fire Plan was revised in 2018 and is discussed in Section 6. An integral part of pre-fire management focuses on taking action before fires occur. Projects are designed and implemented to reduce the frequency, severity, and size of wildfires and include the following:

- Fuel breaks to stop wildfires
- Wildfire protection zones to buffer communities
- Forest stewardship for healthy forests
- Prescribed fire to reduce fire fuels

Figure 5-11 shows the location of the annual fire mitigation measures in the Pardee and Camanche Watersheds. EBMUD has an active program of fire hazard mitigation that involves disking, mowing, brush removal, prescribed burning, livestock grazing and other measures. Table 5-11 lists the typical scope of work for these mitigations during 2020 MRWSS update period.

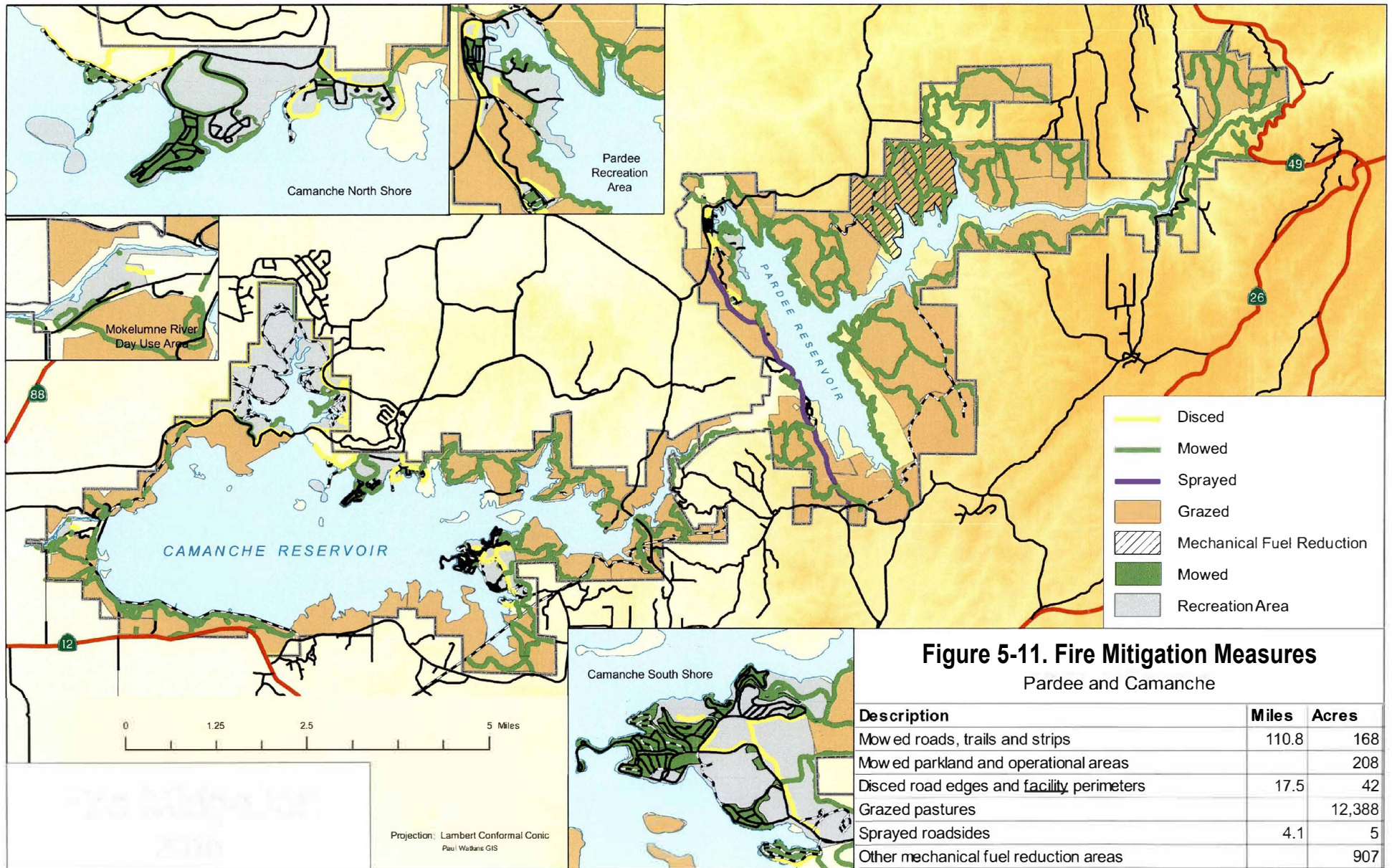


Table 5-11. Fuel Management Activities, EBMUD, 2015-2019

Type of Treatment	Quantity
Discing	18.5 miles/yr
Roads/Trails Mowed	110.6 miles/yr
Brush Removal (Hand Crews)	5 acres/yr
Prescribed Burning	146.75 acres ^a

a) Total acreage treated over 5-year period

Butte Fire (2015)

The Butte Fire occurred in September 2015, at the end of a four-year drought period, southeast of the town of Jackson. The fire burned a total of 70,868 acres, including approximately 14,000 acres within the Mokelumne watershed, or roughly four percent of the Upper Mokelumne Watershed. The fire destroyed 877 structures, damaged 44 more, and caused two fatalities. A summary of the fire event is presented in Table 5-12.

Section 4 Water Quality provides a review of the water quality monitoring efforts undertaken to assess the impacts of the Butte Fire on the Mokelumne River and Pardee Reservoir in the wet season following the fire. As explained in Section 4, the fire occurred at the end of a four-year drought period, and the wet season following the fire brought more rain and runoff than the previous four years. Therefore, impacts on water quality due to the fire are impossible to separate from the impacts of this first significant runoff in years.

Table 5-12. Butte Fire Summary

Location	Approximately 3.5 miles southeast of Jackson, Amador County, and 1.2 miles east of San Andreas, Calaveras County.
Time Period	Originated September 9, 2015, 100% contained on October 1, 2015.
Size	70,868 acres (18,455 acres within the Mokelumne River watershed).
Land Type	Approximately 12,000 acres of public land (Bureau of Land Management) and 59,000 acres of privately owned land, consisting of grasslands, young and mature brush/chaparral, and mature timber. Elevation of the burn area ranged from 600 feet to 3000 feet, and topography ranged from gentle slopes to steep ravines.
Cause	Contact between a tree and a PG&E powerline
Cost	>900 structures destroyed, two fatalities, damage estimates of at least \$450 million

Logging

Logging is one of the major land use activities in the Upper Mokelumne River watershed (excluding the lower Main Stem river section). The main water quality concerns associated with logging are increased turbidity and nutrient loading from eroded soils. In addition, herbicides are commonly used when replanting new growth. The previous

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MRWSS and updates described causes of erosion and the cumulative watershed impacts associated with logging practices. A study was cited that had shown as much as 20 percent increased water yields in the Middle and South Fork Watersheds due to historic logging practices (MRWSS 2000, page 5-107).

Timber harvesting activities are believed to be responsible for the release of several constituents of concern including sediments, nutrients and total coliform bacteria. While the impacts of individual timber harvest may not be significant, the cumulative impacts of numerous operations throughout the watershed are considered significant.

National Forest Land Timber Harvests

Logging on the Eldorado and Stanislaus NFs continues to decline when compared to previous decades. Some of the harvested stands were selected based on fuel loading and disease/insect problems.

The SNFPA spotted owl guidelines published in 2001 outlined very restrictive procedures for determining which stands could be harvested. The subsequent revised SNFPA (2004) was much less restrictive, but still decreased overall activity, especially around Riparian Conservation Areas (RCA) and Protected Activity Centers (PAC) that provide habitat for protected species. Since the 1990s, the focus has been on understory removal of trees less than 30 inches in diameter; however, recent budgetary constraints have left limited funds for planning timber harvesting projects. Hazard-removal of stands near urban interfaces and roads are the given highest priority, as directed by the SNFPA 2004. Table 5-13 shows timber harvests in the update period on NF Land.

Table 5-13. Timber Harvests for National Forest Service Land within the Upper Mokelumne River Watershed, 2015-2019 ^a

National Forest	Acres	Type	Sub Watershed
Eldorado, Amador District	1058	Commercial Thin	Bear River Reservoir (687 ac), Tiger Creek (141 ac), Panther Creek (230 ac)
Stanislaus, Calaveras District	1120	Thinning	Blue Cree, North Fork Mokelumne River
	976	Thinning	Upper Middle Fork Mokelumne River
	510	Thinning	Forest Creek
Total	3664	Acres	

a) Sources: Eldorado and Stanislaus National Forests, Resource Management

Private Land Timber Harvests

CAL FIRE is responsible for enforcing timber harvesting regulations on privately-owned lands in California. The California Forest Practice Act was enacted in 1973 to ensure that logging is conducted in a manner that will preserve and protect fish, wildlife, forests and streams. Additional rules enacted by the State Board of Forestry and Fire Protection are also enforced to protect these resources.

Timber Harvest Plans (THPs).

The regulations require submittal and advance approval of THPs for all significant harvesting efforts. THPs are in effect for three-year time segments and can be extended several times, with the result that the timber may be harvested a number of years after the THP is approved. THP identifies what timber is allowable to log, but the THP does not document the total areas actually cut and harvested.

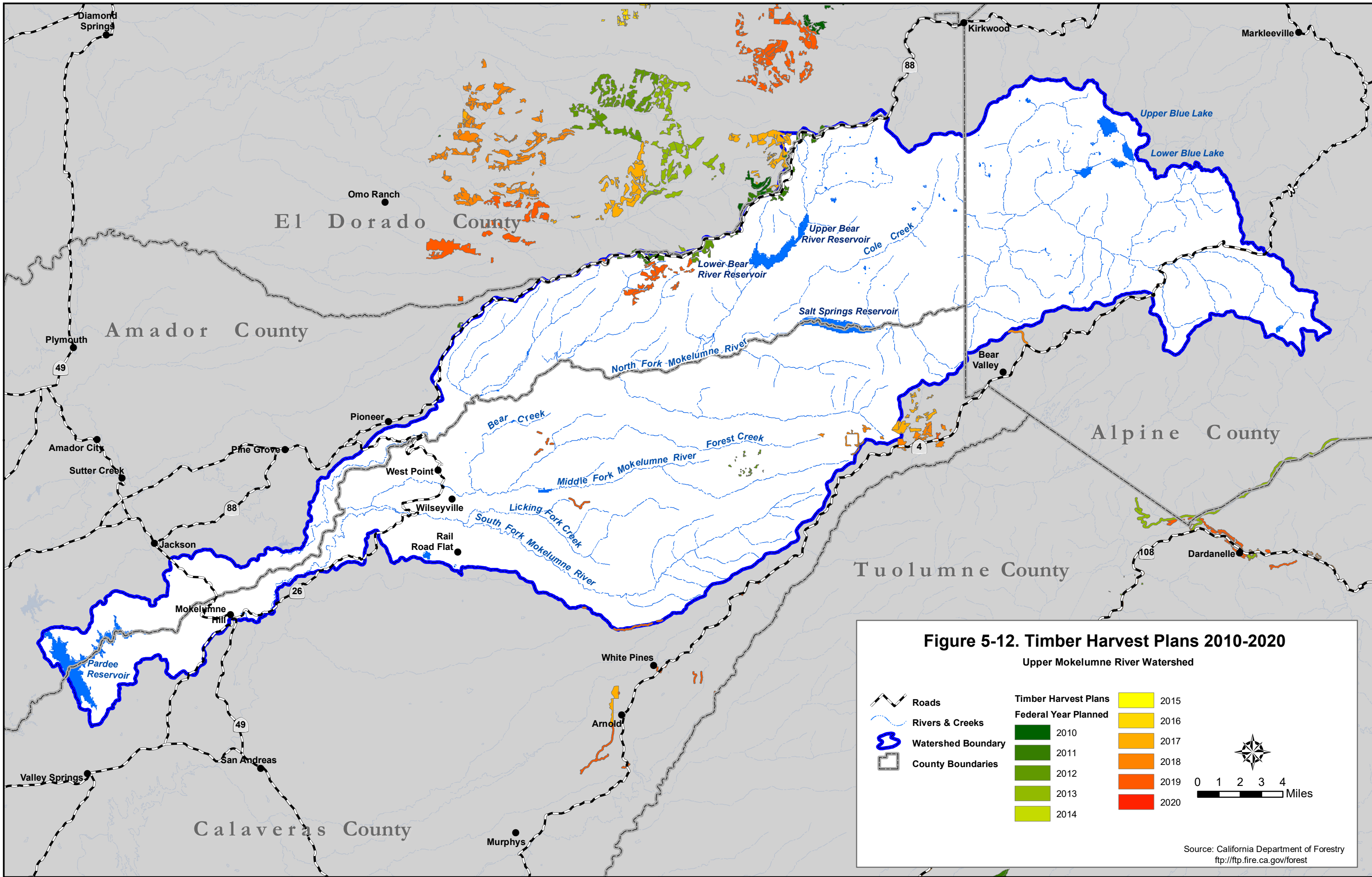
THPs are the environmental review documents submitted by landowners to CAL FIRE outlining what timber is proposed for harvest, how it will be harvested, and the steps that will be taken to prevent damage to the environment. THPs are prepared by Registered Professional Foresters (RPFs) who are licensed to prepare these comprehensive, detailed plans. CAL FIRE follows up on approved THPs with site inspections and can shut down operations, cite or fine RPFs, Licensed Timber Operators, and landowners if illegal operations are found.

SPI is the largest current private landowner and timber harvester, operating on both its own lands, USFS lands, and other private lands in the Upper Mokelumne River Watershed. THPs filed with CAL FIRE are shown on Table 5-14 for the period 2005-2019, and Figure 5-12 shows corresponding areas by year. The vast majority of these THPs were submitted by SPI, who owns more than 80,000 acres of the 368,000 acres in the watershed. Logging by SPI within the Mokelumne watershed decreased for several years as SPI focused on salvage logging in areas damaged by the Rim Fire (2013) and the King Fire (2014), both outside the Mokelumne Watershed. Table 5-14 indicates THP filings have declined significantly since their peak during the 2006-2013 period.

Table 5-14. Timber Harvest Plans^a

	Period	Timber Harvest Plans (Total Acres)
Totals Each Year	2005	245
	2006	1,986
	2007	2,540
	2008	2,291
	2009	2,434
	2010	5,495
	2011	2,792
	2012	3,970
	2013	2,433
	2014	230
	2015	761
	2016	262
	2017	327
	2018	1,135
	2019	0
Totals Over 5-year Periods	2005-2009	9,496
	2010-2014	14,920
	2015-2019	2,485

a. Source: California Department of Forestry and Fire Protection, CAL FIRE (<https://forest-practice-calfire-forestry.hub.arcgis.com/datasets/calfire-thps>, accessed 2020)

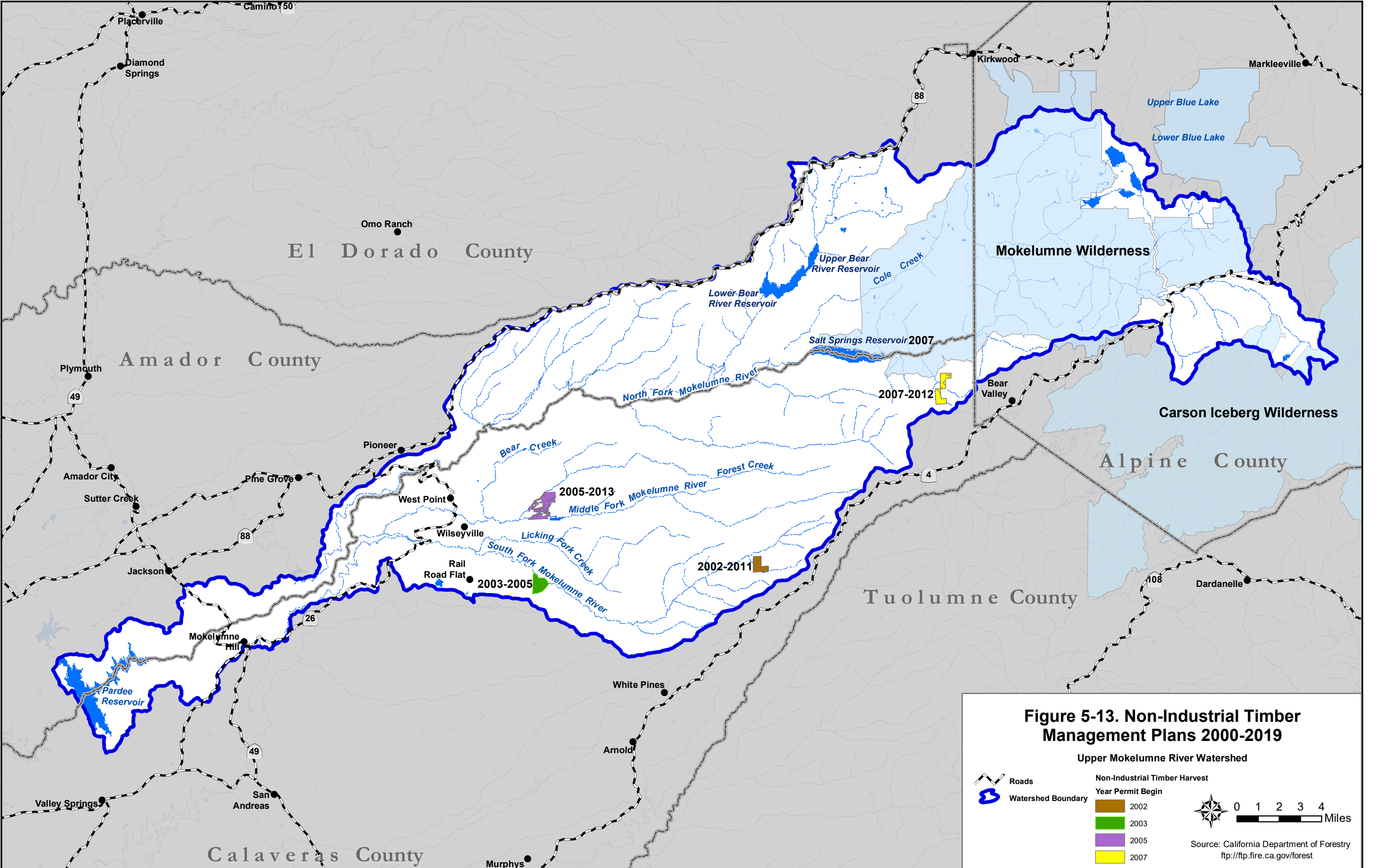


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PG&E, another significant private landowner in the watershed, maintains an active timber management program that is managed by a staff of RPFs. As part of the timber management program, there are ongoing timber harvest plans on many of the properties proposed for ownership transfer under Project 137, Stewardship Council LCCPs. As required by state regulation, PG&E has filed THPs with CAL FIRE for the specific timber areas.

Non-Industrial Timber Management Plans (NTMPs)

NTMPs were added to the California Forest Practice Act in 1989. NTMPs promote long term management and planning on forest ownerships of 2,500 acres or less, with reduced regulatory time and expense. In exchange, landowners agree to manage forests through uneven-aged management (no clear cutting) and long-term sustained yield. Private forest owners are generally classified into industrial and non-industrial ownerships based on size and association with industrial uses; non-industrial ownerships typically do not own a mill. See Figure 5-13 for the location and size of the three NTMPs approved within the Upper Mokelumne Watershed. There have been no new NTMPs filed on the Upper Mokelumne Watershed since 2007.



Pesticides

At present time there is no known usable data for the largest volume of pesticide/herbicide used, i.e. over-the-counter sales to individuals. In the Mokelumne Watershed, the denser population areas are also closer to Pardee Reservoir, so there is less opportunity for attenuation of the pollutants. However, as described in Section 4, analysis of water quality monitoring in Pardee Reservoir does not indicate that these chemicals are present in detectable levels in the water supply. Pesticide usage data for the 2020 MRWSS update period was obtained from USFS, as well as Amador and Calaveras counties, in addition to EBMUD. County data includes all agricultural pesticide use reported with a township/range/section inside the watershed.

National Forest Lands

In Stanislaus NF, pesticides are primarily being used for plantation maintenance only. Decreases in timber harvesting, and the shift towards removal of smaller trees with less clear-cutting have resulted in much less pesticide use for reforestation. During the 2020 MRWSS update period, pesticides were not used in the Stanislaus NF. This trend in pesticide usage in the Stanislaus NF is expected to continue.

In Eldorado NF, use of pesticides in recent years has been predominantly for control of invasive weeds. Table 5-15a presents the data on pesticides used at the Eldorado NF within the Upper Mokelumne River Watershed between 2015 and 2019. In most years only minimal amounts of pesticides were used, with 2018 being an exception.

BMPs for pesticide application at the NFs are outlined in the USDA *Water Quality Management for Forest System Lands in California* manual, dated September 2000.

Table 5-15a. El Dorado National Forest Pesticide Usage 2015-2019^a

Product Name	Annual Quantity Used					Units
	2015	2016	2017	2018	2019	
Roundup Custom	0	0	3.42	714	0	gallons
Super Spread MSO	0	0	0	652	0	gallons
Transline	5.63	0	0	0	0	ounces

^a Source: Amador County Department of Agriculture, Barry Clark, Agriculture and Standards Inspector, April 2020.

Non-Federal Lands

County Agricultural Commissioners have jurisdiction over pesticides applied on non-federal lands. The Agricultural Commissioner's staff verifies compliance with pesticide laws by periodic inspections of pesticide applications, mixing and loading operations, employee headquarters inspections, and inspections of pesticide storage facilities. The Counties then send the pesticide use information to the State Department of Pesticide Regulation (DPR).

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Agriculture pesticide use data from 2015 to 2019 was obtained from Amador and Calaveras County agriculture departments, including information on the application operator. Pesticide use data was not collected from Alpine County because Most of the Upper Mokelumne River Watershed portion of Alpine County is NF and designated as wilderness; therefore, pesticide use data was not collected from Alpine County.

Specific data is available on the production agricultural pesticide use in the Upper Mokelumne River Watershed, because production agricultural applications users, including forest/timberland applications such as SPI, are required to report pesticide and herbicide use by location, including township-range-section. Pesticide data for urban users, such as structural pest control applications, is only available by County and is incomplete, since only limited urban users must report pesticide use.

SPI is the largest user of pesticides in the Upper Mokelumne River Watershed, applying herbicides for treatment of regrowth sites. Quantities of pesticides used by SPI in the watershed were obtained from the Amador and Calaveras County data, and are shown in Table 5-15b by product name and by quantity using several measurement units. The contractor hired by SPI typically applies pesticides on SPI properties from April through August. Unlike typical agriculture operations, forestry operations evolve over decades and can be widely impacted by forest fires. These variables create an uneven demand for pesticide application, and the pesticide usage reports indicate significant variation from year to year.

The total production agriculture pesticide use on Mokelumne River Watershed within Amador and Calaveras counties is summarized in Tables 5-15c and 5-1d, respectively. The pesticide usage data shown on these two tables are indexed by commodity and does not include pesticide used by SPI. In Amador County, wine grapes are the commodity using the most pesticides during the period, and in Calaveras County timberland and rangeland are the commodities using the most pesticides.

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Table 5-15b. Agriculture Pesticide Use on Mokelumne River Watershed Applied by Sierra Pacific Industries, 2015-2019 ^a

Product Name	EPA Registration Number	Annual Usage (volume)					
		2015	2016	2017	2018	2019	Units
Accord XRT II	62719-556-AA	371		89	179.8	802.5	Gallons
Alligare Rotary 2 SL	81927-6-AA				7.02	67.8	Gallons
Cayuse Plus	2935-50171-AA					3.2	Gallons
Dyne-Amic	5905-50071-AA					3.3	Gallons
Garlon 3A	62719-37-ZC					20.3	Gallons
Gly Star 5 Extra	42750-59-ZB	2.5					Gallons
Gly Star Original	42750-60-AA	232.5		408.5	40.5	478.2	Gallons
Glystar K-Plus	42750-122-AA				3		Gallons
Gopher Getter Type 2 AG Bait by Wilco	36029-23-AA					13.5	Pounds
Liberate	34704-50030-AA			16.9			Ounces
Milestone	62719-519-AA	1	13.4		9.59	7.66	Quart
M.O.C.	5905-50095-AA			36	10.5	12.5	Gallons
MSO	1051226-50005-AA	120					Gallons
NuFarm Polaris AC Complete Herbicide	228-570-AA		3				Gallons
NuFarm Weedone LV4 EC Broadleaf Herbicide	228-139-AA-71368					23.2	Gallons
Pindar GT	62719-611-AA		20.4	93.7		27.8	Gallons
Polaris SP Herbicide	241-296-AA-228	1					Gallons
Roundup Custom for Aquatic & Terrestrial Use	524-343-ZG					3	Gallons
Super Spread MSO	2935-50176-AA	274.5		449	192.75	939.3	Gallons
Transline	62719-259-AA			14.7		3	Gallons
Tri-Fol	2935-50125-AA			12			Ounces
Wilco Gopher Getter Restricted Use Bait	36029-50005-AA					12	Pounds
Velossa	5905-579-AA		42.8		5.75	48.3	Gallons

a) Sources:

- Amador County Department of Agriculture, Barry Clark, Agriculture and Standards Inspector, April 2020.
- Calaveras County Department of Agriculture, Justice Rasmussen, Agriculture Biologist, April 2020 and June 2020.

Table 5-15c. Total Agriculture Pesticide Use on the Upper Mokelumne River Watershed within Amador County, 2015-2019 ^{a, b}

Commodity/Product Name	2015-2019 Usage Quantity				
	Gallons	Liters	Quarts	Pounds	Ounces
Forest, Timberland					
Velossa	3.25				
Grape, Wine					
Abound Flowable					
Acramite 50WS				5.25	
Activator 90	7.63				132
Agri-Mek SC (CA & HI)	1.8				
Agri-Mek SC Miticide/Insecticide					274
Alion Herbicide					137
Applaud 70 DF Insect Growth Regulator					168
Cayuse Plus	4.59				
Champ Formula 2 Flowable	48.8		195		
Cosavet-DF Edge				231	
Crop\$mart Glyphosate 41% Extra			7		
Crosshair	1.91				
Direx 4L	15.9				
Dupont Matrix SG Herbicide					28
Dusting sulfur				5,350	
Farmworks 41% Glyphosate Grass & Weed Killer					3.5
Fujimite 5 EC			12.25		
Gly Star Plus			12.5		
Goal 2XL	44.1				
Hasten	9.24				
Helosate Plus Advanced	24				
Honcho Herbicide	11.8				
JMS Stylet-Oil	230				
Kaligreen				35	
Laguna	3.09				
Lifeline	16.24				
Luna Experience					390
Macho 2.0 FL	1.54				

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Table 5-15c. Total Agriculture Pesticide Use on the Upper Mokelumne River Watershed within Amador County, 2015 - 2019 (continued) ^{a, b}

Commodity/Product Name	2015-2019 Usage Quantity				
	Gallons	Liters	Quarts	Pounds	Ounce
Mettle 125 ME Fungicide	2.57				35
Microthiol Disperss				1266.5	
Miller Nu Film P	6.09				
Montana 2F Insecticide					22.4
Omni Oil 6	130				
Pasada 1.6F					3.5
Poast Herbicide	9.24				
Princep 4L	35.46				
Pristine Fungicide					791
Pro Silicone 100	2.02				
Pruvin Herbicide					14
Quintec					15
Rally 40 WSP					504
Rally 40 W Agricultural Fungicide in Water Soluble Pouches					351.5
Rely 280 Herbicide	14.48				
Roundup Powermax Her	19.78				
Sovran Fungicide					4
Surflan AS AG	4.09				
Syl-Tac	10.83				
Viticure	2.54				
Wettable Sulfur				780	
Wilbur-Ellis Dusting Sulfur				800	
Olive					
Farmworks 41% Glyphosate Concentrate with Surfactant Grass & Weed Killer					40
GF-120 NF Naturalyte Fruit Fly Bait			1		
Pastureland					
Milestone	19.92				
Nufarm Weedone LV6 EC Broadleaf Herbicide	2.5				
Weedone LV6 EC	5				
Rangeland					
Nufarm Weedone LV6 EC Broadleaf Herbicide	2				
Pro Crop Oil	1.56				
Transline	1.25				
Triclopyr 4E	20				
Weedone LV6 EC	2				
Rights of Way					
Garlon 3A	2				
PHT Crop Oil Concentrate	2				
Plant Health Technol	0.75				
Roundup Powermax Her	4				
Uncul Non-Ag					
Roundup Powermax Her	2				

a) Does not include pesticide used by Sierra Pacific Industries or US Forest Service.

b) Source: Amador County Department of Agriculture, Barry Clark, Agriculture and Standards Inspector, April 2020.

Table 5-15d. Total Agriculture Pesticide Use on the Upper Mokelumne River Watershed within Calaveras County, 2015-2019 ^a

Commodity/Product Name	2015-2019 Usage Quantity				
	Gallons	Liters	Quarts	Pounds	Ounces
Apple					
Pronto Big'nTuf 41% Glyphosate Weed & Grass Killer			2		
Beehive					
HopGuard II					
Forest, Timberland					
Roundup Custom for Aquatic & Terrestrial	42				
Garlon 3A	25				
M.O.C.	50				
Grape, Wine					
Cosavet DF				42	
Cosavet DF Edge				30	
Fusilade DX Herbicide					60
Lifeline Herbicide					160
Luna Sensation					31
Microthiol Disperss				59.5	
Pristine					20
Pristine Fungicide					130
Pronto Big'nTuf 41% Glyphosate Weed & Grass Killer			6		107
Rally 40W Agricultural Fungicide					12
Sovran Fungicide					20
Viticure					110
Yellow Jacket Special Dusting Sulfur				20	
Pastureland					
Garlon 3A	1.5				
M.O.C.	25				
Milestone	1.5				
Nufarm Weedone LV4 Solventless Broadleaf Herbicide	10				
Rangeland					
Castle Brand Duo-Sperse	4				
Chem-Trol	5				
First Choice M.S.O. Modified Vegetable Oil Concentrate	95				
Garlon 4					116
Garlon 4 Ultra					106
Hasten					114
Milestone VM					94
Mist Control (Revised Formula)	4				
Nufarm Weedar 64 Broadleaf Herbicide	1.5				
R-11 Spreader-Activator					127
Roundup Custom for Aquatic & Terrestrial Use	95				
Transline	16.25				
Triclopyr 3A					364
Vista	20				
Weedone LO VOL 6 Broadleaf Herbicide	51.75				

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Table 5-15d. Total Agriculture Pesticide Use on the Upper Mokelumne River Watershed within Calaveras County, 2015 - 2019 (continued)^a

Commodity/Product Name	2015-2019 Usage Quantity				
	Gallons	Liters	Quarts	Pounds	Ounces
Rights of Way					
Lifeline Herbicide			2		
Roundup Powermax Herbicide			2		
ISOBAC 20			1		
Uncul Non-Ag					
Crosshair					4
Hasten-EA			0.5		
Liberate	0.72				
Milestone	2.63				7
Rodeo	18				
Telar XP Herbicide					0.75
Walnut					
Alion Herbicide					60
Assail 30SG Insecticide					80
Clean Crop Malathion 8 Aquamul	14				
Cornerstone Plus By Winfield			688		
Dyne-Amic	3.15				300
Farmworks 41% Glyphosate Grass & Weed Killer	12				
Farmworks 41% Glyphosate Plus Concentrate with Surfactant Grass & Weed Killer	5				
GF-120 NF Naturalyte Fruit Fly Bait	7.81				1500
Gly Star Plus	13.5		108		
Gly-4 Plus			90		
Honcho Plus Herbicide	10				
Malathion 8 Aquamul	1		20		
Nu-Lure Insect Bait			18.75		
Strychnine Alkaloid N.F. Powder					37.5
Treevix Powered by Kixor Herbicide					36

a) Source: Calaveras County Department of Agriculture, Justice Rasmussen, Agricultural Biologist, April 2020

PG&E

Typically, a total of approximately 10-15 acres around PG&E facilities (equipment yards, flumes, dam faces) are treated annually with pre- and post-emergents. Total quantities applied by PG&E vary from year to year, because rights-of-way are treated every three to five years, and plantations are treated one to three times in the 60-year growing cycle. Plantation treatments may decrease once the Stewardship Council land transfers are complete, because lands being donated contain timber management units (see Section 6)

Caltrans

Caltrans District 10 applies pesticides along portions of State Highway (88, 26, 4, and 49) in the Upper Mokelumne River Watershed for weed abatement and fire control. The dirt shoulders of paved highways in both directions are sprayed in bands of four to eight feet. Caltrans has reduced pesticide use by limiting spraying of pre-emergents to signs and barriers, mowing at optimum times, and applying sub-lethal concentrations of post-emergents to allow for development of bio-barriers to weed growth.

The District

The Mokelumne Watershed and Recreation Division (MW&RD) has an Integrated Pest Management (IPM) program to address pest issues in its area of responsibility. Currently there are programs to control pests such as yellow jackets, ground squirrels, and feral pigs; this control is achieved through mechanical means such as trapping, and in some cases, shooting by federal trappers. Voles are controlled with zinc phosphide, a rodenticide used to prevent destruction of bird habitat at the Camanche Hill Hunting Preserve (CHHP). Other pests are controlled by both mechanical and/or chemical means. Such pests include insects around facilities/structures, and noxious weeds such as Yellow Star Thistle. Herbicides currently approved for use in the Mokelumne Division by EBMUD's IPM Committee are Roundup Pro, Garlon 4, Transline, and Milestone VM.

In addition, the Water Supply Division Pardee Section also has separate herbicide and pesticide programs to address pest issues in the Pardee area. Herbicides are applied twice a year around the Pardee area by EBMUD's Maintenance Specialists certified for pesticide application. Herbicides are also applied once a year to the Camanche Dam and dikes using a helicopter. In addition, other pesticides are being applied once a month at twenty-four locations within the Pardee area by a contractor.

The types and amounts of herbicides and pesticides used at EBMUD's properties within the Upper Mokelumne River Watershed area by MW&RD and the Water Supply Division during the 2020 MRWSS update period are summarized in Table 5-16.

Table 5-16. EBMUD Annual Herbicide and Pesticide Usage on Upper Mokelumne River Watershed, 2015-2019^a

Product Name	Annual Quantity Used					Units
	2015	2016	2017	2018	2019	
Herbicide Usage on Upper Mokelumne River Watershed Area other than Pardee Area						
Galon 4 Ultra	764	451	720	558	64	Ounces
Hasten (vegetable oil)	636	834	1424	594	96	Ounces
Milestone VM	224	192.4	270.5	147	138.7	Ounces
R-11 (surfactant)	1824	309.2	271	322	164.3	Ounces
Roundup Pro	284	677	269	466	7	Ounces
Herbicide Usage on Pardee Area						
Accord	55.5	0	0	0	0	Quarts
Dimension	423	18	12.1	12.5	0	Quarts
Gallery	0	1.3	0	0	0	Pounds
Garlon	0	2	0	0	2.3	Quarts
Landmark	0	4.5	117	0	13	Ounces
Milestone	413	905	390	793	1497	Ounces
Rodeo	71	132	118	212	205	Quarts
Pesticide Usage on Pardee Area						
Bifen IT Insecticide	68	194	139	140	0	Gallons
Contrac Rat	132	201	206	206	0	Pounds
Essentria G	194	254	254	254	0	Pounds
Martin's Permethrin	48	54	42	54	0	Gallons
Microcare® 3% CS	.025	.05	.05	.05	0	Gallons
Phantom	59	59	59	59	0	Ounces
Tempo Ultra WP	38	54	54	54	0	Pounds
Termidor SC	74	88	88	88	0	Gallons

Unauthorized Activities

Amador and Calaveras County staff indicate that illegal dumping continues to be a problem. The worst areas are typically roadsides outside official dumps sites, such as Defender Grade Road near Pioneer in Amador County. On these roads, illegal dumping consists mostly of construction waste, large appliances, and other inert materials. Calaveras County operates seven transfer stations where Calaveras and Alpine County property owners can discard their household trash and mixed recyclables at no cost.

Section 5. Potential Contaminant Sources

Additionally, Calaveras County operates a solid waste facility in Milton that is a landfill, transfer station, and toxics collection facility. Of these facilities, only the transfer station in Wilseyville lies within the watershed.

After recreational marijuana was legalized in 2016, there was a large boom in marijuana growth. In Calaveras County, more than 700 cultivators paid \$3.7 million in registration fees for license to grow marijuana. However, the county later reverted their decision with a ban on marijuana grow. The county's failure to refund the registration fees accordingly resulted in them currently facing a lawsuit of \$16 million.

Calaveras County Sheriff's Department continues to find and eradicate illegal marijuana grow sites in the Mokelumne Watershed. These illegal grow sites are typically subjected to a wide variety of pesticides and fertilizers use in their operations, not to mention the trash and other human wastes left behind in these makeshift camps. The Calaveras County Sheriff reports seven to ten marijuana farms removed from the Upper Mokelumne River Watershed during the period 2005-2009. Alpine County reported a marijuana farm at approximately 7,500 feet elevation, suggesting that marijuana farms could become more of a problem in the Upper Mokelumne River Watershed in the future. In 2019, Calaveras County Sheriff's Department found a 400-block and an 8000-block illegal marijuana cultivation sites.

In the Upper Mokelumne River Watershed, lands in the 2,500-4,500 foot elevation range are owned primarily by SPI. SPI reports that illegal marijuana farming is not a big problem on their land, given that most of their roads are gated and fairly routinely traveled. When SPI finds illegal farms, they make a report to the proper authorities (county sheriff or NF law enforcement).

Rangers continue to patrol recreational activities at Pardee reservoir and Middle Bar. Each year, rangers make several contacts with recreational users regarding their illegal water contact (e.g. swimming, waterskiing, wading without waders) at these locations that usually results in their immediate eviction from the facility in question.

Camanche Watershed

The Camanche Watershed is defined here as the 49 square-mile area that drains to Camanche Reservoir, downstream of Pardee Dam. As described in Section 2, Camanche Reservoir is immediately downstream of Pardee Reservoir, and therefore contaminant sources in the Upper Mokelumne River Watershed, discussed in the previous section, can affect Camanche Reservoir water quality. This section addresses additional land uses and activities in the Camanche Watershed only.

Many of the details pertaining to the relationships between the potential contaminant sources (land uses and activities) and the five water quality parameter groups have been thoroughly addressed in the Upper Mokelumne River Watershed section and in previous

Section 5. Potential Contaminant Sources

MRWSSs (1995, 2000, 2005, and 2010). Therefore, they will not be discussed here to the same level of detail.

Potential contaminant sources are discussed in the following categories:

- EBMUD Facilities
- Water Resources Development
- Sanitation Facilities
- Hazardous Materials
- Urban Area Runoff
- Rural Area Runoff
- Utilities - Hydroelectric Power
- Transportation Corridors
- Agriculture
- Wildlife and Livestock
- Recreation/ Public Access
- Mines
- Geologic Hazards
- Fires and Fuels management
- Logging
- Unauthorized Activities

Most facilities and corresponding activities within the Camanche Watershed are associated with EBMUD facilities. Therefore, most of the potential contaminant sources identified for Camanche Watershed will be documented under the category of *EBMUD Facilities*. Sanitation facilities, urban area runoff, rural area runoff, hydroelectric power, and recreation, if associated with District facilities, are included under the category of *EBMUD Facilities*.

EBMUD Facilities

District facilities within the Camanche Watershed include the Camanche Dam and dike system, Camanche hydroelectric facilities, CASS Recreation Area, CANS Recreation Area, Pardee Reservoir afterbay and spillway, and the EBMUD's Watershed Headquarters Administration Building and Maintenance Yard. EBMUD also owns and operates hydroelectric facilities, as discussed under "Utilities - Hydroelectric Power".

CASS Recreation Area

The CASS Recreation Area is located in a rural area on the south shore of Camanche Reservoir in Calaveras County. In 2015, improvements were made to the CASS road system. Figure 5-14 shows the locations of the Camanche Reservoir Recreation Areas, and Figure 5-15 shows the CASS Recreation facilities. Detailed CASS campground maps are included in Appendix 5-3. The only road to the facility is Wade Lane and there are no major businesses, care facilities, highways, hospitals, or schools in the immediate area. The facility is surrounded by the reservoir on three sides and the area to the east is a residential area.

Figure 5-14. Camanche Reservoir Recreation Area

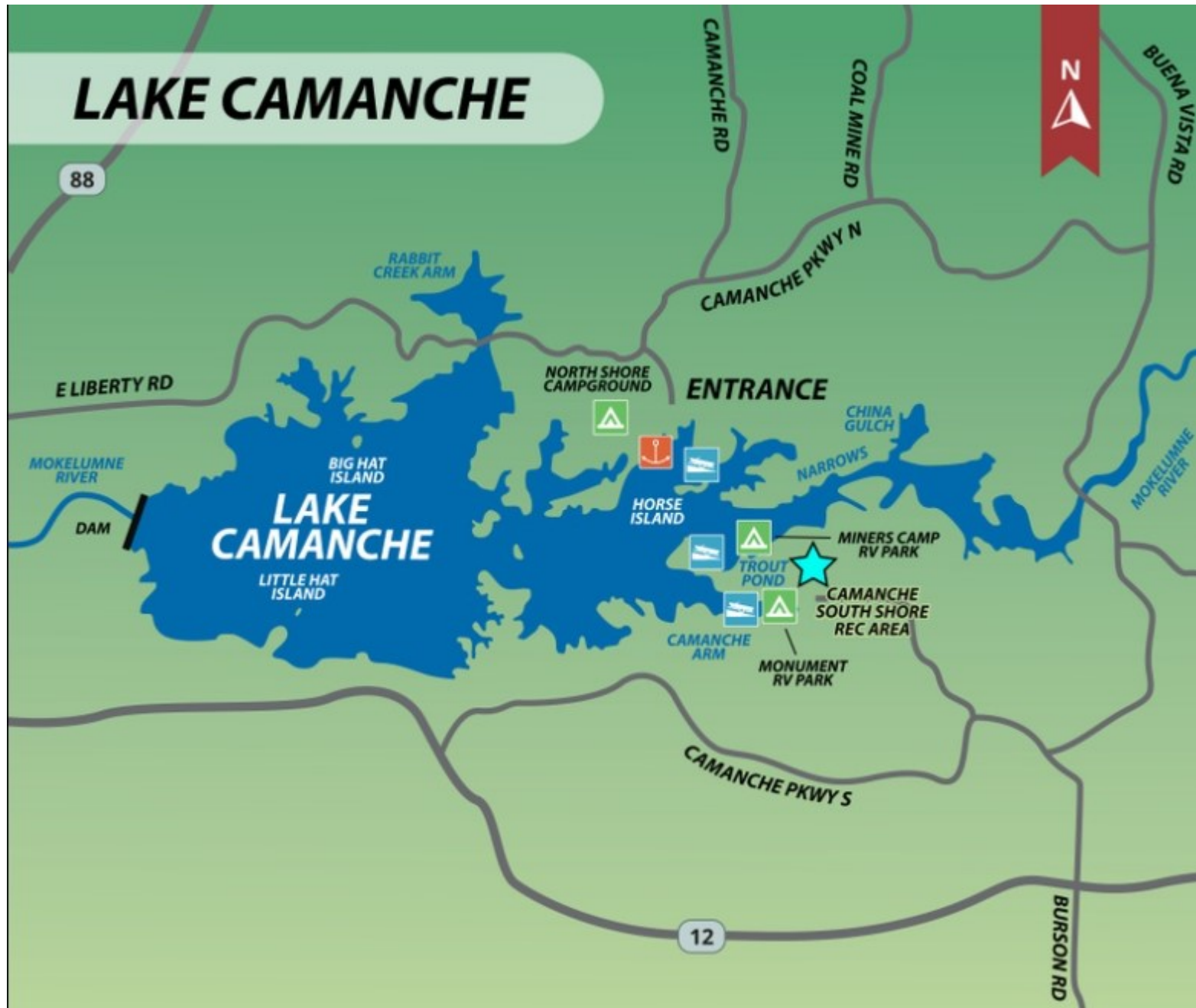
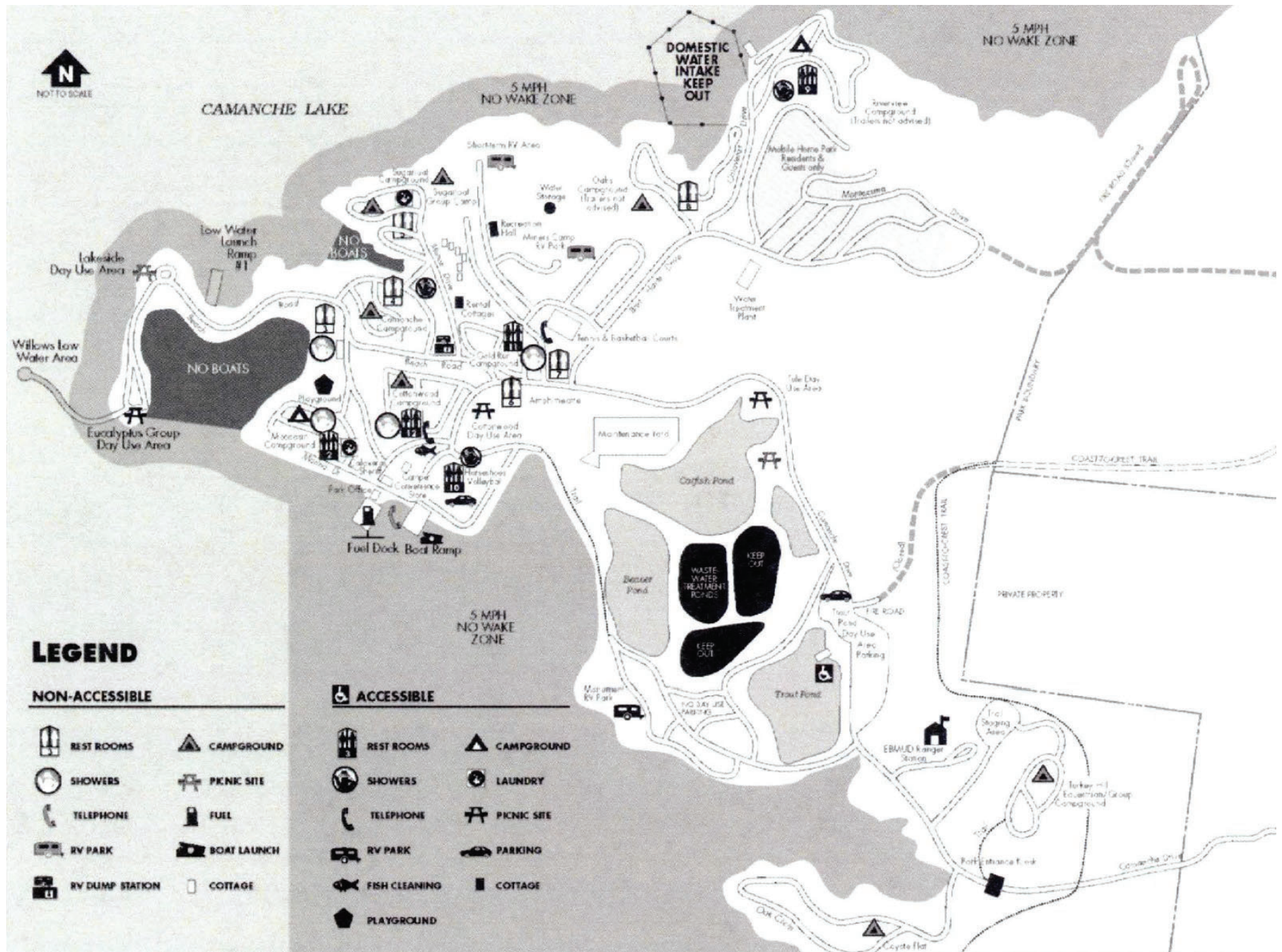


Figure 5-15. Camanche South Shore Recreation Facilities



Section 5. Potential Contaminant Sources

The CASS Recreation Area encompasses approximately 1,740 acres. Approximately 140 acres are developed, including a marina with fueling facilities paved boat launch, fish cleaning station, camper convenience store, general store, public restrooms, day-use picnic areas, recreational vehicles sites, campgrounds, rental cottages, laundry facilities, mobile home park, WTP, WWTP, park office, Calaveras County Sheriff office, maintenance yard, dry storage yard, and several large parking areas. Beginning in 2009, the marina boat fueling facilities became onshore only. Table 5-17 summarizes the recreation facilities located in this recreation area. The remaining acreage is undeveloped watershed. Except for the water and WWTPs, ranger station, and maintenance yard, which are maintained and operated by the District, the facilities are maintained and operated by the concessionaire, Camanche Recreation Company.

Table 5-17: Camanche Recreation Area Facilities

Facility	Existing Size/Quantity	
	South Shore	North Shore
Tent Campsites	292	241
RV Campsites (short-term)	120	0
RV Campsites (seasonal)	87	0
Picnic Sites	99	29
Roads (paved)	11 mi.	9 mi.
Total Day Use Parking Spaces	400	450
Paved Parking Spaces	156	202
Fishing Docks	3	0
Fishing Ponds	3	0
Ampitheater	1	0
Drinking Fountains	86	51
Trail Staging Areas	1 (access to 28 mi. of trail)	1 (access to 7.1 mi. of trail)
Volleyball Courts	1	0
Basketball Courts	1	1
Playgrounds	1	1
Fish Cleaning Facilities	1	1
RV Dump Stations	1	1
Restrooms (portable)	24	33
Total Buildings	95 (70 private)	158 (130 private)
Restroom Buildings	11	4
Toilets	53	27
Urinals	18	6
Sinks	60	29
Showers (Locations)	7	2
Shower Heads	30	16
Laundry (Locations)	2	1
Dryers	4	2
Washers	4	2
Park Offices	1	1
Ranger Station	0	0
Entrance Kiosks	1	1
Restaurant/Café	1	1
Recreation Hall	1	1
Utility Building	0	1
Projection Buildings	1	0

Section 5. Potential Contaminant Sources

Table 5-17: Camanche Recreation Area Facilities (continued)

Facility	Existing Size/Quantity	
	South Shore	North Shore
General Store	1	1
Service Stations (land)	1	0
Marina	1	1
Service Station (on water)	0	1
Open Berths	0	44
Covered Berths	34	40
Rental Boats	8	11
Courtesy Docks	3	2
Boat Launch Ramps	4 locations	2 locations
SS Main - Lake Elevation 235-205'	8 lanes	
SS Low Water 1 - Lake Elevation 225-185'	2 lanes	
SS Low Water 2 - Lake Elevation 185-160'	2 lanes	
SS Low Water 3 - Lake Elevation 160-125'	1 lane	
NS Main - Lake Elevation 235-200'		8 lanes
- Lake Elevation 200-197'		4 lanes
- Lake Elevation 197-194'		2 lanes
NS Low Water - Lake Elevation 194-175		2 lanes
Mobile Home Parks	1	2
Private Mobile Homes	69	126
Monthly Rentals (Stables)		1
Total Triplex and Cottage Units	7	25
Rental Cottages Buildings	7	10
1 Triplex, 2 Resort Rentals		3 BLDG
"A Unit" Motel Rooms (King Size Beds) 2 person		4
"B Unit" 4 Person Housekeeping		4
"C Unit" 6 Person Housekeeping		4
Cottages/13 BLDG, MHP1, MHP3, CSS	7	5 BLDG
4 Person Housekeeping/12 BLDG 4 Duplexes plus ADA	7	9
Maintenance Facilities		
Shop Buildings	1	1
Storage Buildings	1	3
Fenced Yards	2	1
Sewage Treatment Facilities		
Sewer Lift Stations	7	4
Sewer Treatment Ponds	3	6
Sewer Spray Fields	0	1
Water Treatment Facilities		
Water Tanks	2	2
Wells	1	4
Raw Water Pumping Platforms	1	0
Backwash Ponds	0	2
Telemetry Buildings	1	1
Treatment Plant Buildings	1	1
Dry Storage Yards	1	3
Spaces	25	154
Public Telephones	0	0

Recreation

Recreational activities include swimming, boating, fishing, picnicking, camping, bicycling, horseback riding, and hiking. Table 5-18 presents the number of visitor use at CASS Recreation Area for the update period. Average annual visitor use for the update period was 224,547, which is a twenty-two percent increase over the previous five-year period annual average.

During the 2020 MRWSS update period, as shown on Table 5-19, two boating-related spills occurred affecting Camanche Reservoir:

- In 2015, an oil spill of 1-2 gallons entered Camanche South Reservoir.
- In 2015, a gasoline spill of ¼ gallon entered Camanche North Reservoir.

Table 5-18. Visitor Use of Camanche South Shore Recreation Area, 2015-2019

Month	2015	2016	2017	2018	2019	average
Jan	10,905	11,688	12,623	13,206	11,353	11,955
Feb	11,046	14,094	13,194	15,449	9,965	12,750
Mar	13,801	15,673	17,424	16,612	14,656	15,633
Apr	13,645	17,281	20,370	20,457	18,080	17,967
May	16,486	21,521	26,253	25,523	19,460	21,849
Jun	14,922	20,526	30,326	34,346	38,005	27,625
Jul	20,882	33,511	40,823	37,475	38,752	34,289
Aug	15,683	21,570	25,009	26,448	30,641	23,870
Sep	14,260	18,658	22,988	23,145	20,877	19,986
Oct	10,250	11,273	15,108	15,248	10,272	12,430
Nov	11,861	12,978	15,933	16,815	11,390	13,795
Dec	10,523	12,267	14,327	14,990	9,889	12,399
Total	164,264	211,040	254,378	259,714	233,340	224,547

Table 5-19. OES Spills Tributary to the Camanche Reservoir Area and Watershed, 2015 – 2019^a

OES Spill Report #	Date	County	Location	Agency Reporting	Type of Spill	Amount Spilled (gal)	Contained Before Entered Waterway	Water Way Entered
15-1611	March 20, 2015	Calaveras	11700 Wade Ln	EBMUD	Oil	1-2	No	Camanche South Reservoir
15-3681	June 6, 2015	Amador	2000 Camanche Rd	EBMUD	Gasoline	1/4	No	Camanche Reservoir North Shore

a) Source: Hazardous Materials Spill Report (website accessed 2020). California Emergency Management Agency.
[https://w3.caleta.ca.gov/operational/mal haz.nsf/\\$defaultview](https://w3.caleta.ca.gov/operational/mal haz.nsf/$defaultview)

Water Supply

As described in Section 2, drinking water for residents and visitors is currently provided by EBMUD's CASS WTP that draws its supply from Camanche Reservoir. A new regional water treatment plant (RWTP) is being built as part of the CARWSP project to replace both existing Camanche Reservoir treatment plants (CANS and CASS). Located at the CASS Recreation Area, the RWTP is expected to be in service by the end of 2016. Related pipeline work was constructed in 2015-2016, including a new pipeline connection between the RWTP and EBMUD's Mokelumne Aqueducts No. 2 and 3, and new conveyance piping across Camanche Reservoir to deliver treated water to the Camanche North Shore area.

Hazardous Materials Storage

The WTP for the CASS Recreation Area uses a coagulant and calcium hypochlorite to treat the water prior to distribution. The coagulant is stored in the delivered 55-gallon containers with spill containment for each container. Any spills are contained locally in the WTP building. In 2010, the calcium hypochlorite system was replaced with sodium hypochlorite. Waste oils, paints, automotive batteries, used tires, and universal wastes are stored on-site in spill containment pallets by concessionaire.

Sanitation Facilities

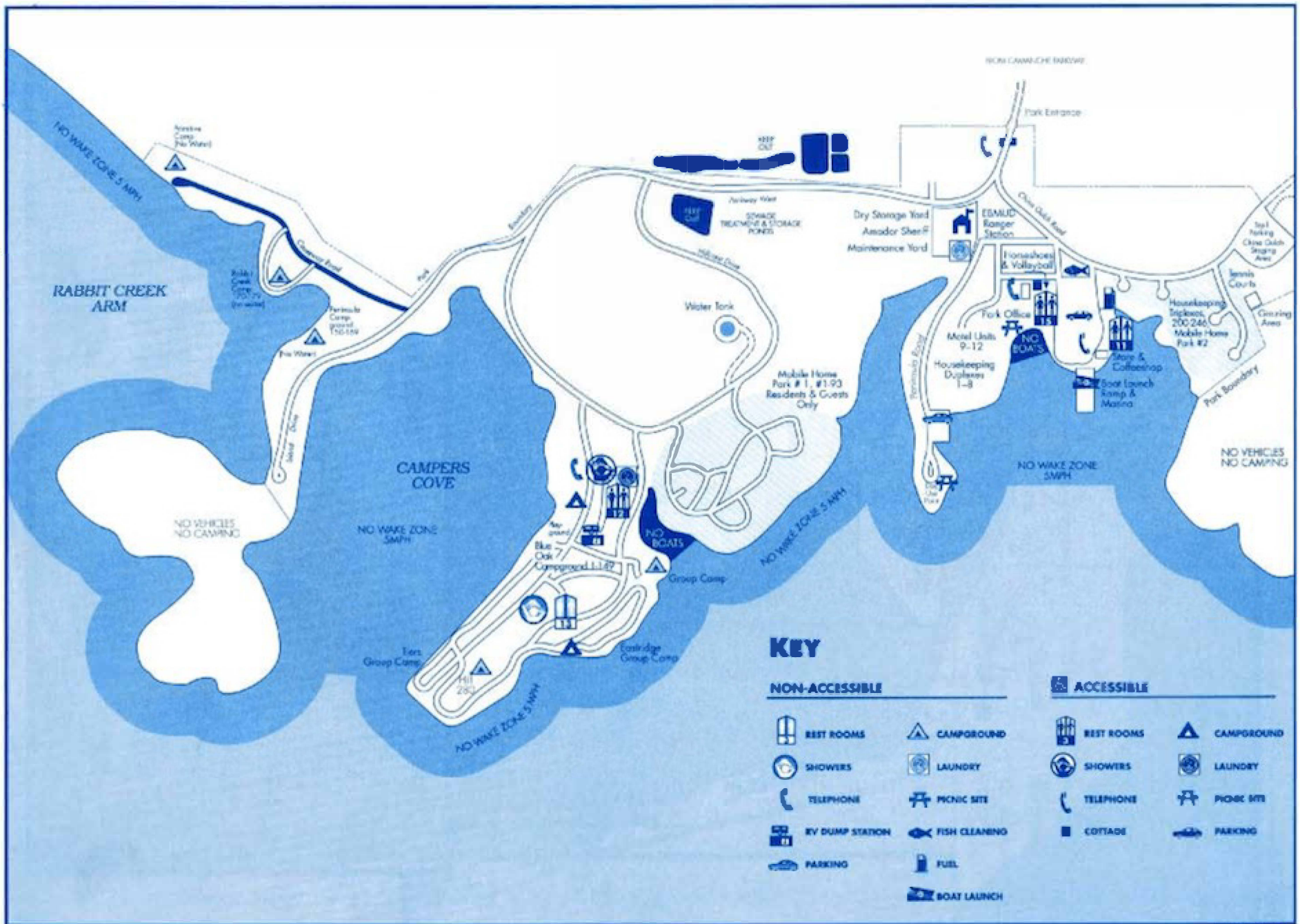
Wastewater disposal and treatment services for the CASS Recreation Area are provided by a sewer collection system and wastewater treatment facilities. The wastewater treatment facilities are composed of three ponds: two with mechanical aeration, and one for final disposal by evaporation and percolation. Chemical toilets are also used at CASS Recreation Area to augment the sanitation facilities during the peak visitor season. No sewer overflows occurred in the CASS sewer system during the past five years.

The CASS Solid Waste Facility is owned by EBMUD and was operated between 1967 and 1984. It accepted household waste from the CASS Recreation Area. In July 1987, the RWQCB issued a Waste Discharge Requirement for facility closure, groundwater monitoring, and reporting on closure activities. In 1997, the RWQCB indicated that no significant threat to water quality remained and rescinded the discharge requirement. This now abandoned solid disposal site is located adjacent to the wastewater treatment ponds.

CANS Recreation Area

The CANS Recreation Area is located in a rural area on the north shore of Camanche Reservoir in Amador County. In 2015, a new campground and restaurant was added at CANS. Figure 5-14 shows Camanche Reservoir Recreation Area, and Figure 5-16 shows the CANS Recreation facilities. Detailed CANS campground maps included in Appendix 5-3. The only roads into the area are Camanche North Parkway and Camanche Road. There are no major businesses, care facilities, highways, hospitals, or schools in the immediate area other than a few stores and restaurants at Lake Camanche Village three miles away. The area to the north is a residential area. The areas to the west and east are predominantly undeveloped watershed and agricultural land.

Figure 5-16. Camanche North Shore Recreation Facilities



Section 5. Potential Contaminant Sources

The CANS Recreation Area encompasses approximately 535 acres. Approximately 100 acres of the parcel is developed and includes a marina with fueling and boat cleaning facilities, paved boat launch, fish cleaning station, coffee shop, general store, public restrooms, day-use picnic areas, campgrounds, rental cottages, motel units, laundry facilities, two mobile home parks, WTP, WWTP, park office, Amador County Sheriff office, maintenance yard, three dry storage yards, and several large parking areas. Table 5-17 summarizes the recreation facilities that can be found in the CANS Recreation Area. The remaining acreage is undeveloped watershed. The WTP and WWTP, ranger and sheriff stations, and maintenance yard are maintained and operated by EBMUD. The remaining facilities are maintained and operated by the concessionaire, Camanche Recreation Company.

The marina on-water boat fueling facilities include a secondary containment system with sensor leak monitoring and alarms, installed in 1998. The concessionaire performs daily and weekly inspections of the fuel tank, double wall piping, and fuel dispenser (on the floating dock). Inspection documentation is submitted weekly to EBMUD.

Recreation

Recreational activities include swimming, boating, fishing, picnicking, camping, bicycling, horseback riding, and hiking. Table 5-20 presents the record of visitors at CANS Recreation Area for the 2020 MRWSS update period. The average annual visitors for the 2015 MRWSS update period was 233,340 which is an eight percent increase over the previous five-year period.

Table 5-20. Visitor Use of Camanche North Shore Recreation Area, 2015-2019

Month	2015	2016	2017	2018	2019	average
Jan	11,069	9,631	11,297	11,447	11,353	10,959
Feb	9,873	11,621	11,409	12,605	9,965	11,095
Mar	12,208	11,373	16,432	12,997	14,656	13,533
Apr	11,394	13,552	18,420	16,168	18,080	15,523
May	15,151	18,517	27,287	23,283	19,460	20,740
Jun	15,350	22,620	31,972	35,700	38,005	28,729
Jul	18,908	34,670	41,987	40,224	38,752	34,908
Aug	13,687	22,446	26,923	27,368	30,641	24,213
Sep	11,792	18,353	21,513	22,026	20,877	18,912
Oct	10,160	9,675	12,388	12,315	10,272	10,962
Nov	9,188	9,613	10,882	11,290	11,390	10,473
Dec	8,946	10,589	11,526	11,251	9,889	10,440
Total	147,726	192,660	242,036	236,674	233,340	210,487

Water Supply

As described in Section 2, drinking water for the residents and visitors is currently provided by EBMUD's CANS WTP. Three wells provide potable and non-potable water

Section 5. Potential Contaminant Sources

to the CANS Recreation Area facilities. EBMUD's potable water treatment facilities provide drinking water to 211 service connections (155 general and residents, 56 seasonal). A new RWTP is being built as part of the CARWSP project to replace both existing treatment plants.

Hazardous Material Storage

Sodium hypochlorite (400 gallons) liquid is stored in a double-walled containment tank in a separate protected room. Hazardous material storage by the concessionaire is similar to that at CASS Recreation Area.

Urban/Rural Runoff

Four USTs were removed from the CANS Recreation Area Marina Store in April 1997. During the removal activities, hydrocarbon contamination was discovered in the old piping run to the North Shore Marina. Subsequent soil excavation took place, along with confirmation sampling, which indicated that some contaminated soil was left in place. In November 1999, two groundwater monitoring wells were installed at the site. Two site characterizations were performed: one in 2000, and the other in 2004. In 2004, free product was observed in one of the wells, and in October 2005, additional soil and groundwater sampling was performed. The data collected indicate that the contamination is highly localized, there is no threat to reservoir water quality, and natural attenuation is an acceptable remediation alternative. The case has been closed and site closure was received from the RWQCB in December 2009.

Sanitation Facilities

Wastewater treatment and disposal services are provided by a combination of a sewer collection system, a septic system, and spray fields. Chemical toilets are used at CANS Recreation Area to augment the sanitation facilities. The current WWTP consists of six ponds: two for aeration, one for extended aeration, two for winter storage and one for polishing/equalization. After treatment, spray irrigation is practiced over an eight and a half-acre area. The spray irrigation is controlled by a computer program which maximizes evaporation while minimizing runoff. The spray area is contained, with any runoff diverted back into the polishing pond.

There were no sewer overflows for the CANS system during the 2020 MRWSS update period.

Watershed Headquarters and Maintenance Yard

In addition to the Ranger Stations located at the CASS and North Shore Recreation Areas, EBMUD operates an office building that serves as the headquarters for the EBMUD's Mokelumne Watershed and Recreation Division. Wastewater treatment and disposal is provided on-site by two septic tanks and leach fields (one for the administration building and one for the crew's quarters). The facilities and septic systems/leach fields were upgraded and replaced in 2011. EBMUD also operates a maintenance yard that houses equipment and supplies for EBMUD's Pardee and Camanche facilities.

Water Resources Development

Integrated watershed management between the Pardee and Camanche watersheds will be critical to insure any negative impacts detected at Camanche Reservoir are minimized.

Sanitation Facilities

As mentioned in Section 3, the District owns approximately half of Camanche Watershed, including the reservoir and sanitation facilities. Any sewer overflows within EBMUD property are associated with the EBMUD's facilities and are discussed above. AWA (AWA) provides wastewater service to a small area north of EBMUD's CANS Recreation Area; AWA calls this service area Camanche Village Unit 6. Wastewater is collected and pumped through four pump stations, treated at a WWTP, and is disposed of through spray disposal fields. AWA facilities that serve Camanche Village Unit 6 are located within or at Camanche Watershed boundary. AWA treatment facilities consist of a primary pond, two polishing ponds, a chlorine contactor, a storage pond, and a 12-acre spray field. No runoff is allowed from the spray field; runoff is captured in tailwater ditches and returned to the pond. However, the storage pond overflowed in 2006 due to a 100-year rain event; no other ponds with less treatment were permitted to overflow. Residents and businesses outside District property and AWA Camanche Village Unit 6 rely on septic systems.

In 2018, an initial study and Mitigated Negative Declaration was published by Stantec Consulting Services Inc. to improve the existing Camanche Village Unit 6 Wastewater Treatment Plant. The project includes an increase in the current treatment system capacity, increase in effluent storage capacity, and effluent disposal area. These improvements address deficiencies preventing the WWTP from providing wastewater service to existing and previously approved parcels in the Camanche Village Unit 6 development. The service area prohibited 72 lots from developing over a decade due to the WWTP deficiencies.

Hazardous Materials

Hazardous materials stored associated with EBMUD's facilities are discussed above. Incidents involving abandoned drug lab chemicals and solvents being recovered are sometimes reported in the watershed. The materials are typically dumped and along roadsides. Reports are made to the Amador or Calaveras Sheriff's office, which with the County Environmental Health Office respond and clean-up these sites. Typical chemicals found during these incidents were discussed in the Upper Mokelumne Watershed section.

Urban Area Runoff

Urban land uses include residential, commercial, and public facilities. The potential contaminants in the runoff from these facilities include metals, solvents, oil, grease, hydrocarbons, and pesticides from landscaping activities, coliform bacteria, and sediments from construction. Urban area runoff within Camanche Watershed is associated with the EBMUD's facilities and Camanche Village served by AWA, as discussed above. In

addition, the area north of CHHP is also residential and relies on septic systems; future development is expected in this area.

Rural Area Runoff

For the purposes of this study, rural area runoff is focused on potential contaminant sources associated with rural residences. Rural residences are generally dispersed over large areas, often on large parcels of land - one house per 100 acres. The potential water quality issues associated with rural residences are similar to those for urban residential areas. One difference for the rural residences is the use of septic systems instead of sewers for waste collection and treatment. Much of the non-EBMUD property in Camanche Watershed is rural and relies on septic systems. There were no subdivision applications submitted to Amador County during 2015-2019 for the Camanche Watershed area.

Utilities - Hydroelectric Power

Hydroelectric power generation occurs at Camanche Dam and is part of EBMUD's facilities as mentioned above. Some water from the turbine stock seal area and the turbine head cover pump is collected in the wastewater sump located within the powerhouse. Penstock water flowing through the wear seals, leaking turbine seals and the monthly wash down water used to generate between 0.05-0.10 MGD of wastewater. The amount has been reduced to approximately 0.014 MGD with the District's various source control efforts.

The wastewater treatment process consists of a collection sump equipped with an oil belt skimmer located within the powerhouse. Oil that is recovered by the belt skimmer is recycled and reused at the powerhouse. The water within the sump is pumped to a 20,000-gallon retention pond (located outside of the powerhouse). The retention pond is equipped with a rope oil skimmer, and through a series of baffles, re-circulates the surface skimming to an aboveground storage tank. The oil is removed from the site as recycled waste oil every 90 days. The effluent from the pond is pumped to a 750,000 gal holding/infiltration pond located on the northwestern corner of the Camanche Warehouse lay down area. This pond is operated in accordance with a State of California's General Waste Discharge Requirements for Sanitary Sewer Systems (WDR) discharge to land permit. An 85,000-gallon standby earthen basin is located adjacent to the sump and is used when the retention pond undergoes scheduled maintenance or for overflow from the evaporation percolation pond.

Transportation Corridors

The primary concerns associated with transportation corridors are the automotive-related contaminants in surface runoff from roads and parking areas and herbicide application. While no major transportation corridors traverse Camanche Watershed, several secondary roads exist which primarily service the EBMUD's CASS and CANS recreation facilities. These roads are highlighted under *EBMUD Facilities* section above.

Agriculture

No major agricultural activities are currently present within the Camanche Watershed.

Wildlife and Livestock

While livestock are the greatest contributor of animal waste in the Camanche Watershed, birds and mammals can introduce microorganisms into Camanche Reservoir and its tributaries through direct contact or animal waste. Deer, raccoons, bobcats, opossums, beavers, otters, skunks, coyotes, California ground and grey squirrels, gulls, and waterfowl are common species occurring in the Camanche Watershed. Significant pathogens associated with animal waste include *Cryptosporidium parvum*, *Giardia lamblia*, *Salmonella*, *E. coli* and avian influenza.

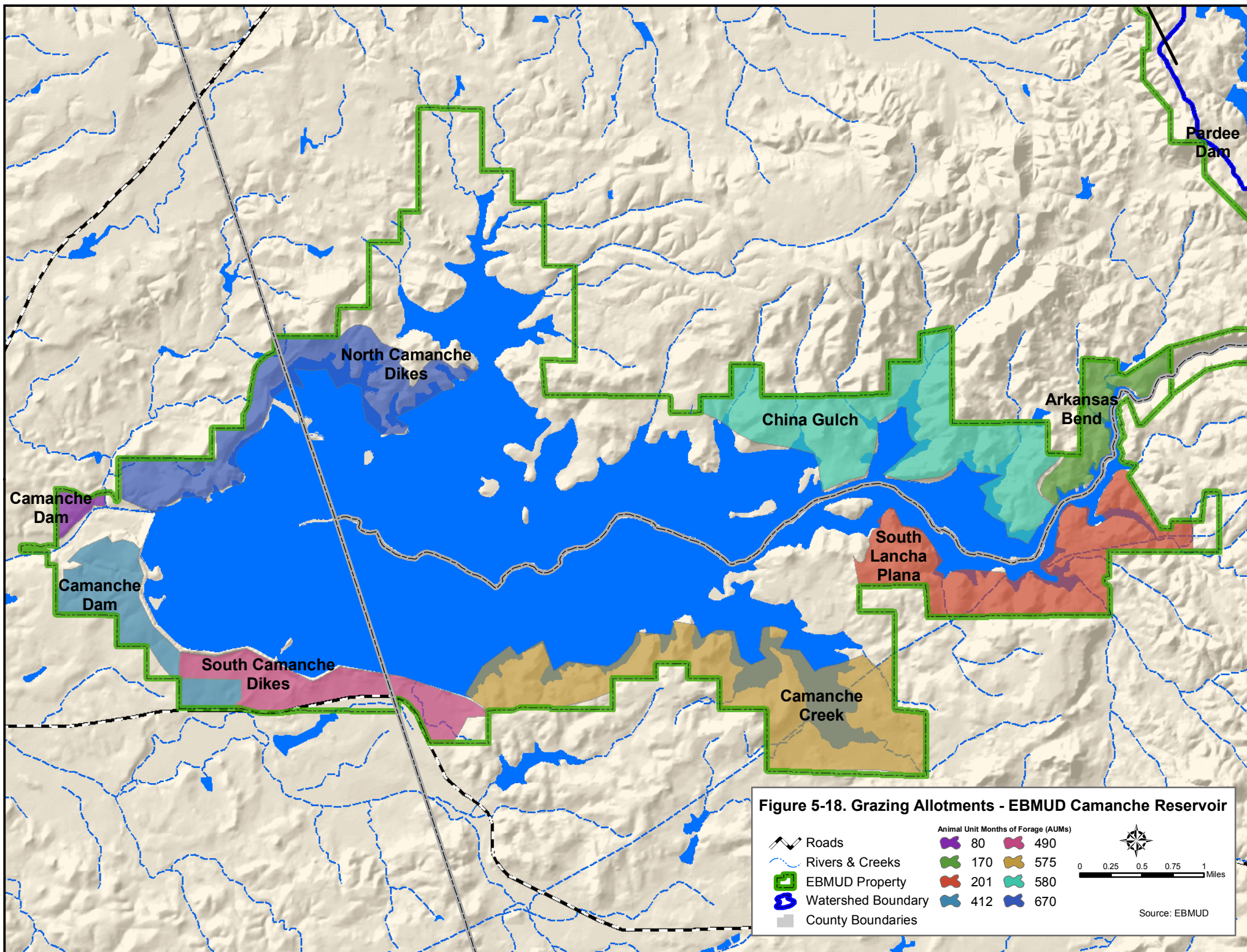
Cattle grazing occurs throughout the Camanche Watershed basin and is permitted on portions of the EBMUD-owned lands surrounding Camanche Reservoir. EBMUD's grazing policies were described in the Upper Mokelumne River Watershed section. Grazing occurs on approximately 5,000 acres of land in the Camanche Watershed. Table 5-21 lists the active grazing leases and the total AUMs. Figure 5-17 shows the locations of the grazing allotments.

Table 5-21. Active Grazing Leases on EBMUD land around Camanche Reservoir

Name	Approximate Acreage	2019 Estimated AUM's	Lease Expiration
West Portal	52	36	October 31 2020
Arkansas Bend	243	103	October 31 2020
China Gulch	1118	673	October 31 2020
Camanche Dam	438	520	October 31 2020
North Camanche Dikes	697	542	October 31 2020
South Camanche Dikes	420	285	October 31 2020
Camanche Creek	1243	575	October 31 2020
South Lancha Plana	797	630	October 31 2020
Causeway	80	55	Annual
HWY 12	38	30	Annual
South Camanche Parkway	40	30	Annual

Recreation

Recreation activities occur within the Camanche Watershed and are associated with the EBMUD's facilities at CASS and CANS Recreation Areas; these are discussed under *EBMUD Facilities*. As discussed previously, numerous activities are included under the heading of recreation. A variety of water quality concerns are associated with recreation and vary depending upon the specific activity.



Non-Body Contact Recreation

CHHP is located adjacent to CANS Recreation Area. It is located on EBMUD land, but operated by a concessionaire. It is a popular site that has grown significantly over the past few decades and now hosts regional as well as national events. Due to CHHP's proximity to Camanche Reservoir, non-lead shot is required for all upland game hunting. The use of lead shot is only allowed at their sporting clay stations (30 clay stations covering approximately 28 acres) within their lead reclamation zones. Lead ammunition was collected and reclaimed for the first time in 2010; the next lead ammunition collection is scheduled for 2021.

CHHP uses several septic tanks, a sand filter and leach field for waste disposal. The wastewater from the picking room is not connected to the septic system; it enters a separate 2000 gallon holding tank that is pumped out and hauled off to a landfill in Amador County.

Mines

Only one mine, Penn Mine, in the Camanche Watershed has been identified as a potential contaminant source. Penn Mine was a copper and zinc mine abandoned in 1953. EBMUD and the RWQCB completed the Penn Mine Environmental Restoration Project to implement site restoration work (1997-1999). Approximately 380,000 cubic yards of waste material were excavated and placed in a six-acre landfill (with a clay liner and leachate collection system). A soil cover was placed over areas disturbed by the waste excavation, which were then revegetated with native grasses and shrubs. BMPs were employed for erosion control and sediment management. Existing diversion channels were removed and surface water was allowed to flow into restored streambeds which were designed to minimize erosion and restore habitat. Construction activity for the Penn Mine Environmental Restoration Project was completed in November 1999.

Three years of post-restoration monitoring of the Penn Mine facilities determined that the site was returned to 'pre-mining' condition, and the USEPA rescinded its 309 Order. EBMUD continued quarterly monitoring of surface water runoff from the site for metals, turbidity, and pH until January 2010.

Since 2000, four groundwater wells around the landfill are routinely monitored and the landfill is regularly inspected for maintenance requirements and site stability. Bi-annual reports are submitted to the SWRCB. During the 2020 MRWSS update period, based on continued monitoring results and site inspections, there continues to be no evidence of release of landfill leachate to groundwater. EBMUD plans on continuing the groundwater sampling, landfill inspections, and bi-annual SWRCB reports.

Mine Tailings Ponds

A series of three tiered ponds - lower, middle and upper pond - are located just north of Camanche Reservoir. These ponds are suspected to have been used in association with

Section 5. Potential Contaminant Sources

historical mining activities; based on local topography, surface flows from the ponds drain into Camanche Reservoir.

The three ponds are dry most of the time. The upper pond is approximately 5.2 acres in size. It is primarily on BLM property with the southern portion (approximately 0.6 acres) located on EBMUD property. It consists of mine waste, possibly transported from the Penn Mine Site. Samples collected from the northern portion of the upper pond by BLM showed concentrations of arsenic, lead, zinc and iron above regulatory limits, though elevated metals levels have not been observed in Camanche Reservoir that can be conclusively attributed to the ponds as the reservoir is already on the State's list of Impaired Water bodies for copper and zinc pollution. The dam at the upper pond has been breached, and surface drainage from the upper pond flows into the middle and lower ponds (both of which have filled with native sediment and are more like moist grasslands today) in a southwesterly ephemeral drainage. From the lower pond, surface water flows into Camanche Reservoir. The middle and lower ponds are 1 and 1.3 acres respectively and lie entirely on EBMUD land.

Phase I and II site assessments were completed by EBMUD. The Poison Lake Pond Complex Site Engineering Evaluation/Cost Analysis were completed by BLM. Supplemental investigations and a Human Health and Ecological Risk Assessments were completed.

EBMUD stabilized the lower bank of the lower pond in Summer 2009 with a rock wall, backfill, and native vegetation. BLM has also temporarily stabilized the upper pond and drainage between the upper and middle ponds with check dams, bonded fiber matrix, and erosion control blankets.

In 2013, BLM and EBMUD held a series of meetings to keep local residents informed about proposed remediation alternatives and other activities at the site. The engineering report recommends that the 2 lower ponds on District property be left alone, since vegetation now covers the ponds and effectively prevents sediments from moving.

For Penn Mine, continued leachate removal and bi-annual groundwater monitoring was conducted, and the report delivered to California RWQCB. The downward leachate trend has continued even after the extremely wet winter of 2016-2017, which indicated that the Penn Mine landfill cap repair was effective. Planned activities for FY20-24 include continued leachate removal, continued bi-annual reporting of groundwater conditions, and removal of a weir from an onsite stream.

For Poison Lake, recent accomplishments include completion of the remediation project which involved scraping and capping surface mine waste and armoring the drainage channels with boulders and re-seeding bare areas which have no filled in with grasses. The annual surface water quality monitoring was conducted and the report delivered to California RWQCB. Planned activities for FY20-24 include post-remediation monitoring and surface water quality monitoring and reporting to evaluate any potential impacts from the site to the reservoir.

Geologic Hazards

Soil erosion is the primary geologic hazard in Camanche Watershed. Suspended sediment in a water supply reservoir can cause turbidity problems. Phosphorus and nitrogen, which associate with sediments, promote algal blooms and increases in biological oxygen demand in the reservoir during the summer. In 1997, 50,000 cubic yards of material eroded out of Mexican Gulch into the Mokelumne River below Pardee Dam. A contractor removed the material with mining equipment. Since that time, there have not been any other erosion issues at Mexican Gulch. This is primarily due to the fact that the flows over the spillway have been much less than during that period (approximately 40,000 cfs). Also, the spillway has been restructured in attempts to avoid similar problems if flows reach those levels in the future.

While specific geologic hazards are not identified for Camanche Watershed, heavy rainfall can lead to erosion from surface runoff. The risk to the Camanche Reservoir is greatest when erosion occurs near the reservoir itself, since small rainfall events can transport sediment over a short distance. Large storms can transport sediment from throughout the watershed. Erosion is most likely to occur where the land has been disturbed, exposing bare soil. Road cuts on steep slopes are a major source of sediment erosion. Landslides, fires, or disturbances by animals are other modes by which the erosion risk increases

See the 2010 MRWSS update for a description of two major erosion prevention projects completed by EBMUD to decrease erosion into Camanche Reservoir: the CASS Area shoreline boulder retaining wall and the China Gulch Restoration Project. The China Gulch Restoration Project also prohibits drainage from the mine tailings ponds from reaching Camanche Reservoir.

Fire and Fuels Management

In lower, less forested portions of the Sierra foothills, human-caused wildfires may pose a more significant threat than lightning strikes. Fire created by activities along the roadside or trails, such as discarded smoking materials, catalytic converters, or vehicle fires, could have significant negative impacts on the water quality of Camanche Reservoir resulting from increased erosion during rainfall events.

Table 5-22 lists fires that occurred during the 2020 MRWSS update period in the Camanche Reservoir area and Watershed. The largest fire reported in the watershed during this update period, was a 210-acre Camanche fire along multiple spots of Camanche Parkway in Amador County.

Table 5-22 Wildfires in the Camanche Reservoir Area

Date	Location	CAL FIRE Name ^a	Size (Acres)
5/30/15	Teepee Ct. adjacent to Camanche Hills Hunting Preserve – Amador Co.		0.25
7/17/15	Camanche Reservoir (HOUSEBOAT FIRE) – Amador Co.		0
7/30/15	Multiple spots along Camanche Pkwy. S. – Calaveras Co.		1
10/7/15	Curran Rd. – Amador Co.		1.5
5/28/16	Camanche Pkwy. N. – Amador Co.		2.6
6/15/16	Cheyenne Dr. – Calaveras Co.		83
6/17/16	Multiple spots along Camanche Pkwy. N. – Amador Co.	Camanche	210
6/27/16	Campo Seco and Chili Camp Rd. – Calaveras Co.	Campo	33
8/5/16	Deer Ridge Ln. – Amador Co.	Deer	26
8/15/16	Hoya Ct. and Camanche Hills Hunting Preserve – Amador Co.		22.6
8/11/17	Camanche Hills Hunting Preserve at Grapevine Ct – Amador Co.		1.5
5/28/18	Coyote Dr. – Amador Co.		0.5
6/10/18	Duck Creek Ln. – Amador Co.		5
7/28/18	Camanche Pkwy S. ¼ Mi. S of county line – Calaveras Co.		0.5
8/7/18	Camanche South Shore Recreation Area – Calaveras Co.		0.3
11/7/18	Watertown Rd./Campo Seco Rd. – Calaveras Co.		0.5
4/27/19	Slate Dr. – Calaveras Co.		0.8
5/10/19	Camanche North Shore Recreation Area – Amador Co.		0.5
5/23/19	Camanche South Shore Recreation Area MHP – Calaveras Co.		0.68
6/2/19	Grapevine Gulch Rd. – Amador Co.		1.5
7/1/19	Grapevine Gulch Rd. – Amador Co.		2
7/30/19	Camanche North Shore Recreation Area MHP – Amador Co.		5.7
8/1/19	Camanche South Shore Recreation Area – Calaveras Co.		5.7

a) Source: California Department of Forestry and Fire Protection (CAL FIRE) Incidents website (accessed 2020). <http://www.fire.ca.gov/incidents>.

Unauthorized Activities

Unauthorized activities within the Camanche Watershed can contribute to a myriad of contaminants entering the Mokelumne River and ultimately Camanche Reservoir. Roadways leading into or through the watershed increase the potential for unauthorized activities such as illegal dumping. Illegal dumping and trespassing may impact reservoir water quality by introducing contaminants from materials dropped into creeks or the Mokelumne River leading directly into the reservoir. The illegal dumping of household wastes and appliances is a common ongoing problem within watersheds. In addition, commercial dumping (e.g. concrete blocks, creosote logs, tires) has also occurred.

Significance of Potential Contaminant Sources

This section summarizes the various contaminant sources identified previously and their potential for water quality degradation. The potential for each contaminant source to impact water quality is ranked insignificant, low, medium, and high as shown in Table 5-23. These rankings take into account watershed characteristics (size, slopes, soils, and vegetation), type of contaminant, distance to water bodies, and magnitude of source. The water quality parameter of greatest concern for a specific contaminant source in Table 5-23 is identified in bold type.

Table 5-23: Summary of Contaminant Sources and Their Potential Impacts on Water Quality^a

Contaminant Source	Key Contaminants	Potential to Impact to Drinking Water Quality
Fires and Fuels Management	Turbidity Algae/Taste and Odor TOC SOCs, VOCs, pesticides, herbicides	<u>Medium to High</u> - Increasing fuel stock in National Forests - Fires due to lightning strikes are a significant threat. - While fires make land vulnerable to erosion, heavy rainfall is necessary to induce major erosion and impact water quality. - BMPs (goat grazing, firebreaks, etc.) are being implemented.
Geologic Hazards	Turbidity Radionuclides General minerals and Metals TOC	<u>Medium to High</u> - High erosion risk lands within watersheds and in close proximity to water bodies. - Historically landslides have occurred in close proximity to water bodies.
Wildlife and Livestock	Turbidity Algae/Taste and Odor Microorganisms General minerals and Metals TOC Nutrients	<u>Medium to High</u> - Grazing on private land is not regulated or tracked - Cattle grazing can be significant source of microorganisms, especially <i>Cryptosporidium</i> - Erosion and TOC loadings from cattle grazing - BMPs have been developed and implemented on District and National Forest land.
EBMUD Facilities (Excluding recreation)	Microorganisms Turbidity General minerals Metals TOC Oil and grease, other hydrocarbons	<u>Medium to High</u> - Increasing visitor use at Camanche Reservoir - Facilities including septic systems proximate to the reservoirs and tributaries. - Sewage spills have occurred at Camanche facilities - Maintenance activities can contribute contaminants.

Section 5. Potential Contaminant Sources

Table 5-23: Summary of Contaminant Sources and Their Potential Impacts on Water Quality
(continued) ^a

Contaminant Source	Key Contaminants	Potential to Impact to Drinking Water Quality
Recreation (EBMUD)	Turbidity Algae/Taste and Odor Microorganisms General minerals and Metals TOC Oil, grease, other hydrocarbons, MTBE	<u>Medium to High</u> - Significant recreation use at both Pardee and Camanche Reservoirs - Recreation is prohibited near the outlet towers. - Body contact is permitted only in Camanche Reservoir. - Cross contamination from privately owned boats can be a significant issue. - Fire hazards increase with visitor use.
Recreation (Sierra Pacific, Eldorado & Stanislaus National Forests, Bureau of Land Management, PG&E)	Turbidity Algae/Taste and Odor Microorganisms General minerals, Metals TOC Oil and grease, other hydrocarbons, MTBE	<u>Medium to High</u> - Recreational activities occur at reservoir and river locations throughout the watershed basin - Increased access and recreation sites along Mokelumne River - Erosion due to OHV use now declining due to increased road regulations
Mines	Turbidity Radionuclides General minerals and Metals Oil and grease, other hydrocarbons	<u>Medium to High</u> - Inactive mines exist throughout watersheds. - Water quality degradation due to mine discharges has been significant. - Mines are proximate to reservoirs and main tributaries.
Logging	Turbidity Nutrients Algae/Taste and Odor General minerals and Metals Microorganisms TOC SOCs, VOCs, pesticides, herbicides oil and grease, other hydrocarbons	<u>Medium to High</u> - Logging is extensive in Upper Mokelumne watershed, - Increasing criteria assessed in harvest plans on public and private lands - Logging roads cut areas and provide access for OHVs - Logging roads traverse watersheds and cross tributaries. - Pesticides used for vegetation management. - Housing, maintenance, and administrative facilities are located within watershed - Increased regulations for logging roads decrease risks

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Table 5-23: Summary of Contaminant Sources and Their Potential Impacts on Water Quality
(continued) ^a

Contaminant Source	Key Contaminants	Potential to Impact to Drinking Water Quality
Utilities - Hydroelectric Power Generation	Turbidity Algae/Taste and Odor Temperature General minerals and Metals TOC SOCs, VOCs, pesticides, herbicides Oil and grease, other hydrocarbons	<u>Low to High</u> - Operations of facilities can dramatically affect water temperatures. - Extensive hydroelectric facilities occur throughout Pardee and Camanche watersheds - Hydroelectric facilities are integrated into the complex system of reservoirs, canals, and tunnels
Rural Area Runoff - Residential	Turbidity Algae/Taste and Odor Microorganisms General minerals and Metals TOC SOCs, VOCs, pesticides, herbicides Oil and grease, other hydrocarbons	<u>Low to High</u> - Rural areas are sparsely populated, but there are less control measures for erosion and sanitation facilities - Rural development is increasing
Sanitation Facilities	Algae, Taste and Odor Microorganisms TOC	<u>Low to High</u> - Impacts from leaks and spills are dependent on location of incident, amount and type of material, and response time - Failed septic systems have been documented - Aging septic systems more prone to fail
Transportation Corridors	Turbidity General minerals and Metals TOC SOCs, VOCs, pesticides, herbicides Oil and grease, other hydrocarbons	<u>Low to Medium</u> - Increasing development increases road utilization - Main thorough-fares proximate to reservoirs. - Storm water drains feed directly into the reservoirs. - Accidents occur along main thoroughfares. - Maintenance activities can contribute contaminants. - Logging activities create roads throughout watershed - Trends toward integrated pest management for road maintenance

Section 5. Potential Contaminant Sources

Table 5-23: Summary of Contaminant Sources and Their Potential Impacts on Water Quality
(continued) ^a

Contaminant Source	Key Contaminants	Potential to Impact to Drinking Water Quality
Unauthorized Activities (Illegal Dumping or Marijuana Farm Sites)	Turbidity Algae Microorganisms General minerals and Metals TOC SOCs, VOCs, pesticides, herbicides Oil and grease, other hydrocarbons	<u>Low to Medium</u> - Access roads to the reservoirs increase risks of impacting water quality. - Illegal dumping increasing with additional populations and increasing dump fees. - Abandoned sites of illegal marijuana farms, where large quantity of herbicides, pesticides, and fertilizers were used / left on-site.
Agriculture	Turbidity Algae/Taste and Odor General minerals TOC SOCs, VOCs, pesticides, herbicides	<u>Insignificant to Low</u> - Agricultural properties are few and small. - Pesticide and herbicide applications are well regulated.

a) Bold indicates contaminants of greatest concern. Ranking of potential to impact drinking water quality is based on contaminants of concern, proximity to water bodies, magnitude of sources, watershed characteristics, and any mitigating factors. Contaminants are prioritized as follows:

1. Microbiological contaminants with the potential for acute illness.
2. Algae and inorganic compounds which contribute to taste and odor problems
3. Turbidity which also transports adsorbed contaminants.
4. Total organic carbon which when disinfected can form DBPs.
5. Other organic and inorganic compounds which are at or below detection limits in raw waters.

Section 6: Watershed Control and Management

Introduction

This section documents watershed management practices of East Bay Municipal Utility District (EBMUD), and other public and private entities that may have a significant impact on water quality within the Upper Mokelumne River and Camanche Watersheds. This section first presents the jurisdictional authority for the various responsible agencies. Then the Watershed Management policies and practices are summarized, broken into three groups:

1. Watershed Management (general)
2. Watershed Management by EBMUD (by category)
3. Watershed Management by Others (by category)

Jurisdictional Authority in the Watershed

One component of a watershed sanitary survey is to define the “lines of communication” between responsible agencies. A summary of the local, state, and federal agencies and utilities that have jurisdictional authority within the Upper Mokelumne River and Camanche Watersheds are shown in Table 6-1. This information can assist EBMUD in the event that best management practices (BMPs) need to be modified and/or created, and to develop open lines of communication between interested agencies. Each of these agencies has a role in achieving adequate source water protection and their active participation is essential for successful protection.

Table 6-1: Agencies with Influence over Source Water Quality

Agency	Jurisdiction or Issues of Concern
<i>Local / Regional Agencies</i>	
EBMUD	Management of water supply, quality, treatment, and distribution. Collection, treatment, and disposal of wastewater
Counties of Alpine, Amador, Calaveras, and San Joaquin	Regulation and monitoring of agricultural pesticide usage. Control of animal and plant pests.
	Inspection of hazardous materials storage and underground storage tanks.
	Fire protection, storage of hazardous materials, emergency response.
	Stormwater collection and disposal.
	Management of natural resources.
	Emergency planning and response.
	General plan/zoning land use changes, use permits, environmental compliance.
	Construction and maintenance of county roads--vegetation management and erosion control.
	Transportation planning and traffic control.
	Development services /building permits.
	Hazardous materials business plan.
	Collection, treatment and disposal of wastewater, septic system permits.
Sierra-Pacific Industries	Management of forests - planting and logging.
	Management of associated facilities -- roads, timber processing plant, administrative and maintenance buildings.
Pacific Gas & Electric (PG&E)	Management of hydroelectric facilities.
	Management of associated facilities -- water transmission, water quality, roads, administrative buildings, recreation sites.
Amador Water Agency (AWA)	Management of water supply, quality, treatment, and distribution.
Calaveras Public Utility District (CPUD)	Management of water supply, quality, treatment, and distribution.
Contra Costa Water District (CCWD)	Management of water supply, quality, treatment, and distribution.
Jackson Valley Irrigation District (JVID)	Management of water supply, quality, treatment, and distribution.

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Table 6-1: Agencies with Influence over Source Water Quality (Continued)

Agency	Jurisdiction or Issues of Concern
<i>State Agencies</i>	
Caltrans - CA Department of Transportation	Construction and maintenance of state and federal roads
	Stormwater collection along state and federal roads
	Hazardous materials spill response and maintenance of spill records along state and federal rights-of-way
CA Department of Fish and Wildlife	Protection of state listed species
	Monitoring of water quality for aquatic species
	Regulation of alterations to natural state of rivers, streams, or lakes.
	Invasive species control
CA Department of Forestry and Fire Prevention	Fire prevention and suppression on all state-responsible lands (includes all EBMUD-owned watershed lands, except Lafayette Watershed)
	Regulation of timber harvesting activity on private lands
CA Department of Toxic Substances Control	Regulation of hazardous waste generation and storage
CA Regional Water Quality Control Board - Central Valley Region	Protection of drinking water supplies Regulation of public water supply, treatment, and distribution systems Regulation of waste discharge into surface waters Regulation of stormwater discharge
CA Sierra Nevada Conservancy	State agency created in 2004. Initiates and funds Sierra Nevada region environmental projects (Prop 84 bond funds)
CA State Water Resources Control Board	Drinking water regulations
<i>Federal Agencies</i>	
U.S. Army Corps of Engineers	Regulation of discharge of dredged or fill materials into waters of U.S.
U.S. Department of Agriculture Natural Resources Conservation Service	Resource conservation and soils
USFS	Management of NFs
U.S. Department of Interior Fish and Wildlife Service	Protection of federally listed species
U.S. Bureau of Land Management	Management and permitting of activities on federal lands.
U.S. Environmental Protection Agency	Set drinking water standards, delegate authority for enforcement to states
	Protection of drinking water supplies
	Regulation of public water supply, treatment, and distribution systems

Watershed Management Practices

This section provides an overview of the practices and policies that have potentially significant impacts on source water quality in the Camanche and Upper Mokelumne River Watersheds. Watershed management practices by EBMUD and other public entities were reviewed.

The documents listed in Table 6-2 were obtained and reviewed for the MRWSS 2020 update. First, these policies and documents are described generally if they pertain to multiple watershed management categories; next, EBMUD management practices are discussed by category; and finally, the various other agency management practices are discussed in context of the following watershed management categories:

- Land Use Planning
- Access control
- Erosion Control
- Pest Management
- Logging Practices
- Grazing and Livestock Management
- Mineral Exploration and Mining
- Stormwater Management
- Waste Management
- Structures, Dredging, and Fill Management
- Inspection, Surveillance, and Enforcement Procedures
- Emergency Response
- Public Education
- Fire and Fuels Management

Section 3 details land ownership in the Upper Mokelumne River Watershed, including EBMUD, six major institutional landowners and major private landowners. Of these landowners, EBMUD property accounts for about 3 percent, SPI owns approximately 24 percent, BLM approximately 3 percent, PG&E approximately 1 percent, U.S. Forest Service (USFS) approximately 54 percent, and others approximately 15 percent. Although BLM own a relatively small percentage of the watershed acreage, the BLM parcels are important because they are located right along the Mokelumne River. National Forest (NF) land is located in the upper elevations in the eastern watershed. In Calaveras County, SPI owns a large band of mid-elevation land encompassing much of the Middle and South Fork Watershed land.

Section 6. Watershed Control and Management

Table 6-2: Documents Reviewed for MRWSS 2020 Update

ID	Agency	Title	Date	Affected Management Practice
1	Amador County	General Plan, Housing Element Update	2016	Land Use
2	Amador County	Hydrology and Water Quality General Plan Update Working Paper	2007	Land Use, Stormwater Management
3	Amador County	Local Hazard Mitigation Plan Update draft	2020	Fire and Fuels Management
4	Amador County	Amador County Stormwater Ordinance	2015	Stormwater Management
5	Calaveras County	General Plan, Housing Element Update	2019	Land Use
6	Calaveras County	Calaveras Recycles, Wilseyville Transfer Station	2019	Waste Management
7	Calaveras County	Design Manual Grading, Drainage and Erosion Control	2012	Land Use, Stormwater Management
8	Calaveras County	General Plan, Utilities and Services Systems, Final Edits Memo	2019	Wastewater Management
9	Calaveras LAFCO	Final Water and Wastewater Municipal Service Review	2012	Wastewater Management
10	Caltrans	Stormwater Program Annual Report, District 10	2019	Stormwater Management
11	Caltrans	Stormwater Program 2019-2020 Workplan, District 10	2019	Stormwater Management
12	Caltrans	Stormwater Monitoring Guidance Manual	2020	Stormwater Management
13	California Department Fish and Game	Draft Environmental Impact Statement (EIR) and Proposed new Suction Dredging Regulations	2016	Mineral Exploration and Mining
14	California Department Forestry and Fire Protection (CAL FIRE)	Forest Practice Rules and Act Road Rules 2020	2020	Logging
15	California Department Forestry and Fire Protection (CAL FIRE)	Timber Operations in Areas Substantially Damaged Due to Wildland Fires Memorandum	2012	Logging
16	Central Sierra RC&D	Annual Report	2012	Water Quality Monitoring, Education
17	EBMUD	Various watershed management practices and BMPs	2015	Rangeland Management, Water Quality Monitoring Program, Invasive Aquatic Species Response Plan
18	USDA USFS	2012 Planning Rule Final Directives for NF System Land Management Planning	2012	Restoration, Fire and Fuels Management, Logging, Pest Management

Table 6-2: Documents Reviewed for MRWSS 2020 Update (continued)

ID	Agency	Title	Date	Affected Management Practice
19	USDA USFS Pacific Southwest Region	Sierra Nevada Draft Forest Plan Amendment Final Supplemental Environmental Impact Statement	2019	Restoration, Fire and Fuels Management, Logging, Pest Management
20	USDA USFS Pacific Southwest Region	Draft Water Quality Management Handbook	2011	Logging, Grazing
21	USDA USFS	Water Quality Management For Forest System Lands in California BMPs	2000	Logging, Road Management, Mining, Recreation, Vegetation, Fire and Fuel Management, Grazing
22	USDA USFS Pacific Southwest Region	Ecological Restoration Implementation Strategy: Stanislaus NF	2011	Logging, Road Management, Mining, Recreation, Vegetation, Fire & Fuel Management, Grazing
23	Stanislaus NFS	Stanislaus NF, Forest Plan Direction 2010, with Errata 2015	2015	Land Use, Erosion Control, Logging, Grazing
24	Stanislaus NFS	Stanislaus NF, Temporary Fire Restrictions	2015	Fire and fuel management
25	Eldorado NFS	Power Fire Restoration Project – Proposed Action and Data Table	2014	Fire and fuel management
26	PG&E Pacific Forest and Watershed Lands Stewardship Council	Land Conservation Strategic Plan Goals and Objectives: 2018	2018	Land Use
27	Stanislaus NFS	Stanislaus Fire Plan	2004	Fire and fuel management
28	Stanislaus NFS	Forest Plan Direction: Motor Vehicle Travel Management	2004	Erosion Control, Access Control
29	State Water Resources Control Board,	AB885, OTWS Regulations	2018	Waste Management
30	State Water Resources Control Board, Central Valley Region	Drinking Water Policy, Basin Plan amendments	2014	Water Quality
31	State Water Resources Control Board, Central Valley Region	Marijuana Cultivation Fact Sheet	2014	Water Quality, Permits
32	SPI Industries	Pesticide Use BMPs	2010	Pest Management
33	Upper Mokelumne River Watershed Authority MAC Plan Signatories	Mokelumne/Amador/Calaveras Integrated Regional Water Management Plan Update 2018	2018	Access Control, Pest Management, Recreation, Public Education, Erosion Control, Grazing, Fire and Fuels Management

USFS Watershed Management

USFS, a division of the U.S. Department of Agriculture (USDA), directs the management of the Eldorado and Stanislaus NFs, which together encompass all NF lands within the watershed. Specific NFs each adopt their own land and resources management plans for their respective areas of jurisdiction. The plans contain standards and guidelines, as well as specific plans and management area prescriptions.

In 2012, the USFS released the 2012 Planning Rule, a major overhaul of the 1982 document that guides the individual NF land management plans. The 2012 Planning Rule creates an adaptive framework that emphasizes collaboration and supports an all-lands context for resource management. The all-lands approach recognizes that many management issues such as fire, water and wildlife will require understanding of what is happening both on and off the NF System lands.

In 2016, amendments were made to the 2012 Planning Rule clarifying that plan amendments do not need to meet all the substantive rule requirements for sustainability, plant and animal diversity, multiple uses, and timber requirements. Rather, the responsible official must determine which substantive requirements are directly related to plan direction being changed by the amendment and apply those requirements to the amendment in a way that is commensurate with the scope and scale of the amendment.

Sierra NF Plan Amendment (SNFPA)

The Sierra NF Plan Amendment (SNFPA) was promulgated in January 2004. The 2004 amendment established management direction, land allocations, desired future conditions, standards and guidelines for management actions, and a strategy for supporting adaptive management of forest lands. The plan refined management direction for (1) old forest ecosystems, (2) aquatic, riparian, and meadow ecosystems, and (3) fire, fuels, and forest health. Components of the 2004 SNFPA are discussed further in the *Grazing and Livestock Management* subsection. Because of lawsuits and a court order, a 2013 Final Supplemental EIS was issued to correct specific deficiencies in the original Supplemental EIS. The new Supplemental EIS properly models all alternatives and will consider the “new” objectives of reducing stand density and restoring ecosystems after catastrophic disturbance events (i.e., fire) in evaluation of alternatives.

The Stanislaus NF, Forest Plan Direction, April 2010, and Errata 2015, summarize specific required Management Practices, including water quality management, and require the use of the USDA BMPs (described below). A road ecosystem travel analysis completed in 2012 evaluated the Stanislaus NF road system, and recommended roads which should be eliminated or abandoned. Water quality was one of the factors that were considered in the analysis. The Eldorado NF complies with the SNFPA.

In June 2019, a draft forest plan for the Sierra National Forest was released for public comments. The draft plan allows for prescribed fires and naturally-ignited wildfires for the benefit of resources. The plan includes setting objectives for fire restoration that better fits ecological needs of the landscape. The draft forest plan also includes a plan to increase prescribed fire capacity by creating wildland fire crews dedicated to supporting prescribed

fire rather than fire suppression. Additionally, the plans increase focus on reducing surface and ladder fuels and using prescribed and managed wildfire as the primary fuel reduction and forest restoration tools. In addition to fire management, the draft forest plans also address protecting at-risk wildlife species by protecting high-quality habitat (dense, large-structured forests) for old-forest dependent species.

Collaborative Forest Landscape Restoration Program

Between 2016 and 2018, the country-wide Collaborative Forest Landscape Restoration (CFLR) program served to support and sustain healthy and resilient forests and communities. There are currently 23 CFLR projects across the country, ranging in size from 130,000 to 2,400,000 acres. Overall accomplishments included the following:

- Reduced hazardous fuels to reduce the risk of catastrophic wildfire on more than 2.9 million acres;
- Improved access for sports enthusiasts and other recreational visitors by improving over 760 miles of trails and constructing or reconstructing over 100 stream crossings to allow fish to move under roads and maintain healthy populations;
- Improved or enhanced over 385,000 acres of soil and water resources;
- Enhanced over 2,526,000 acres of terrestrial habitat; and
- Maintained or improved more than 19,700 miles of roads.

Travel Management Rule

USFS finalized the Travel Management Rule in 2005 requiring each NF or ranger district to designate those roads, trails and areas open to motor vehicle use. Years of unmanaged motorized use on NF land has resulted in unplanned roads and trails, erosion, and watershed and habitat degradation. The Travel Management Rule restricts motor vehicles (cars, trucks, ATVs, motorcycles, RVs, 4WDs, etc.) to designated roads and trails, and specifically prohibits cross country travel. Parking outside of developed trailheads and recreational sites is restricted to turnouts or within one vehicle length of the road or trail. Designated trails and dirt roads are also closed seasonally to prevent damage during wet conditions.

Although temporary restrictions were implemented earlier, the final travel management changes were implemented as follows:

- The Eldorado NF Final EIS, Record of Decision (ROD) 2008, and associated Motor Vehicle Map 2009. The Motor Vehicle Map identifies which roads and trails allow motor vehicle travel, both surfaced and dirt.
- The Stanislaus NF Forest-wide Forest Plan Amendment ROD 2009 and associated Motor Vehicle Map 2010.
- In 2012, a lawsuit against the Eldorado NF resulted in the temporary closure of 42 roads (120 miles of off-road trails) that cross meadows, including the Deer Valley Trail and Blue Lake Road in the Upper Mokelumne River Watershed. The lawsuit alleged that USFS had not satisfactorily shown how vehicular use on off-road trails affects the hydrology of meadow areas crossed by the trails. USFS has agreed that some of the roads are impacting the meadows, and the roads will remain closed until impacts can be corrected. The Deer Valley and Blue Lakes

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Road Environmental Assessment (EA) was issued in 2015. In February 2016, the 9th U.S. Circuit Court of Appeals ruled unanimously against the plaintiffs stating that USFS's assessment of the environmental impacts of each alternative was detailed and thorough, and that the plaintiffs failed to show how considering additional alternatives would have fostered more informed decision making.

Water Quality Management for Forest Lands in California: BMPs

In 2012, USFS issued a National BMPs (BMP) for Water Quality Management Handbook, revising and incorporating the BMPs from the 2000 document "Water Quality Management Plan for Forest Lands in California: Best Management Practices". The documents establish uniform BMPs for protection of USFS lands in California from non-point source contaminants.

The "Waiver of Waste Discharge Requirements for Nonpoint Source Discharges Related to Certain Federal Land Management Activities on National Forest System Lands in the North Coast Region", Order No. R1-2015-0021 (2015 Federal Waiver), applied to discharges associated with nonpoint source activities on federal lands having the potential to discharge waste that may affect water quality. The RWQCB is currently developing a new permit to modify several procedural and regulatory aspects of the existing waiver and its monitoring and reporting requirements. The new permit will also improve its application to federal lands managed by the BLM and NPS. In August 2020, the RWQCB adopted a short-term renewal of the 2015 Federal Waiver so the RWQCB can continue developing their new Federal Lands Permit.

Mokelumne Wilderness

The Mokelumne Wilderness is a 105,165-acre protected area between Highways 4 and 88 that straddles the crest of the Sierra Nevada range, draining to the North Fork Mokelumne and Carson River watersheds. Approximately 20 percent of EBMUD's Upper Mokelumne River Watershed area is within the Mokelumne Wilderness. Designated in 1964, the Mokelumne Wilderness is managed by the NFs. Travel is restricted to horseback or foot only, with all mechanical transportation prohibited (wheelchairs excepted). Permits are mandatory for entry. See Appendix 6-1 for an NF and wilderness location map.

BLM Watershed Management

The BLM Folsom Field Office (now the Mother Lode Office) adopted the Sierra Resource Management Plan (RMP) in 2008, replacing the 1980 BLM Management Framework Plan. The Sierra RMP summarizes specific management actions, mitigations, and project design features for managing resources and uses of BLM lands, with breakdowns including water resources, livestock grazing, energy and minerals, recreation, and abandoned mines. The RMP requires that BMPs be developed as needed in accordance with BLM guidance and policy.

The RMP details a ban on OHV travel, except on approved roads (similar to the current NF approach). The RMP has Motorized Vehicle Route Designations maps to show paved and unpaved roads approved for motorized vehicles. RMP maps also show the sections of

the Mokelumne River recommended for inclusion as a Wild and Scenic River. See Appendix 6-2 for RMP maps showing the Motor Vehicle Route Destinations and the Recommended Wild and Scenic River, Main and North Fork Mokelumne.

In 2020, EBMUD submitted a request for proposal for general environmental services to cover a broad scope of possible projects on an “as-needed” basis. The potential projects may be defined in three broad categories: emergency response, investigation and/or remediation, and technical consulting and report/plan preparation. The base contract will be for 3 years, with the option to extend the contract to 2 additional years. The contractor shall be capable of supporting environmental programs including, but not limited to, the following:

- Point source wastewater discharges;
- Potable water discharges;
- Hazardous air pollutants;
- Hazardous materials and hazardous waste management (including fuel tanks);
- Due diligence compliance and audits;
- Storm water management; and
- Soil and groundwater management.

Natural Resources Conservation Service (NRCS)

NRCS was originally established by Congress in 1935 as the Soil Conservation Service (SCS). NRCS has expanded to become a conservation leader for all natural resources, ensuring private lands are conserved and restored. NRCS works with landowners through conservation planning and assistance designed to benefit the soil, water, air, plants, and animals that result in productive lands and healthy ecosystems. NRCS partners with local communities and conservation districts and provides funding for local watershed projects. In December 2018, the Farm Bill was enacted to support conservation efforts of America’s farmers and ranchers through reauthorization and expanded flexibility of NRCS conservation programs.

California Department of Fish and Wildlife (CDFW)

CDFW is responsible for conserving, protecting, and managing California’s fish, wildlife, and native plant resources. In addition to other responsibilities, CDFW issues Lake or Streambed Alteration Agreements and suction dredging permits. There has been a moratorium on these suction dredging permits since 2009. For additional information, see the later subsection under Mining.

Any proposed activity that may substantially modify a river, stream, or lake requires a Lake or Streambed Alteration Agreement, which will include reasonable conditions necessary to protect fish and wildlife resources. Diversions, obstructions or changes in the natural flow or the streambed, channel or bank of a river are a few examples. In addition, using materials from a streambed or lake bottom, or disposing of debris or waste materials where they can pass into any river, stream, or lake, are also activities regulated by CDFW, and may require a permit prior to the start of such activities.

PG&E Land Conservation Commitment Stewardship Council

The Pacific Forest and Watershed Lands Stewardship Council (Stewardship Council) is a nonprofit organization founded in 2004 as part of a bankruptcy settlement, requiring PG&E to protect approximately 140,000 acres of PG&E watershed lands in 22 counties. The land will either be protected with perpetual conservation easements or shall be made available for donation to public entities and/or non-profit organizations, if not necessary for current or future hydro-project operations.

The Stewardship Council's main task was to develop the Land Conservation Plan (LCP) as a series of three volumes to manage the donated lands, to preserve and enhance recreation, sustainable forestry, open space, protection of habitat, agricultural uses, and protection of cultural resources:

- **LCP Volume I, Land Conservation Framework (2007):** Overall framework (legal requirements, planning process, methodologies, public involvement, and relevant regulatory processes).
- **LCP Volume II, Planning Unit Concepts (2007):** Documents existing conditions and presents management objectives, potential measures, and conceptual plans
- **LCP Volume III, Final Disposition Packages (2009-2016):** A series of real estate transaction packages that will detail the specific land conservation and/or disposition requirements for each parcel or parcel cluster.

As of April 2015, the Stewardship Council's Board has approved the final Land Conservation and Conveyance Plans (LCCPs) for the three planning units that lie within the Upper Mokelumne River Watershed (see Appendix 6-3 for detailed disposition package maps, 2,424 acres total).

- **North Fork Mokelumne River Planning Unit, November 2014:** 1,115 acres will be donated to CAL FIRE and Mother Lode Land Trust (MLLT) will hold the conservation covenant for all 1,115 acres. The land is in Amador County along Tiger and Panther Creeks and surrounding the Tiger Creek Regulator Reservoir, near the North Fork and Main Stem of the Mokelumne River. In the future, the new landowner or conservation easement holder may restrict OHV use from Tiger Creek, enhance existing day use facilities at Electra, add a permanent restroom at the Tiger Creek put-in, improve fishing access at Tiger Creek Reservoir and/or reduce timber harvest.
- **Lower Bear Area Planning Unit, September 2014:** Ownership of all 899 acres will be retained by PG&E. MLLT will hold a conservation easement for the 899 acres. The land is in Amador County surrounding Upper and Lower Bear River Reservoirs. In the future, the new conservation easement holder may close unauthorized OHV area
- **Blue Lakes Planning Unit, April 2015:** 410 acres will be donated to the USFS. Sierra Nevada Conservancy (SNC) will hold the conservation covenant for the 410 acres owned by the USFS. In the future, the new landowner or conservation easement holder may protect Twin Lake shoreline from vehicle access, restrict recreation use by Deer Creek, add a day use area at Upper Blue Lake and/or

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formalize or close OHV trails. The remaining 1,447 acres within the planning unit will be retained by PG&E (after the requesting agencies withdrew due to a requirement pertaining to the Federal Powers Act).

A grant program has been developed to fund physical enhancements on these lands in the future. The potential physical enhancements identified earlier in the process may be implemented in the future by the new landowner.

In September 2016, the Stewardship Council approved the proposed conservation easement funding agreement to allow the holder of the conservation easement to be reimbursed for costs, and all fee title transactions and conservation easement recordings should be complete.

Upper Mokelumne River Watershed Authority (UMRWA)

UMRWA is a joint powers agency established in 2000 for the purpose of preserving and enhancing Mokelumne River water supply, water quality, and environment. The member agencies are Alpine County, Alpine County Water Agency, Amador County, AWA, Calaveras County, CCWD, CPUD, JVID and EBMUD. UMRWA addresses four areas of interest: watershed management, water resource projects, integrated regional planning, and water conservation. Funding for UMRWA programs comes from stakeholders, members and grants.

Ongoing since 2005, local teachers, the Central Sierra Resource Conservation and Development District (CSRC&D) Council, and the UMRWA began a watershed education program for local schools. The Stewardship through Education Program is a watershed educational program which is run by teachers and funded by local water agencies and EBMUD. Trained and certified docents are given permission to run tours on EBMUD watershed property.

UMRWA Project (UMRWAP)

UMRWAP was a three-year effort costing nearly \$1.3 million, completed in 2007. UMRWAP advanced a broader understanding of watershed water quality issues and developed a method and tools for the long-term evaluation of Upper Mokelumne River water quality.

The UMRWAP report is detailed in the MRWSS 2010 update and briefly summarized below:

- **Land Use:** Created a land cover and land use GIS database and map
- **Monitoring:** Created and implemented a monitoring program. Created a master database with existing monitoring data.
- **Baseline Water Quality:** 51 parameters within the four major river segments. Benchmarks were established. Identified trends as well as benchmark exceedances.
- **Modeling: WARMF:** The Watershed Analysis and Risk Management Framework (WARMF) model was calibrated. Simulated water quality in unmonitored areas. EBMUD is the WARMF Steward and so maintains the WARMF model.

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- **Fire Behavior:** Simulated potential wildland fires using the modeling tools FARSITE and FlamMap. WARMF then analyzed potential water quality impacts.
- **Water Quality Vulnerability Zones:** Identified vulnerability zones more susceptible to transport contaminants to surface waters.
- **Draft Septic System Management Program (UMRWP Appendix K):** A draft Septic System Management Plan (SSMP) was developed for implementation by the Alpine, Amador and Calaveras Counties. SSMP includes community outreach, recommended septic survey, and possible septic management practices, first targeting the areas where the suspected problematic septic systems are located.
- **Key Findings:** River water quality is very good and concentrations of only a few parameters exceed benchmarks. Elevated concentrations of fecal coliform, *E. coli*, and *Cryptosporidium* were observed in Middle and South Forks and Main Stem. Septic systems are believed to be the primary source of microbial contamination. Reducing frequent small, high intensity fires would likely improve water quality. Areas near waterbodies with very steep slopes are most susceptible to transporting contaminants.

Key Recommendations/Tools

Key watershed management recommendations and tools to address existing and potential water quality concerns included:

- **Land Use Management:** General Plan updates should encourage compact development.
- **Monitoring:** Implement water quality and temperature monitoring in river segments identified as having elevated parameters of interest, particularly pathogens.
- **Septic Management:** Develop and implement a septic management program. Expand sewer collection systems where feasible.
- **Fire Management:** Manage the fuels through measures such as prescribed burns, harvesting of biomass fuels, etc.
- **Stormwater Management:** Implement “green street” design principals to support increased infiltration of stormwater and decreased runoff and erosion. Standards needed for roadside pesticide use.
- **Trash Management:** Provide toilets and trash receptacles at informal recreation sites.
- **Public Outreach:** Highest priority is informing residents about septic system management practices.

Integrated Regional Water Management Plan (IRWMP)

IRWMPs are required for regional management of water resources in at least four main areas: water supply, groundwater management, ecosystem restoration, and water quality. The IRWMP is a non-binding planning document that offers multiple potential solutions to local and regional water management issues, coordinating water resources, planning and implementation activities. IRWMPs have been funded by Proposition 50, the Water Security, Clean Drinking Water, Coastal and Beach Protection Act, 2002, Proposition 84 (2006), and Proposition 1E.

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The Mokelumne/Amador/Calaveras (MAC) IRWM region was formed in 2006 and the MAC IRWMP (MAC Plan) was issued in November 2006. MOU signatories included AWA CCWD, EBMUD, Amador County, Amador Regional Sanitation Authority, and the cities of Jackson, Plymouth and Sutter Creek. Over 12 public stakeholder workshops were held between 2005 and 2007.

Substantial funds are designated to implement MAC Plan projects. In 2009 UMRWA assumed lead agency responsibilities for the 2013 MAC Plan update. The 2013 MAC Plan update consists of three volumes:

- Vol. 1: Plan update with MAC region description, issues, governance, objectives, project review process, coordination, and plan administration
- Vol. 2: Appendix with proposed project information forms (for the purposes of applying for IRWMP project funding)
- Vol. 3: Appendix with comments and responses

In 2014, the Water Quality, Supply, and Infrastructure Improvements Act authorized a Disadvantaged Community (DAC) and Tribal Involvement Program, which allocated \$1.3 million to the Mountain Counties Funding Area for the purpose of ensuring involvement of disadvantaged communities, economically distressed areas, or underrepresented communities in IRWM planning efforts. DWR manages the implementation of this effort. The primary objectives of the DAC Involvement Program are as follows:

- Work collaboratively to involve DACs, community-based organizations, and stakeholders in IRWM planning efforts to ensure balanced access and opportunity for participation in the IRWM planning process.
- Increase understanding and identify the water management needs of DACs
- Develop strategies and long-term solutions that address the identified DAC water management needs.

In 2016, the Department of Water Resources updated the standards for IRWMPs. To meet these new requirements and maintain funding eligibility, the Department of Water Resources prepared the 2018 MAC Plan update, which was adopted in January 2019.

Wild and Scenic River Designation

As part of SB 854, thirty-seven miles of the North Fork and main stem of the Mokelumne River became a California Wild and Scenic River on June 27, 2018. A Wild and Scenic River is protected from new dams and diversions that may harm the waterway's free-flowing character and natural condition for the benefit and enjoyment of the people of the state. This designation does not affect District's existing water rights or the District's ability to operate, maintain, or replace existing facilities, so as long as it is within the capacity of existing water rights.

Rivers classified as wild are withdrawn from the mining and mineral leasing laws, meaning that no new leases can be granted. On all Wild and Scenic Rivers, existing mining and mineral claims and leases would be allowed to continue, subject to regulations

that protect water quality (minimize surface disturbance, water sedimentation, pollution and visual impairment).

Sierra Nevada Conservancy

The Sierra Nevada Conservancy (SNC) is a state agency created by bi-partisan legislation and signed into law by Governor Schwarzenegger in 2004. The SNC was created with the understanding that the environmental, economic, and social wellbeing of the Sierra Nevada and its communities are closely linked and that the Region would benefit from an organization providing a strategic direction. California's principal watershed lies within this region (covers 22 counties), supplying 65 percent of the developed water supply across the state. The SNC program has seven objectives, with two objectives being to protect and improve water and air quality and to reduce the risk of natural disasters, such as wildfire.

Funding for the implementation of the SNC's programs is primarily provided by bond funds (Proposition 1, 2014 and Proposition 84, 2006). The SNC was involved in grant distribution and is currently accepting Proposition 1 grant applications. SNC Prop 84 funds have supported various activities within the Mokelumne Watershed.

Local Agency Formation Commission (LAFCo)

Local Agency Formation Commission (LAFCo) is a public agency with county-wide jurisdiction established in 1963 and modified by the California Cortese-Knox-Hertzberg Local Government Reorganization Act of 2000. The objectives of each LAFCo are to encourage the orderly formation of local governmental agencies, to preserve agricultural land resources, and to discourage urban sprawl. Among other duties are:

- Municipal Service Reviews (MSR) were added to LAFCo's mandate in 2005. MSRs are a comprehensive study to better inform LAFCo, local agencies, and the community about the provision of municipal services. The MSR evaluates operations, finances, management, board oversight and future planning. The MSR is a prerequisite to a sphere of influence determination (SOI) and may also lead a LAFCo to take other actions under its authority.
- Initiation of Special District Consolidations: As of July 1, 1994, LAFCos have the authority to initiate proposals that include the dissolution or consolidation of special districts, or the merging of an existing subsidiary district. Prior to initiating such an action, LAFCo must determine that EBMUD's customers would benefit from the proposal through adoption of an SOI or other special study.

Upper Mokelumne River Watershed Council

The Upper Mokelumne River Watershed Council (Council) is located in Jackson and is coordinated by EBMUD. The Council supports landowners, local governments, and stakeholders with water quality monitoring, watershed planning, resource conservation, watershed assessment/restoration, and public outreach and education on the Upper Mokelumne River, Dry Creek, and Upper Calaveras River watersheds. The Council works to restore and maintain the Upper Mokelumne River Watershed in a manner that ensures

sustainable environmental, economic, educational, cultural, recreational, and water quality benefits.

Central Sierra Resource Conservation & Development

The Central Sierra Resource Conservation & Development (CSRC&D) Council was originally formed by the USDA in 1997 and reorganized as a nonprofit in 2003. The CSRC&D Council helps people in rural areas plan and carry out activities that increase the conservation of natural resources, support economic development, enhance the environment and standard of living in local communities. CSRC&D area councils are locally organized, sponsored, and led. USDA provides technical and financial assistance, and sponsors obtain additional funding and services from a variety of other sources.

The following projects were highlighted in the CSRC&D Council 2012 Annual Report:

- Stewardship Through Education programs in Amador and Calaveras Counties, using a publication called Circles and Cycles, which describes Mokelumne Watershed
- Water quality monitoring program

During the MRWSS 2020 update period, the CSRC&D Council focused on the following new programs:

- Firesafe and Fuels Reduction Program – initiated in February 2019 and runs through December 2021. This program focuses on the Eastern Fresno County and enlists private landowners within the Sierra National Forest to develop fire-defensive areas on their properties and the Wildlands Urban Interface identified through the Fresno County Tree Mortality Task Force.
- Creek Fire Recovery Program – The Firesafe and Fuel's Reduction Team worked with local landowners to prevent wildfire and recover from the single largest wildfire in California History.

Mokelumne Coast to Crest Trail (MCCT)

MCCT is a scenic non-motorized, multi-user trail corridor that will extend from the Pacific Ocean near San Francisco Bay to the crest of the Sierra Nevada Mountains, just south of Lake Tahoe. Development of the MCCT is being coordinated by the MCCT Council, a coalition of volunteers and public and private agencies, including EBMUD. In the Mokelumne watershed area, the trail will pass up the North Fork of the Mokelumne River. The 300-mile proposed trail will cross public lands under diverse jurisdictions, including various state and federal agencies, public utility and railroad corridors, local and regional parks, as well as some parcels of private property. Trail construction will utilize BMPs embraced by each agency, following industry standards. Bare slopes will be seeded and mulched.

The approximately 32 miles of MCCT route on EBMUD watershed property is now complete. The MCCT trail has been developed on EBMUD property by staff and the Mokelumne Trailbusters, a volunteer organization managed by EBMUD. The most

recently completed trail section is a three-mile loop trail extending from Middle Bar up towards Highway 49.

EBMUD Watershed Management

For the MRWSS 2020 update, EBMUD's management practices were documented for access control, fire and fuels management, erosion control, pest management, grazing, inspection, surveillance, control, and emergency response. EBMUD manages watershed lands it owns surrounding Pardee and Camanche Reservoirs. The Watershed and Recreation Rules and Regulations, last updated in 2018, outline the specific rules pertaining to access, boating, camping, commercial uses, dangerous activities, sanitation, trails, vehicles, bicycles, and hunting.

Mokelumne Watershed Master Plan

EBMUD's Mokelumne Watershed Master Plan (MWMP) was completed in 2008, providing long-term policy and guidance for future use and management of the lands and water owned by EBMUD within the hydrologic watersheds of Pardee and Camanche Reservoirs. The MWMP outlines the land use, land use goals, strategies to achieve those goals, and the objectives associated with those strategies in five areas: natural resources, community use, assets, communications, and financial management. Several of the MWMP strategies include the development of detailed management plans. All except the ecological integrity/natural resources management plan have been completed.

The following detailed management plans responding to MWMP strategies were completed previously and detailed in the MRWSS 2010 update period:

- **Recreation Management Plan, January 2010.** Identifies specific measures to provide a quality recreational experience while protecting water quality and the environment.
- **Infrastructure Management Plan, January 2010.** An infrastructure asset management system to "Prevent asset failure due to deferred or otherwise inadequate maintenance."
- **Financial Management Plan, January 2010.** An accounting framework to track revenues and expenditures based on watershed management programs.
- **Mobile Home Park Management Plan, January 2010.** Specific management practices to ensure that construction, repair, and maintenance activities by mobile homeowners meet legal and EBMUD standards and align with EBMUD goals.

The following three detailed management plans responding to MWMP strategies were completed during the MRWSS 2015 update period:

- Fire Management Plan (FMP), December 2011
- Water Quality Monitoring Program (2006-2012)
- Rangeland Management Plan, March 2013

FMP, December 2011

The purpose of the FMP is to establish an updated and formalized program for minimizing the risk to life, property and water quality from wildfires in the EBMUD-owned portion of the Mokelumne watershed. The FMP outlines fire risks and hazards, along with strategies for risk reduction and fire response (suppression and restoration). Objectives include:

- Establish fire management units (FMUs): firebreaks, road access, and predicted containment areas for wildfires on each FMU on watershed property and threat areas outside EBMUD property boundaries.
- Continue grazing to reduce fuels and fire risk per the Rangeland Management Plan.
- New or enhanced access routes for fire suppression (topography, risk of ignition)
- Document BMPs for fire prevention, hazard reduction, and fire suppression, referencing related plans and programs such as rangeland management and ecological integrity.
- Document the current fire rating system (weather/fuel moisture conditions, watershed use restriction criteria, etc.)
- Outline restoration activities to be implemented after a fire based on the characteristics of the burned area, such as size, intensity of burning, vegetation, slope, etc.
- Incorporate prescribed burns, firewood/fuel removal, and habitat creation
- Estimate potential impacts to water quality from fire and provide for post-fire monitoring as part of the water quality program.
- Public education program in coordination with other fire agencies for recreation visitors, and others conducting work or otherwise present in the watershed.
- Continue participation in local fire-safe councils (fire response, information exchange).
- Serve as a reference document for existing annual FRPs and the fire atlas.

Water Quality Monitoring Program (2006-2012)

In 2006, a stormwater runoff monitoring plan was developed and implemented for the Pardee watershed to evaluate the effectiveness of grazing BMPs intended to minimize the risk of *Cryptosporidium*. The BMPs included the removal of livestock during the wet-weather season (“dry grazing”) and exclusion of cattle less than four months of age from direct contact with streams and creeks. These BMPs were incorporated into the 2013 Rangeland Management Plan.

Rangeland Management Plan, March 2013

The Rangeland Management Plan addresses grazing and range management issues to identify and implement management practices that meet the rangeland management goals for healthy and productive watersheds:

- Employ sustainable rangeland management practices
- Reduce fire hazard and potential fire hazard severity by reducing grassland fuels,
- Maintain existing undeveloped open space by limiting development within the Mokelumne hydrologic watershed boundaries
- Consider cost effectiveness for ranchers

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- Minimize noxious invasive species and promote native plant species

The Rangeland Management Plan objectives include:

- Permit grazing by domestic livestock for fuel reduction, protect against erosion
- BMPs for protection of water quality and ecological integrity.
- Infrastructure requirements by pasture (provide for construction and maintenance)
- Sustainable grazing practices (multiple pastures, rotation, seasonal/managed grazing)
- Maintain or improve the health of the rangeland resources with indicators/metrics
- Expand GIS system with key of grazed lands attributes for tracking over time.
- Recognize the relationship between grazing and maintenance of open space.
- Certified Rangeland Manager (licensed): create leases, plans for EBMUD lands.
- Form a grazing focus group

The Rangeland Management Plan grazing program components include:

- Standard grazing lease and tenant selection procedures
- Annual Grazing Plans (AGP) for each lease, outlining BMPs and monitoring requirements (water quality protection, residual dry matter goals, and invasive species control)
- Rangeland Health Assessment and Monitoring Program: Includes current conditions assessment, range health checklist, spring and fall surveys, and specifics for vulnerable and degraded areas, sensitive habitats and water quality concerns
- Periodic review cycle with adaptive management

Safe Harbor Agreements

Safe Harbor Agreements (SHA) are overseen by USFWS. Landowners can sign up to restore or enhance habitat on their property which contribute to the recovery of threatened and endangered species. See the MRWSS 2010 for additional details. In summary, in 2007, EBMUD signed the Lower Mokelumne Watershed SHA, California's first multi-landowner SHA, providing elderberry bushes (sole food of the federally-threatened Valley elderberry longhorn beetle). In 2009, EBMUD signed an historic 28,000-acre SHA to protect and enhance three listed species in the Mokelumne watershed around Pardee and Camanche Reservoirs. This 30-year SHA will cover three federally-protected species: Valley elderberry longhorn beetle, California red-legged frog, and the California tiger salamander.

Since the agreement was signed, EBMUD built and rehabilitated eight shallow water habitats (ponds). In February 2019, staff identified six known populations of tiger salamanders, where before the agreement there was only one.

Access Control - EBMUD

All Camanche and Upper Mokelumne River watershed lands owned by EBMUD are fenced and posted, with human access strictly controlled. The shorelines of Pardee Reservoir and the Mokelumne River where it passes through EBMUD land are also fenced to exclude cattle. Cattle are not excluded from the riparian areas of some

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subordinate tributaries but grazing is restricted at critical times of the year to minimize impact. Most public roads within EBMUD watershed lands are fenced along the entire passage through EBMUD lands except in the Recreation Areas.

Trail Permits

EBMUD requires users to acquire a permit before accessing EBMUD trails. EBMUD Trail Use Rules and Conditions outline that the users shall, when on EBMUD property, stay on designated trails and close gates after passing through. Furthermore, the Rules require that permit holders use designated restroom facilities (toilets shown on trail map). Users shall not use conveyances with wheels, tracks, or skids on unpaved roads or trails.

Signs

Signs along the trails and at trailheads notify hikers that EBMUD permits are required, request that users protect the watershed, and summarize key water quality rules (such as: stay on designated trails, no dogs or wheeled vehicles, no camping or fires). See Appendix 6-4 for examples of sign postings.

Equestrian Access and Camping

Horses are allowed on most EBMUD trails and fire roads and in the equestrian campground, but they are excluded from the rest of the recreation areas. Based on sign-ins at trail registers, about 80 to 85 percent of the Mokelumne area trail users are equestrians. EBMUD Trail Use Rules and Conditions outline that the users shall:

- Stay on designated trails, closing gates after passing through
- Remove and dispose of all animal waste products (from user's animals) from staging area
- Not allow any saddle or pack animal to stand unattended/untethered or swim/wade in any reservoir or stream

The Turkey Hill Equestrian/Group Campground is located on 16 acres near CASS, adjacent to the MCCT. The campground encourages equestrian camping in a location reasonably distanced from streams, rivers and reservoirs. Operated by concessionaire, the seven sites can accommodate 32 horses and 128 people. Sites include a paddock for each horse a horse wash station, and bins for horse waste. Permit rules require that horse waste be cleaned up and disposed of in waste bins.

MW&RD Fire Response Plan (FRP)

EBMUD's Mokelumne Watershed FRP is updated annually by the MW&RD Resource Patrol Unit; it documents current EBMUD fire prevention measures, suppression resources, and response procedures in order to safely facilitate timely and effective response to fires in its area of concern. It is intended both as a guide to Division staff and as a communication tool with other Divisions/Departments within EBMUD as well as with outside agencies.

Some FRP details include:

- The FRP sets guidelines for EBMUD, concessionaire, and contract personnel when operating equipment in dry fuels with a high probability of ignition.

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MW&RD staff follow the Mowing/Weed Abatement Procedure (Appendix K). Concessionaires follow their respective Fire Prevention Plans (Appendixes L, M, and N).

- **Fire Training Guidelines (Appendix A):** EBMUD firefighters must complete initial firefighting and wildland firefighting training, along with annual refresher training. Multiple vehicles are equipped with fire suppression equipment and necessary radios to conduct effective communication with all responding agencies.
- **Environmentally Sensitive Areas (Appendix Q):** The FRP contains a map of Environmentally Sensitive Areas which shows the 100-foot No Fire Retardant Buffer Zone around Pardee Reservoir. Fire suppression chemicals are typically only used at substantial distances (greater than 100 feet) from EBMUD's reservoirs and tributaries with standing water. CAL FIRE operating procedures restrict the use of chemicals within 300 feet of "anadromous" waterbodies with the exception of the protection of life and property.
- **Red Flag Protocol.** The Red Flag Protocol procedure outlines the notifications and operational steps that will take place in the event a Fire Weather Watch or Red Flag Warning is issued by the National Weather Service for EBMUD property in the Mokelumne Area. Prudent measures are taken to reduce fire hazards on EBMUD property and to maintain firefighting capability, equipment and patrols. Mokelumne area employees, concessionaire employees, and recreational visitors are notified. Operational changes include extra ranger patrols, increased water storage at recreation areas, and prohibiting activities that create sparks (outdoor cutting, welding or mowing).
- **Disking.** Disking is accomplished annually in the late spring to provide fuel breaks, especially at the property boundary bordered by residential developments and other urban interfaces. Recreation Area road edges most susceptible to fire starts are also disked. During the MRWSS 2020 update period, the trend to replace diskings with mowing has continued, in order to minimize erosion where slopes are steep or the fire threat is low.
- **Mowing.** Interior fire access roads and public hiking/equestrian trails are mowed annually in order to reduce the threat of accidental fire starts while minimizing impacts from erosion that would be facilitated by grading the soil to bare ground.
- **Concessionaires.** Concessionaires for EBMUD operating within about 2,500 acres of developed Recreation Areas also have an active program of mowing and line trimming.

Woody Fuels Management Program

Permits are issued by EBMUD to remove down and dead wood from areas where it could constitute a fire hazard. Open to the public and EBMUD employees, there is a two-cord limit per person.

Brush Removal

EBMUD works effectively with CAL FIRE and the California Youth Authority (CYA) and the California Department of Corrections (CDC) to remove or reduce heavy stands of brush near adjacent residential properties and at locations strategic to the spread of catastrophic wildfires. This is accomplished by manual removal using hand tools wielded

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by state wards from the local conservation camps at Pine Grove and Vallecito under the direct supervision of CAL FIRE. Brush removal is conducted using techniques established to minimize soil erosion and is directed by EBMUD staff.

Prescribed Burning

MW&RD Rangers conduct vegetation management burns for multiple purposes on the watershed on an annual basis. These purposes include integrated pest management for noxious weed control, fire suppression training and vegetation conversion from brush to grasses and other herbaceous plants.

In addition to fuel reduction and control of noxious weeds, the benefits of these burns include improved range conditions, improved wildlife habitat, increased water production, and conditions favoring biodiversity. The amount of annual acreage burned is variable from year to year.

MW&RD 2007 Fire Atlas

The MW&RD 2007 Fire Atlas (Fire Atlas) was created to facilitate emergency response to incidents on or threatening EBMUD lands. The Fire Atlas has been distributed within EBMUD and to various agencies, including CAL FIRE. The Fire Atlas consolidates very detailed fire response information and will significantly improve emergency fire response by EBMUD and other agencies.

The Fire Atlas is made up of detailed aerial photos and maps, plus a series of specialty maps, as follows:

- **Aerial Photos and Maps by Grid:** For each grid location there is an aerial photo (showing property lines and roads) and a detailed map. Each detailed map is annotated to show roads (paved, gravel, unimproved), trails, water sources (listing supply rate gpm), bridges (with weight restrictions), evacuation areas, EBMUD property lines and defined Fire Response Zones (the zone immediately outside EBMUD property).
- **Aerial Photos and Maps by Recreation Areas:** For each EBMUD Recreation Area there is an aerial photo and a detailed map. Shows similar information those by grid, but are centered on the recreation areas and shown at a smaller scale.
- **Specialty Maps:** Include Fire Response Zone overview, environmentally sensitive areas, helicopter landing zones, Fire Districts, EBMUD water sources, fire weather zones and an index.

Grazing - EBMUD

Livestock grazing on 12,900 acres of EBMUD-owned watershed is utilized for fuels management and accounts for the removal of an estimated 26,000 to 50,000 tons of grasses and other one hour fuels in the grazing leases. The amount varies depending on the annual rainfall and corresponding forage production. The lease agreements stipulate that residual dry matter (RDM) is to be left on the ground in order to minimize erosion and enhance both the quality and quantity of forage produced. The RDM requirement varies by slope according to the Table 6-3. *Cryptosporidium* and nitrates are water quality parameters of interests that may be connected to grazing activities.

Table 6-3: Residual Dry Matter Minimum Requirements by Slope^a

Woody Cover (percent)	RDM standard for percent slope (lb/acre)			
	01-10 percent	10-20 percent	20-40 percent	>40 percent
0-25	500	600	700	800
25-50	400	500	600	700
50-75	200	300	400	500
75-100	100	200	250	300

a) Table excerpted from University of California, Division of Agriculture and Natural Resources, Rangeland Monitoring Series Publication 8092, <https://anrcatalog.ucanr.edu/pdf/8092.pdf>.

In 2013, the Mokelumne Watershed Rangeland Management Plan (Rangeland Management Plan) was released as part of the MWMP. A detailed description of the 2013 Rangeland Management Plan is provided with the MWMP discussion earlier in this section. The Rangeland Management Plan documents the grazing BMPs that were implemented in the current EBMUD grazing plans, including:

- **Seasonal Grazing Lease Periods:** Beginning in 2006, several annual grazing leases were modified to allow seasonal grazing only (grazing seven months or nine months per year, during dryer months), as shown in Table 5-8. The lease periods were selected based on site considerations, such as proximity to reservoir outlet towers, steep terrain, fence conditions or soil conditions.
- **Detailed Grazing Program Components** including:
 - Standard grazing lease and tenant selection procedures
 - AGP for each lease, outlining BMPs and monitoring requirements (water quality protection, RDM goals, and invasive species control).
 - Rangeland Health Assessment and Monitoring Program: Includes current conditions assessment, range health checklist, spring and fall surveys, and specifics for vulnerable and degraded areas, sensitive habitats, and water quality concerns
 - Periodic review cycle with adaptive management

Erosion Control - EBMUD

BMPs for erosion control are being developed/adopted for use on EBMUD-owned watersheds. Current BMPs on the watersheds include, but are not limited to, the use of the following measures to protect construction sites and areas of disturbed soil from erosion during the wet weather season:

- Placement of silt fences, wattles, and erosion control facines on project perimeters (facines are bundles of dormant branches that will root, grow, and provide quick plant cover)
- Tarping of spoils piles
- Use of silt dams for work in the riparian/aquatic environment
- Use of erosion control tarps and blankets, jute netting, straw, seeding and hydromulching on disturbed soil
- Placement of straw bales, check dams and sediment traps in runoff channels
- Monitoring of construction sites and streams during storms for evidence of erosion
- Strategic placement of stockpiles of erosion control materials for emergency use

Several environmental restoration and erosion control improvement projects were implemented 2005-2009 and are detailed in the MRWSS 2010 update, including the Camanche Reservoir China Gulch Erosion Control Project (2009), the Camanche Shoreline Stabilization Project (2006) adjacent to the South Shore Campground, and the Natural Asbestos Stabilization on an unpaved fire road/trail where the soil has naturally-occurring asbestos (road is also used as part of the MCCT near Pardee Reservoir).

Pardee Shoreline Stabilization Project

Erosion is threatening to undermine the perimeter access roads around the edge of Pardee Reservoir. The erosion is caused by water levels rising and falling (changes by approximately 18 feet seasonally), and by wind caused waves. Approximately \$2 million may be needed in the future to fully stabilize the access roads, especially during late winter/early spring high water periods. Substantial earthwork will be needed.

Pest Management - EBMUD

As discussed in Section 5, the MW&RD has an IPM program to address pest issues in its area of responsibility. The Mokelumne Division has implemented a BMP with regard to herbicide application and use. Several points from this document are listed below:

- Herbicides shall not be used within 1,000 feet of reservoirs or tributary creeks, except for spot treatment of pest plant species only. Application within this 1,000-foot zone must be approved prior by the IPM Committee.
- When herbicide application has been approved by IPM Committee within the 1,000-foot zone, the following restrictions apply:
 - There shall be a minimum three-foot wide zone maintained from flowing watercourses, standing water, or aquatic habitat where spot spray application shall be prohibited. Direct target plant contact application may occur in accordance with herbicide label.
- Outside the three-foot zone, spot spray application is allowed, provided drift does not occur. Wind speeds shall essentially be near zero.
- Mixing herbicides shall not occur adjacent to a storm drain inlet, culvert, watercourse, or filter bed. Mix in an area where spillage, if it occurs, can be easily contained.
- All herbicide applicators shall have attended an annual pesticide safety course.
- The least toxic herbicide that will adequately achieve IPM goals shall be used.

Quagga/Zebra Mussel Prevention Program

In 2011, EBMUD released the Invasive Aquatic Species Response Plan (revised final draft). This plan provides a response framework should an infestation of non-native invasive aquatic species be discovered in EBMUD reservoirs or water system infrastructure. Although intended primarily to address a Quagga or Zebra Mussel infestation, it can apply to other potentially invasive organisms. Recent California legislation, AB 2065, has added requirements to the California Fish and Game Code requiring programs to prevent the introduction of nonnative dreissenid mussel species like quagga and zebra mussels.

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EBMUD has a Quagga/Zebra Mussel Prevention Program to protect its reservoirs, including Pardee and Camanche Reservoirs. This prevention program includes a Vessel Inspection Program and a Vessel Inspection Seal Program. The Vessel Inspection Program requires every vessel to pass both a vessel history survey and a physical vessel inspection before it can be legally launched in EBMUD reservoirs. The Vessel Inspection Seal Program allows the boat operator to elect to have a vessel inspection seal placed on their vessel so that they can re-enter EBMUD reservoirs without having an additional physical inspection (a new vessel history survey is still required with each launch).

Vessel History Survey

Boat operators complete the EBMUD Recreation Area Private Boat Launch Inspection Form with information on the vessel operator and where the vessel was operated in the past 30 days. County of origin is determined by vessel registration documents. A vessel will fail the vessel history survey and will not be allowed to launch in EBMUD reservoirs if it is originally from a high-risk area or if it has been launched on waters in a high risk area in the past 30 days. Currently, all Southern California counties and all locations outside of California are defined as high risk (there has been positive identification of one of the mussel species). Some reservoirs have a vessel cleaning and a 30-day quarantine program as an alternative to the vessel history requirements.

Physical Vessel Inspection

Performed by qualified EBMUD staff, vessels will fail the physical vessel inspection and not be allowed to launch if standing water is found on the vessel (including live bait containers), if water drains out of an engine when it is lowered into the vertical position, or if mussels or other aquatic invasive species are found attached to some portion of the vessel. CDFW will be notified if Quagga or Zebra Mussels are suspected.

In addition, EBMUD is also asking all boaters to follow the CDFW guidelines for mussel prevention, checking their boat, trailer and vehicle every time a boat is taken out of the water. All exposed surfaces should be checked and all water should be drained, wait five days, and keep watercraft dry between launches into different fresh waters.

In 2020, Quagga and Zebra Mussels monitoring was done at Pardee and Camanche Reservoirs. No veligers or adult dreissenid mussels were detected. Every year, the District on quagga and zebra mussel monitoring for CDWF. The latest report was submitted to CDWF in March 2021.

CASS Ground Squirrels

Ground squirrels around CASS trees have been trapped and exterminated with CO₂ gas. Poisons are not used around the reservoir.

Canadian Goose Management Program

The Canadian Goose Management Program has reduced the goose population at Camanche Reservoir using legal hunt methods, along with a permitted nest and egg reduction effort. This program addresses water quality concerns at Camanche Reservoir beaches. Water testing has shown high levels of *E. coli* bacteria in some of the swimming

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coves at Camanche, likely caused by an unnaturally high goose population. The grass around the campgrounds and beaches is mowed in order to reduce the threat of accidental fire starts, and the geese are drawn to these areas to eat the cut grass.

Between 2007 and early 2010, the goose management program reduced the goose overpopulation by 1016 geese using legal hunt methods at Camanche Reservoir and CHHP. The beach *E. coli* contamination levels were reduced, but at times still remained close to the maximum levels allowed for beaches in California.

In order to further improve recreational beach water quality, a CDFG permit was obtained in March 2010 to reduce the goose nest and egg production around Camanche Reservoir by a total of 67 nests/400 eggs. The required FWS registration was completed, and in April 2010, cooking grade oil was applied to 299 eggs from an estimated 43 nests at multiple locations on Camanche Reservoir.

The Camanche Reservoir “carrying capacity” is estimated at approximately 2000 geese total, without creating adverse water contaminant levels. EBMUD staff continue to monitor the goose population and water contaminant levels to adapt the goose management program as needed. Camanche Hills Hunting Preserve, Inc. will be offering Canadian Goose hunting for the 2020-2021 season.

Stormwater Management - EBMUD

Between 2001 and 2008, Pardee Center had a NPDES Industrial Stormwater Permit from the RWQCB for discharges associated with the Pardee lime facility, the result of legal proceedings with Calaveras County. A Stormwater Pollution Prevention Plan (SWPPP) and a Monitoring and Reporting Program were implemented in compliance with the permit conditions, including monitoring samples twice per year. A cleanup of the abandoned Pardee Lime Tower in May 2005 removed the only significant source of potential stormwater contamination from the site. In 2008 the Calaveras County Superior Court dissolved the injunction.

See the MRWSS 2010 update for a detailed description of the six bio-retention filter basins constructed in two CASS campgrounds in 2005 to capture and treat road, campsite and parking lot runoff before discharging into Camanche Reservoir.

Waste Management - EBMUD

EBMUD’s Regulatory Compliance Office maintains many BMPs related to water quality protection and waste management. The Employee Field Guide includes procedures such as Chemical Spill Response, Trench Spoils - Contaminated, and Sewage Spill Response Checklist. The EBMUD Environmental Compliance Manual contains plans for hazardous material management and hazardous waste management, integrated pest management, point source discharges, and sewer system overflows. The manual also includes BMPs on subjects such as sedimentation control, dechlorination, hazardous waste storage locker use and stormwater management.

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A Sewer System Management Plan (SSMP) was certified by EBMUD's Board of Directors in August 2010 for CANS Recreation Area, CASS Recreation Area, and PARA to comply with the Statewide General Waste Discharge Requirement Order. The CVRWQCB has adopted the same State requirements, composed of eleven elements, to manage wastewater systems to protect drinking water supplies. The SSMP is a living document that describes EBMUD's activities to manage its wastewater collection systems effectively, minimize the number and impact of sanitary sewer overflows. The SSMP will be updated a minimum of once every five years.

WDR Order

RWQCB WDR individual orders are used to regulate each of the WWTP effluent discharges from Pardee Center, PARA, CANS and CASS. The WWTP effluents each discharge to ponds or spray fields, with adjacent groundwater monitoring wells. The WDRs specify the monitoring and discharge requirements, covering the influent, effluent, lagoon, land application area, lysimeter, and groundwater monitoring. The WDR details water quality constituents and sampling frequency, along with discharge specifications and prohibitions. See Appendix 5-2 for WDR monitoring details.

NPDES Permits for WTP Backwash Water Discharge

RWQCB NPDES general orders are used to regulate each of the WTP backwash water discharges from Pardee Center, PARA, CANS and CASS. Pardee Center NPDES permit is no longer required due to low flow. At CASS and PARA the NPDES permit threat level was raised from low to limited, resulting in new dechlorination and bioassay requirements. See Appendix 6-5 for NPDES permit examples.

Separate facility BMP documents are required for CASS and the PARA because of the limited threat rating. These CASS and PARA facility BMPs detail facility operations, potential pollutants, pollution control and effluent treatment methods, chlorine management and responsibility and training.

The WTP backwash water is discharged as follows:

- PARA: To a holding pond. Pond overflow is dechlorinated and then land applied
- CASS: To a raw water flow which discharges into an unnamed creek and then to one of three fishing ponds
- CANS: To two unlined holding ponds. Pond overflow is to an ephemeral creek, which flows to Camanche Reservoir only during wet weather conditions.

In 2011, the RWQCB granted CANS an individual permit to allow landscape irrigation for the backwash water. A grassy area near the Blue Oak campground is watered with the backwash water. Specialized turf is used which bioaccumulates and retains iron and manganese, since the groundwater source water is high in these constituents.

Hazardous Material Business Plans

Hazardous Material Business Plans (HMBP) are required by the State and are kept on file with the County Health Department and at the facility. One primary function of the HMBP is to let firefighters know what materials are onsite before they enter an emergency

situation. All HBMPs are updated annually and an example can be found in Appendix 6-6. HBMPs contain basic information on the location, type, quantity, and health risks of the hazardous materials stored, used, or generated at a facility. District emergency contacts information and maps are also detailed. Each of EBMUD's upcountry facilities has an HBMP documenting all hazardous materials on site such as: hypochlorite, polymer, potassium permanganate, oxygen, acetylene, propane, gasoline and diesel fuels, and lubricating oil.

Boat Fueling Camanche Reservoir

The boat fueling stations at Camanche Reservoir have BMPs to avoid spilling gasoline when fueling up. Should any fuel spill onto the reservoir surface, the concessionaire has hydrophobic absorbents on site to clean up the fuel.

Floating Toilets

Floating toilets are installed at Pardee Reservoir. Floating toilets are serviced by EBMUD staff (not concessionaire employees) following practices that minimize any chance for spillage. A California Department of Boating and Waterways grant application is currently being prepared to add floating toilets at Camanche Reservoir. Convenient facilities encourage responsible behavior by recreational reservoir users.

Inspection, Surveillance, and Enforcement - EBMUD

The MW&RD has Resource Patrol Units (RPU) whose primary responsibility is to protect the public and EBMUD property in the Mokelumne area. This is achieved through patrolling all areas in the watershed. Patrol methods used to make public contacts include vehicle, boat, ATV, bicycle and foot. Examples of the public contacts made include checking entry permits, giving directions or information to recreation facilities, and enforcement and education of park rules. The patrol truck is the primary means of patrol for the RPU. Four permanent rangers are tasked to maintain coverage seven days a week, 365 days per year. Additionally, two more rangers are reassigned on a temporary basis during the peak visitor and fire season (May through September). Assisting rangers in patrol functions are local sheriffs brought in under contract. Two full-time deputies from both Amador and Calaveras counties are assigned year-round to EBMUD lands.

Emergency Response - EBMUD

This section discusses EBMUD staff response to emergencies in the Upper Mokelumne River Watershed. See also the later subsection section titled *Emergency Response* for emergency response preparedness with other agencies. The discussion includes NIMS/SEMS and the dam FERC emergency requirements.

RPU

The RPU takes the lead for EBMUD's response to wildland fires on or near EBMUD property. Along with fire response, the RPU responds to a variety of emergencies within our recreation and watershed property. These emergencies include hazmat spills, vehicle accidents, boating accidents, physical altercations, and medical emergencies. Because of proximity of EBMUD offices to the recreation areas, the RPU is often first on the scene of a variety of medical emergencies. This quick response by EBMUD staff has justified the acquisition of Automatic External Defibrillators now carried on RPU patrol vehicles.

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Drowning, physical assaults, bee stings and boating and vehicle accidents are just some of the medical emergencies attended by RPU staff.

Security Shift Supervisors

Security Shift Supervisors at EBMUD are trained first responders for any security or emergency response incident and have access to the full range of resources available to EBMUD. If there is a report or threat of a terrorist or other security concern or any natural or man-caused emergency, while Mokelumne staff coordinates these matters with the local Sheriffs' offices, fire departments and other resources, EBMUD Security and Emergency Preparedness Office requests that the SOCC also be called, at 510-287-0999. The SOCC will notify the on-duty Shift Supervisor and the Manager of Security and Emergency Preparedness, who will coordinate with the involved superintendents and managers in the Mokelumne area, and scale the appropriate response and Emergency Operations Center (EOC) support in keeping with the Standardized Emergency Management System (SEMS), National Incident Management System (NIMS) and the National Response Plan (NRP).

Public Education - EBMUD

Rangers from the Mokelumne Division participate in a number of annual public education events. The Ranger Led Environmental Education Program (RLEEP) educates school groups on watersheds and environmental issues. The Stewardship through Education Program is a collaboration with several other groups to develop watershed educational materials. Rangers attend career days at local elementary schools and talk about their career field and their own career at EBMUD. Rangers attend Fire Prevention Week, and describe to the public our role in fire prevention efforts from our own offices to the campgrounds and watershed lands. EBMUD rangers also co-host an annual River Cleanup day in which members of the public meet and spend a day collecting refuse from the Mokelumne River. The Mokelumne Trailbusters, a dedicated group of volunteers managed by EBMUD, is involved with three diverse land stewardship projects in Amador and Calaveras Counties. These projects are: construction of a thirty-mile segment of the MCCT; planting native vegetation, erosion control and riparian restoration at Pardee and Camanche Reservoir Recreation and Watershed Areas; and participating in the Mokelumne River cleanup in the Pardee/Camanche area. The Trailbuster Work Schedule (every other Saturday throughout the year) includes outings such as Bald Eagle tours; Wildflower hikes; Native American Cave Paintings tours; Gold Rush History tours; and the annual California and National Trail Days hike/work project. Participation varies from 3 to 65 individuals.

Land Use Planning

Effective land use planning is critical to the overall protection of source water quality. Depending upon the specific land use, any number of water quality parameters can be affected including turbidity, microbes, organics, and inorganics. Section 5, which addresses potential contaminant sources as they relate to land uses and activities, provides specific details regarding the water quality concerns corresponding to the land uses

identified. Below is a brief summary of some of the land use planning programs in both Calaveras and Amador counties.

County governments have the authority to restrict activities on lands within the counties that are subject to their jurisdiction. This is done primarily through the establishment and enforcement of land zoning ordinances. Uses of a parcel of land must be consistent with the zoning for that parcel. A General Plan is a long-range policy guide designed to be used by public officials and citizens in the development of land. These General Plans designate specific land uses for each parcel within the counties. Zoning must be consistent with the land uses designated by the County Plan. Zones fall into four general categories: interim zones, resource production zones, residential zones, and commercial/economic zones.

The General Plan and zoning in Amador County is very similar to the General Plan and zoning for Calaveras County. Zones may be consistent with a variety of land uses. Most of the land owned by the largest private landowner in the Mokelumne River Watershed, SPI Corporation, is zoned for timber production with some parcels zoned unclassified (Calaveras County) or R1A (Amador County).

Amador County General Plan - Housing Element Update

The Amador County General Plan Housing Element 2014-2019 identifies and analyzes current and future housing demands in the county. Of the 35,000 residents in the 2010 census, the majority (59 percent) inhabit the unincorporated portions of the county. The projected overall population growth in the county is expected to be around 29 percent between 2010 and 2060.

In the past 10 years, both Amador County and Calaveras County have added detailed water elements or working papers to their General Plans, reflecting the importance of considering water as an integral part of the General Plan Update. These documents better link water-related planning and management with land-use planning. The Amador County Hydrology and Water Quality General Plan Update Working Paper 2007 describes the area hydrology and water quality characteristics, and identifies potential water issues that could arise under the updated general plan.

Calaveras County General Plan - Housing Element Update

Nine agencies provide water and/or sewage to the communities in Calaveras County. In general, there are adequate supplies of water to meet domestic water needs, but a lack of infrastructure to deliver it. Angels Camp (not in the watershed) is the only incorporated town in Calaveras County, and it provides its own public water and sewage system. Most of the population inhabits unincorporated county areas. About 75 percent of residents are served by on-site septic systems. The Mokelumne Hill Sanitation District (MHSD) has the capacity to serve the community for 40-50 years.

Access Control

Landowners can control uses and activities on their land to avoid water supply contamination. Examples of appropriate controls include posting against trespassing, conservation of natural protective features, and adherence to sound waste disposal practices. The major landowners in the upper Mokelumne River Watershed are the BLM, Eldorado NF, SPI, PG&E, and Stanislaus NF.

Fencing and Gating

BLM does not have any riparian areas fenced to control access. Livestock control fences are present but these are designed for livestock management, and not to limit access.

Most of the fencing in Eldorado NF is between range allotments and some fencing is present within the allotments to prevent livestock from entering sensitive areas; however, no single program exists which is designed to protect sensitive watershed areas and riparian lands. Each USFS District Ranger has the authority to restrict usage if a problem exists.

In Stanislaus NF, the USFS has access control measures in campgrounds that restrict vehicles from the riparian zone of Moore Creek, the North Fork of the Mokelumne near Moore Creek, and the North Fork of the Mokelumne near Ebbetts Pass (Bloomfield campground). In 2015 the Stanislaus NF staff removed illegal toilets constructed along the North Fork of the Mokelumne River downstream of Moore Creek Campground to protect river water quality and discourage use in unauthorized areas.

Gating of roadways prevents vehicular access but does not limit livestock access and only partially limits human access. A few gated roadways exist on BLM land in the Mokelumne River Watershed. They are generally placed to prevent driving into mining claims or for public safety.

Eldorado NF has an extensive system of gating of roadways. Access is restricted on roads for a variety of reasons. For example, some roads are closed except when needed for a particular project; some may be closed due to wildlife issues, and some are closed during winter.

Very few roads on lands owned and operated exclusively by the Stanislaus NF are gated; however, a large number of single purpose (timber harvesting) roads are present which are blocked until they are needed again (in 10 to 20 years). The NF land gates that are present are rarely closed because most of them are in the snowbelt and the roads are closed in winter by snow.

SPI estimates that over 90 percent of the roads entering SPI lands have been gated during the 2000-2009 period and are normally kept closed. Because of this, SPI lands have less problems with unauthorized activities (such as OHV use or illegal marijuana growing) when compared with the adjacent NF lands. Any illegal use is reported to appropriate law enforcement staff (NF or county sheriff's department).

BLM has many rights-of-way in the Mokelumne River Watershed. However, access is not restricted on any of the rights-of-way present on BLM land. Eldorado NF has "cooperative" roads, some of which have restricted access where they cross private land. Stanislaus NF has easements on lands owned by SPI in two categories: limited and unlimited. Unlimited easements allow complete public access and limited easements allow access only for protection and management of USFS lands.

Wilderness Area Restrictions

Mokelumne wilderness is jointly administered by Eldorado and Stanislaus NFs. The wilderness is protected by means of restrictions on activities and strict conformance with the wilderness land use designation. Human uses are basically limited to hiking, nature study and photography, horseback riding, backpacking, limited pack train excursions, fishing, cross country skiing and mountaineering. No mechanized vehicles, including mountain bikes or snowmobiles, are permitted in the wilderness area.

Control is imposed by means of overnight permit requirements and issuance. A limited entry permit system is in place, with permits issued on a first-come, first-served basis. A maximum of 12 people per group are allowed for day use and a maximum of 8 people per group are allowed for overnight visits. Backpacking without a permit is a violation punishable by fine. Riparian lands, streams, and water quality are further protected by means of restrictions on campsites and human waste disposal sites. Camps and latrines must be located at least 100 feet away from trails, lakes and stream courses. Stock animals are subject to further, more stringent restrictions on where they may be tethered, as well as tree and vegetation protection measures.

Big Bar Mokelumne River Access

In 2011, new boat put-in/take-out facilities were completed on along the Mokelumne River, just west of the Big Bar Bridge on Highway 49. Figure 6-1 shows an aerial view of the new Big Bar Launch facilities. Previously river boaters and kayakers had to park illegally and trespass across undeveloped private lands to access the river at Big Bar. The new facilities include two access roads, a parking area, toilet, informational kiosk, four picnic sites, a boat put-in/take-out, and associated foot paths. The improvements are operated by BLM and located on two acres of private land, leased to PG&E for up to 25 years. The work is being funded by grants from PG&E and the California Department of Boating and Waterways.

Figure 6-1. Big Bar River Takeout Above Pardee Reservoir at Highway 49



OHV Use Restrictions

As of 2009, the USFS prohibits all off-road vehicles on the Eldorado and Stanislaus NF lands, unless it is an area specifically designated for off-road use as shown on the forest Motor Vehicle Map. Motor vehicles (cars, trucks, ATVs, motorcycles, RVs, 4WDs, etc.) are now restricted to designated roads and trails only. Similarly, the 2008 BLM Sierra RMP prohibits all off-road vehicles on BLM lands unless it is a designated motorized route shown on the RMP maps.

All designated wilderness areas are off limits by Congressional designation. Specific NF lands are closed due to the presence of unstable or devegetated soils, unstable roads and drainage systems, and sensitive biota, such as spotted owl nesting pairs or rare plants.

USFS is not funded to install gates to limit access; so notification is by means of forest orders, signs and maps. Violators are subject to citation by USFS rangers. Convictions can result in stiff penalties of up to a \$5,000 fine and/or six months in jail.

As discussed earlier under the USFS section, a lawsuit against the Eldorado NF in 2012 resulted in the temporary closure of an additional 42 roads (120 miles of off-road trails) that cross meadows, including the Deer Valley Trail and Blue Lake Road in the Upper Mokelumne River Watershed. The lawsuit alleged that the Eldorado NF had not satisfactorily shown how vehicular use on off-road trails affects the hydrology of meadow areas crossed by the trails. The Eldorado NF has agreed that some of the roads are impacting the meadows, and the roads will remain closed until impacts can be corrected. The Deer Valley and Blue Lakes Road Environmental Assessment (EA) was issued in 2015.

In 2020, the Off-Highway Motor Vehicle Information Bulletin, 20-1, explained that properly registered, street-legal, out-of-state vehicles may use OHV areas in California year-round, even if the vehicle would be considered “red-sticker” in California.

Erosion Control

On NF lands, USFS is primarily responsible for the control of erosion and other potential sources of pollution. Both the Eldorado and Stanislaus NFs use the national standards and guidelines for these purposes, proposed BMPs developed by the State of California's Department of Forestry and Fire Protection, and their own Land and RMPs. Included among these regulations are limitations on operations in stream protection zones, on steep or unstable slopes, and during wet weather conditions. Very little quantitative data is available for the NF lands.

See the MRWSS 2010 Update for a summary of the 2004 SNFPA strategies for erosion control.

On private lands, CAL FIRE is responsible for enforcing the regulations of the California FPA to control erosion impacts. The regulations require submittal and advance approval of Timber Harvest Plans (THP) for all significant harvesting efforts for each three-year time segment. The Road Rules, 2013, discussed in an earlier section, significantly tightened logging road building, repair, and monitoring requirements and will minimize erosion on logging roads.

County Grading Ordinances. Amador County requires all projects that move more than 50 cubic yards of grading to obtain a Grading Permit. All plans must comply with standards set by NPDES Stormwater Prevention Requirements. Projects exceeding one acre must file a Notice of Intent (NOI) with the RWQCB and provide an SWPPP. Calaveras County added a grading and drainage ordinance in 2008 covering the unincorporated areas of the county. The ordinance requires implementation of erosion and sedimentation control measures to protect water quality and to reduce discharge of pollutants by using BMPs. A Design Manual for Grading, Drainage and Erosion Control was issued in 2007 by Calaveras County to aid compliance with the grading and drainage ordinance. The detailed requirements are very similar to the Amador County grading ordinance, detailed above, except that projects exceeding 1,000 cubic yards are defined as engineered grading.

Pest Management

Pest management typically includes management practices for nuisance vegetation control, mosquito control, rodent control, or pesticide spraying for agricultural needs. These practices rely quite heavily on the use of pesticides and herbicides. The water quality concerns associated with pesticide and herbicide uses were discussed in Section 5.

Pest management also includes preventative measures taken to prevent the spread of invasive species like quagga and zebra mussels. Recent California legislation, AB 2065,

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has added requirements to the California Fish and Game Code requiring programs to prevent the introduction of nonnative dreissenid mussel species like quagga and zebra mussels. EBMUDs invasive species prevention program was described previously. PG&E has implemented a Mussel Prevention Program at its reservoirs and waterways which includes:

- a vulnerability assessment of PG&E lakes and reservoirs to determine the potential for mussel infestation,
- a public education program to inform reservoir users of the infestation risk and measures to prevent an infestation,
- monitoring for early detection of these mussels, and
- management of recreational, boating, and fishing activities

The California Department of Pesticide Regulation (DPR) regulates pesticides, requires permits for applications of certain restricted materials by agriculture or commercial applicators, and reports the permitted pesticide applications in the Pesticide Use Report (PUR) database. A Guide to pesticide Regulation in California was published in 2011, explaining pesticide regulations, the product registration process, and permit enforcement activities.

- **Restricted materials** are those pesticides which are a potential hazard to public health, pesticide applicators, field workers, domestic animals, crops, or to wildlife and the environment in general, as determined by the Department of Pesticide Regulation.
- **Production agricultural permits** are required for applications of pesticides to growing crops, agricultural fields, and most applications to forest trees and ornamental turf. These permits include the application date and location to the section Meridian Township Range Section (MTRS).
- **Non-agricultural permits** include applications or pesticides to post-harvest commodity treatments, rights of ways, landscapes, structural use, and other non-agricultural uses by commercial applicators. These permits include an application month and application county. There is no application date or section (MTRS) for non-agricultural data.
- **Permits are not required** for residential and institutional uses and most applications to livestock, so this data is not included in the PUR database. According to a DPR fact sheet, in a typical year about three-quarters of the pesticides used in agriculture are NOT restricted materials and so no permit is required.

The County Agricultural Commissioner enforces pesticide laws and regulations at the local level and issues the Restricted Materials Permits. Prior to issuing a permit to possess or use a restricted material, each County Agricultural Commissioner shall determine if a significant adverse environmental impact may result from the use of the pesticide. The DPR restrictions on chemicals are associated to geography and timeline. The county requires the permit applicants to sign off on the terms and conditions before issuing a permit. Permit duration varies between 30 days and 3 years.

- The county agriculture departments host grower's meetings twice a year to issue permits and to present updates on new DPR laws and regulations.

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- Permit applicants are required to have six hours of continuing education with the county once every three years; a minimum of two hours is on updates of new State DPR laws and regulations on restricted pesticide usage.

SPI has BMPs for ground application of pesticides that include maintaining an untreated 25 to 150-foot buffer from flowing domestic water supplies (depending on the presence of aquatic species and site-specific factors such as domestic water supplies and slope), no rinsing of equipment within 200 feet of any watercourse, no spraying when wind speeds exceed ten miles per hour, and the completion of written recommendation from a Licensed Pest Control Advisor for all herbicide applications.

NF procedures for proper pesticide application can be found in the document “USDA Water Quality Management for Forest Lands in California: Best Management Practices,” dated 2000. Pesticides must be applied according to label directions. The BMPs outline the pesticide planning process and the responsible party for ensuring BMP compliance. Constraints identified on the label and other legal requirements of application must be incorporated into project plans and contracts, including streamside wet area protection during pesticide spraying. Water quality monitoring shall be considered during the planning process to ensure application accuracy and lack of impact on water quality. Pesticide spill contingency plans are required, and BMPs for cleaning and disposal of pesticide containers and equipment are included.

Logging Practices

Federal Land

NF timber, which includes trees, portions of trees, and other forest products on NF System lands, may be disposed of for administrative use by sale or without a charge, as may be most advantageous to the United States. Most of the wood products that may be disposed of for administrative use are in the form of personal wood fuels; permits are subject to a maximum quantity set for each NF.

USFS will insure that each permit for timber use is consistent with applicable land and RMPs and environmental quality standards. The key factors include:

- Fire protection and suppression
- Minimizing additional soil erosion
- Insuring favorable conditions of water flow and quality
- Protection of residual timber
- Regeneration of timber

The Code of Federal Regulations prescribes the manner in, and extent to which, timber sales and uses will be conducted, and specifies the conditions of the sale or use and/or the cancellation of same.

BLM requires one or more "Use" Authorization Permits for activities that may impact vegetation. Under the BLM forestry program, a contract is required for removal of timber and other vegetation resources for commercial or domestic use. Timber includes saw

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timber, fuel wood, poles, posts, and any standing trees, downed trees or logs capable of being measured in board feet. Other vegetative resources include Christmas trees, cones, boughs, manzanita, moss, and many other unspecified products which are salable.

Uses and projects, such as new road construction or use of existing roads for commercial hauling of private timber across BLM land, require issuance of right-of-way grants or temporary use permits from BLM. Such uses include access roads, utility lines, communication sites, or any other uses that involve the placement of either temporary or permanent improvements upon BLM lands. In addition, any activity that involves physical disturbance to the land or vegetation requires a permit (e.g., brush removal or test hole drilling). Other long-term occupancy or use of BLM land that could affect vegetation may also be authorized by a lease. Applications must be filed with the local BLM office.

Private and State-Owned Property

Timber owners or operators who propose to cut and remove solid-wood forest products of designated live commercial forest trees from non-federal timber lands must first submit a THP to CAL FIRE for approval. THPs detail the planned logging operations and steps to minimize environmental impacts, including a projection of which trees will be felled, how and where access roads will be cut and which waterways may be impacted. Timber owners include persons who own timber or timber rights on lands owned by another party.

In December 2014, CVRWQCB renewed the Conditional Waiver of Waste Discharge Requirements for Discharges Related to Timber Harvesting. Waiver enrollment participants must meet eligibility requirements and comply with waiver conditions, including BMPs, monitoring and reporting. CVRWQCB is taking a more active role in proposing additional mitigation measures at the time of THP review and approval, and are usually attending pre-harvest inspections of THP areas. CAL FIRE approves THPs to assure that timber operators carry out their activities in keeping with the goal of maximum, sustained timber production while considering maintenance of recreational opportunities, watershed quality, wildlife, range, forage, and fisheries.

In 2013, a new type of timber harvesting permit was established to allow non-industrial landowners of 15,000 acres or less to harvest timber via a non-expiring permit. The California Board of Forestry was required to develop the process for the new Working Forest Management Plan (WFMP) and this was implemented in 2016.

The California State Board of Forestry and Fire Protection released the Forest Practice Rules and Act, Road Rules, 2013 which significantly tightened logging road building, repair, and monitoring requirements. Effective January 2015, these revised Road Rules include numerous references to “significant sediment discharge” and include a statewide requirement for hydrological disconnection of roads from watercourses where feasible. The revised rules are more performance-based rather than past prescriptive-based rules, allowing flexibility for timber management plans submitted to CAL FIRE. The improved Road Rules should minimize logging impacts on water quality and turbidity runoff.

SPI conducted watershed assessment and their report concluded that 13 of 26 planning watersheds owned by SPI had high susceptibility to erosion. As a result of this assessment, SPI developed integrated management recommendations pertaining to new timber harvests, forest practices, restoration strategies, landscape management, and monitoring and adaptive management. SPI is continuing to reduce erosion from forest roads, skid trails and landings. This is done by increasing the amount of crossing repairs and replacements—specifically culverts, rocked-low water crossings, and bridges, and increasing the amount of road rocking nearby streams and watercourses. Other techniques (such as the placement of filtering straw bales, straw wattles, and mulching techniques) are also used when working in proximity to streams.

Timber Operations in Areas Substantially Damaged Due to Wildland Fires

In 2012, the Board of Forestry and Fire Protection issued a guidance memorandum for commercial timberland damaged by fire. The memorandum includes details on tree removals performed as an Exempt Activity or under an Emergency Notice. Harvesting must still comply with regulations and BMPs.

Structure Protection Exemption

In 2015, the Board of Forestry and Fire Protection adopted emergency regulations allowing specified forest management activities, including the cutting or removal of trees between 150' and 300' of a habitable structure (previously only 150') for the purpose of reducing flammable materials and maintaining a fuel break. A Registered Professional Forester (RPF) must prepare, sign, and submit the new form to CAL FIRE.

Grazing and Livestock Management

All grazing and livestock use on USFS Lands, and on other lands under USFS control, must be authorized by a Grazing or Livestock Uses Permit. The Code of Federal Regulations (CFR) sets the rules under which livestock operations will be conducted in order to meet the multiple-use, sustained yield, economic, and other needs and objectives for the lands involved. Allotment Management Plans (AMP) prescribe the manner in, and extent to which, these operations will be carried out on a site-specific basis, to minimize environmental and water quality impacts. The use of BLM lands for grazing or any livestock use requires the issuance of a grazing lease.

The 2004 Sierra Nevada Forest Plan (SNFP) Record of Decision (ROD) specifies grazing limitations to promote hardwood regeneration, and specifies management goals for pounds of RDM acre on grazed grasslands to ensure ecosystem health. For grazing allotments in occupied willow flycatcher sites, only late season (after August 15) grazing is allowed. If, upon evaluation, the habitat is deemed degraded, restoration projects shall be implemented which may include reducing or eliminating grazing areas. When re-issuing grazing permits near riparian zones, the compatibility of livestock with riparian conservation objectives is evaluated. Goals for season-long grazing included limiting livestock utilization to 30 or 40 percent for early and late seral status meadows respectively, and limiting disturbance to no more than 20 percent of stream banks and shorelines, or 10 percent in stream reached identified as “essential habitat.”

Mining

Title 36, Section 228 of the CFR sets the rules and procedures through which the surface of NF System Land may be used in conjunction with operations authorized by the United States Mining and Mineral leasing laws, and the sale of mineral materials. Hard rock mineral leasing on NF System administered lands is subject to CFR Title 43 Part 3500. Mineral development on, or requiring access across, lands under the management of BLM will require one or more "use" authorization permits issued by the BLM. Categories of permits include locatable minerals, leasable minerals, salable minerals (which include oil and gas, and geothermal).

The Office of Mine Reclamation (OMR) and the State Mining and Geology Board (SMGB) jointly administer the California Surface Mining and Reclamation Act of 1975 (SMARA). City and county "lead agencies" adopt ordinances for land use permitting and reclamation procedures which provide the regulatory framework under which local mining and reclamation activities are conducted. SMGB reviews these lead agency ordinances. SMARA is applicable to federal lands regulated by BLM and the USFS.

The OMR maintains a database of statewide mine locations and is responsible for compliance related matters. For active mines, mine operators are required to submit annual reports and annual reporting fees to the Department of Conservation OMR. Mined-land reclamation includes maintaining water and air quality, and minimizing flooding, erosion and damage to wildlife and aquatic habitats caused by surface mining, often including topsoil replacement and revegetation.

The CVRWQCB issues permits and takes enforcement action when surface water or groundwater regulation and policies are violated. The CVRWQCB monitors abandoned mine-related water quality threats and works on remediating priority sites. Currently there are no mine sites undergoing remediation in the Upper Mokelumne River Watershed.

Penn Mine

Penn Mine is an abandoned mine in the Camanche Watershed, and is the only mine that has been identified as a potential contaminant source for Pardee or Camanche Reservoirs. The remediation and surface water monitoring tasks are now complete.

Penn Mine is located on the south side of the Mokelumne River, upstream of Camanche Reservoir. Although not on EBMUD property, EBMUD participated in the Penn Mine Environmental Restoration Project, completed in November 1999. Surface water control measures reduce acid rock drainage discharge to Camanche Reservoir. Waste materials were collected in a six-acre landfill, constructed with a clay liner, low density polyethylene cap, and leachate collection system.

Leachate is still regularly pumped from the landfill and disposed of by a hazardous waste contractor (paid for by the initial lump-sum bid). The landfill cap is regularly mowed. BMPs were employed during and following construction for erosion control and sediment management. In addition, silt is periodically removed from behind the weir at the

confluence of the two streams. The landfill cover was repaired and improved in 2009 to minimize rainwater infiltration. Because of evidence that some rainwater still leaked into the landfill, in 2014, additional repairs were made in the top plastic liner lapping to further reduce rainwater infiltration. The 2014 repairs fixed the water leak.

In the past, EBMUD performed quarterly monitoring of surface water runoff from the site for metals, turbidity, and pH. Routine monitoring of the four groundwater wells around the landfill also occurred. Beginning with the second quarter of 2010, regular monitoring of surface water runoff is no longer performed, given that the site has been restored for over ten years; however, bi-annual groundwater monitoring around the landfill continues.

During the MRWSS 2015 update, EBMUD and the State of California placed a \$10 million lien on the Penn Mine property to recuperate the remediation costs paid by EBMUD and the State of California, should a buyer be found for the property. Without this lien, Calaveras County might have sold the property for back taxes. EBMUD has an interest in the property being owned, operated and maintained in a manner that protects water quality.

During the MRWSS 2020 update period, continued leachate removal and bi-annual groundwater monitoring for Penn Mine was conducted and the report delivered to California RWQCB. The downward leachate trend has continued even after the extremely wet winter of 2016-2017, which indicated that the Penn Mine landfill cap repair was effective. Planned activities for FY20-24 include continued leachate removal, continued bi-annual reporting of groundwater conditions, and removal of a weir from an onsite stream.

Mine Tailings Impoundment

There are three impoundment areas (ponds) just north of Camanche Watershed above China Gulch, suspected to have mine tailings from historical mining activities. Although the main pond is mostly on BLM property, a small section is on EBMUD property. The lower two ponds are entirely on EBMUD property. All three impoundments have gradually filled with sediment over time and now only contain water on an intermittent basis.

Phase I and II environmental site assessment reports were completed in 2007 to assess the presence and distribution of elevated metals in three pond areas. Metals concentrations found in the upper pond were much higher than the middle and lower ponds, particularly arsenic and copper. Sediment and surface water sampling in Camanche Reservoir do not indicate detrimental impacts from the impoundment areas. However, elevated metals in surface water and/or soil at the upper pond area have the potential to migrate to the middle and lower pond area (and eventually to Camanche Reservoir) during intermittent discharge of surface water. A Human Health and Ecological Risk Assessment is planned in the near future.

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In 2013, BLM and EBMUD held a series of meetings to keep local residents informed about proposed remediation alternatives and other activities at the site. The engineering report recommended that the two lower ponds on EBMUD property be left alone, since vegetation now covers the ponds and effectively prevents sediments from moving.

For Poison Lake, recent accomplishments include completion of the remediation project which involved scraping and capping surface mine waste and armoring the drainage channels with boulders and re-seeding bare areas which have no filled in with grasses. The annual surface water quality monitoring was conducted and the report delivered to California RWQCB. Planned activities for FY20-24 include post-remediation monitoring and surface water quality monitoring and reporting to evaluate any potential impacts from the site to the reservoir.

Camanche Reservoir China Gulch Erosion Control Project

The Camanche Reservoir China Gulch Erosion Control Project was completed in 2009. This reservoir bank stabilization project now protects approximately 50 feet of Camanche Reservoir shoreline from wind and wave erosion. See the earlier section under EBMUD Watershed Management, Erosion Control for additional details. This shoreline is downstream of the lower mine tailings impoundment pond.

Suction Dredging Moratorium

In 2014 CDFW issued environmental review documents and revised regulations for its suction dredging permitting program, prohibiting the use of any motorized vacuum or suction dredge equipment as part of a mining operation in any river, stream, or lake in California. This went into effect in January 2016.

Stormwater Management

In general, the concerns identified with urban stormwater include organics, inorganics, microbes, and occasionally turbidity. The first storms of the rainy season have the potential for transporting unusually high concentrations of numerous water quality parameters. These elevated concentrations in turn create both reservoir and treatment-related concerns. Given that there are a few urban areas within the watershed, Amador and Calaveras County stormwater management programs are important to source water protection.

General Construction Activity Stormwater Permit

The SWRCB has developed a General Construction Activity Stormwater Permit for stormwater runoff associated with any construction activity including clearing, grading, excavation, reconstruction, and dredge and fill activities that result in the disturbance of at least one acre of total area.

Discharges composed entirely of industrial stormwater runoff may be eligible for coverage under a General Industrial Stormwater Permit issued by SWRCB rather than an individual permit. Eligible activities include:

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- Facilities subject to stormwater effluent guidelines (CFR Title 40, subchapter N).
- Manufacturing facilities.
- Mining facilities.
- Hazardous waste treatment, storage, or disposal facilities.
- Landfills, land application sites, and open dumps that receive industrial waste.
- Recycling facilities such as metal scrap yards, battery reclamation sites, salvage yards, and automobile yards.
- Transportation facilities.
- Sewage treatment plants.
- Certain stormwater discharge facilities.

Calaveras County Stormwater Management Plan (SWMP)

In 2007, Calaveras County developed a Stormwater Management Plan (SWMP), as required for all regulated jurisdictions by the SWRCB as a condition of coverage under California's statewide General Permit for Stormwater Discharges. The Calaveras County SWMP requires that all Calaveras County ordinances, permitting processes, design guidelines and operating procedures be modified to meet specific BMPs for stormwater control. Although the specific municipal separate storm sewer systems (MS4s) stormwater discharge permit areas defined by the SWRCB are outside EBMUD's watershed, Calaveras County intends to apply many of the stormwater quality control measures to all unincorporated County areas. This countywide approach for selected measures is being done to maximize program effectiveness, to promote consistent regulation of construction activities throughout the County, and to better control stormwater pollution. BMPs are targeted for implementation by 2010 and cover public education and involvement, illicit discharges, and construction site runoff. New ordinances have been in effect since 2008 covering stormwater quality and grading and drainage requirements.

Amador County Stormwater Management

In 2015 Amador County approved a county-wide Stormwater Ordinance with revised BMPs and enforcement provisions. This ordinance was in response to the SWRCB's 2013 General Permit for Stormwater Discharges from MS4s, which added Amador County to the Phase II traditional MS4 designation list. Amador County was newly designated an MS4 because of limited stormwater management in this area and several waterbodies or waterbody segments within or bounding Amador County that are 303(d)-listed for particular contaminants, including Pardee and Camanche Reservoirs, as well as the Lower Mokelumne River. Stormwater management is needed to reduce the pollutant loads prior to adoption of any TMDLs.

Caltrans Stormwater Management Program (SWMP)

Caltrans must comply with the regulations and policies established in its own Statewide SWMP and the stormwater NPDES Permit. The Mokelumne River watershed falls into Caltrans District 10. The SWMP references stormwater BMPs in the Construction Handbook published by the California Stormwater Quality Association (CASQA). See the MRWSS 2010 update for additional details on what is included in the SWMP, including descriptions of:

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- Stormwater Advisory Teams
- Stormwater Treatment BMP Technology Report
- Stormwater Data Report

In 2020, Caltrans established a Caltrans Stormwater Monitoring Guidance Manual. The objective of the manual is to characterize stormwater discharge, comply with regulatory requirements, and evaluate the design and performance of stormwater-related BMPs. The manual offers guidance on the following:

- Planning and characterization of the type of stormwater
- Monitoring methods and equipment, training, pre-storm preparation, sample collection, and quality control
- Reporting memoranda, laboratory deliverables, and data evaluation

SWMP Annual Report 2019-2020

The SWMP Annual Report describes specific measures Caltrans took during the year to implement water quality control measures and assess the effectiveness of each activity performed. Starting from 2014-2015, the NPDES permit mandates Caltrans achieve a minimum of 33,000 compliance units (CUs), or 1,650 CUs annually, over a 20-year window within the 84 Total Maximum Daily Loads (TMDLs) as well as Areas of Special Biological Significance (ASBS). A compliance unit is defined as one acre of Caltrans right-of-way from which runoff is retained, treated, and/or otherwise controlled prior to discharge to a water body with an established TMDL. From 2015-2018, Caltrans completed work resulting in 4,830 CU. In consultation with SWRCB, Caltrans uses the following four methods to achieve CUs:

- Caltrans State Highway Operation and Protection Program (SHOPP) storm water projects (storm water mitigation stand-alone projects)
- Caltrans SHOPP storm water FCO projects (in partnership with local agencies)
- Caltrans fish passage projects, improving water quality, post-construction storm water BMPs, pavement projects placing OGFC (high void pavement material) in TMDL watersheds.
- Other non-SHOPP projects that provide funding for local agency projects.

SWMP District 10 Work Plan 2018-2019

Each Caltrans district issues an annual DWP outlining the planned stormwater activities for the upcoming fiscal year, and information about Caltrans District's waterbodies, BMPs and monitoring programs. The following sections pertain directly to the Upper Mokelumne River Watershed:

- DWP Section 4 describes and identifies locations where spills from Caltrans District 10's facilities can discharge directly to a drinking water reservoir. The determination was based on proximity between the waterbody and the Caltrans facility, use characteristics of the facility, and the probably spill response time. Chapter 4 now lists Highways 49 and 26 in the Mokelumne watershed, as shown in Appendix 6-7.

- DWP Section 5 lists road segments prone to erosion and sediment discharge, located in sensitive watersheds or where there is an existing or potential threat to water quality. A portion of Highway 26 in the Mokelumne Watershed is listed and shown on Caltrans DWP Figure 5-1, also included in Appendix 6-7. The scheduled stabilization date is “TBD”.
- DWP Section 6 lists specific District 10 projects in maintenance, design or construction phases, with summary tables including information on the road route number and waterbodies within or adjacent to the project limits. Design and construction projects listed in the 2018-2019 DWP do not impact EBMUD’s Mokelumne watershed.

Waste Management

Discharge Requirements

The owner or operator of any facility or activity which discharges or will discharge waste that may affect surface water or groundwater quality, or from which waste may be discharged in a diffused manner (e.g., erosion from soil disturbance), must first obtain WDRs from the RWQCB.

The RWQCB issues NPDES permits and adopts WDRs to protect the waters of the State for all designated beneficial uses in the watershed. The SWRCB and RWQCB seek to attain the highest possible water quality in the state. Examples of activities that may require an NPDES permit include:

- Feedlots for cattle, swine, sheep, goats, horses, turkeys, chickens, and ducks
- Sewage treatment plants
- Stormwater runoff discharges (municipal, industrial, and construction)
- Dredge spoils discharges
- Mining activities
- Groundwater discharge operations

Examples of the types of wastes that may require waste discharge requirements are:

- Drainage from agricultural operations
- Drainage from waste materials in landfills
- Flow or seepage containing debris or eroded earth from logging operations
- Drainage from inoperative and abandoned mines
- Waste from construction or dredging operations
- Food production and processing wastes
- Waste from manufacturing and refining operations
- Municipal and industrial wastes, if percolation or injection to groundwater are the disposal methods to be utilized

The discharge of waste into a municipal sewer system is not usually subject to waste discharge requirements. However, USEPA, SWRCB, the RWQCB, and the local wastewater management agency may require some industries to pretreat hazardous wastes prior to discharge to the municipal sewer system. The local wastewater management agency will notify the industry of the requirements. Waste disposal by injection well also

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may be subject to a Federal Underground Injection Control Program Permit issued by USEPA.

The RWQCB evaluates the "Report of Waste Discharge" to determine whether the proposed discharge is consistent with the RWQCB's adopted water quality standards, the Areawide Waste Treatment Management ("208") Plan, the Water Quality Control Plan (Basin Plan) for the area in which the proposed activity is located, and the "Chapter 15" regulations, if applicable.

Land Disposal Regulations

Many of the larger communities in Calaveras County utilize wastewater treatment systems, which collect sewage from septic tanks and transport the effluent to community treatment facilities. After treatment, wastewater is disposed of on land. Land disposal of treated wastewater in Calaveras County is regulated by the CVRWQCB. Discharge requirements are specific to individual sanitary districts. Discharge monitoring requirement for Pardee Center WWTP are shown in Appendix 5-2.

Marijuana Cultivation Fact Sheet

CVRWQCB issued a Marijuana Cultivation Fact Sheet in 2014 detailing their jurisdiction over waste discharges and educating growers about water quality impacts and required permits for medical marijuana (Proposition 215) growing operations. The fact sheet acknowledges that marijuana cultivation in the Central Valley Region "has grown exponentially in recent years" both in number and in size. See Appendix 6-8.

Pharmaceutical Disposal Programs

Neither Amador nor Calaveras County accept pharmaceutical products at their household hazardous waste drop-off facilities.

Underground Tanks (UST) and Chemical/Fuel Storage

The UST law established state regulations requiring permits to be issued by the RWQCB to UST owners. A developer-applicant will need this permit if they own, operate, or intend to construct a UST containing a hazardous substance.

All new USTs must provide primary and secondary containment for the hazardous substances stored. The primary container must be product-tight under all circumstances (i.e., impervious to the substance it contains). Secondary containment must be constructed to prevent structural weakening as a result of contact with any released hazardous substances, and also shall be capable of storing the hazardous substances. To protect water quality statewide, standards have been established for monitoring USTs that store hazardous substances.

Certain specific actions and evaluations must be completed by the UST owner when the UST is either temporarily or permanently taken out of service. Temporary closure allows a UST to be taken out of service for up to one year without implementing permanent closure. LUSTs must be repaired or permanently closed.

MHSD, LAFCo Review and Subsequent Improvements

Because Mokelumne Hill Sanitation District (MHSD) is a small wastewater treatment agency with spray irrigation fields adjacent to the Mokelumne River, just upstream of Pardee Reservoir (see Section 2 for additional details), treated wastewater overflows have the potential to impact Pardee Reservoir water quality. In June 2012, Calaveras LAFCo issued an MSR for MHSD, summarizing that: “MHSD provides minimally adequate services and faces challenges with accountability.” The MSR recommended considering a Zero SOI option, which would signal the eventual dissolution of MHSD, with services possibly being provided by CCWD. Deficits included a lack of constituent outreach, public Board meetings, emergency contact system, capital improvement plan, and rates adequate to cover services and depreciation. MHSD reported that the treatment hypochlorite system and 60 percent of the collection system needed replacement. Many regulatory submittals were submitted late. MHSD had a higher than average number of regulatory violations. Since these deficiencies were not identified in the 2005 MSR, the 2012 MSR observed that MHSD had not been made aware of management practices that are in need of improvement.

In December 2014, Calaveras LAFCo adopted a revised SOI that recommended retaining the existing Coterminous SOI plus annexing MHSD infrastructure spray fields.

In February 2017, MHSD was awarded a \$155,500 CALFIRE grant to reduce the number of dead and dying trees on its 80 acre wastewater treatment disposal parcel. The trees threatened MHSD personnel, utility personnel, and the Mokelumne Hill community which stands to lose critical infrastructure and personal and property loss from wildfire driven by winds up the Mokelumne river canyon. The CALFIRE project was completed on March 31, 2019 and resulted in the following:

- Removal of over 1,000 dead and dying trees
- Reduced potential for degradation of the Mokelumne River Watershed and water supply by reducing the impact of wildfire, insects, disease and erosion
- Continued maintenance of a serviceable internal road system that can support emergency response vehicles and equipment (CALFIRE actively used the internal road system to combat the Butte Fire).

Additionally, MHSD was awarded “Plan of Study” grant from California State Water Resources Control Board, Clean Water State Revolving Fund to determine the feasibility, engineering, and design of some improvement project.

- *Pipeline improvements:* Over 90% of the collection system pipeline was replaced with three prior capital improvement projects funded through state and federal agency loans. The remaining 10% that was not replaced is now deficient in capacity and is beyond its useful life.
- *Spray field automation:* Automation of the spray field operation to reduce labor costs while increasing efficiency.
- *Reestablish the gravity feed collection system:* In the 1970’s, MHSD built a new wastewater treatment plant that required two lift stations to deliver wastewater to the plant. Wastewater delivery to the old plant was gravity fed. In addition to operational costs, lift stations and equipment are vulnerable to environmental

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hazards as demonstrated recently with the Butte Fire and atmospheric river events. Both caused damage and failure to the plant equipment and lift stations.

- *Office Expansion:* Expand the District's 250 sq. ft office and laboratory which is inadequate to accommodate an appropriate work environment while complying with current regulations.

MHSD was awarded \$6 million to build these four projects. In early 2020, MHSD was additionally awarded over \$4 million by the Clean Water State Revolving Fund (CWSRF).

Septic Tank Regulations and Assembly Bill (AB) 885

Approximately one percent of the land use in the Mokelumne River Watershed is residential. But because of the proximity of many residential areas to creeks and other waterways, poorly functioning or situated septic systems present a major potential source of contamination to the Mokelumne River system and Pardee Reservoir.

AB885 authorized regulation of OWTS through the SWRCB. The final Water Quality Control Policy for Siting, Design, Operation and Maintenance of Onsite Wastewater Treatment Systems (OWTS Policy) was signed in 2012, effective May 2013. This Policy establishes a statewide, risk-based, tiered approach for the regulation and management of OWTS installations and replacements. The OWTS Policy sets standards for OWTS that are constructed or replaced, that are subject to a major repair, that pool or discharge waste to the surface of the ground, and that have affected, or will affect, groundwater or surface water to a degree that makes it unfit for drinking water or other uses, or cause a health or other public nuisance condition.

The final 2012 OWTS Policy requires:

- New requirements that apply to OWTS with new construction, replacement or major repairs; that pool or discharge waste to the surface of the ground; or that have affected, or will affect, groundwater or surface water to a degree that makes it unfit for drinking water or other uses, or cause a health or other public nuisance condition
- Minimum operating requirements for OWTS that may include siting, construction, and performance requirements
- Requirements for OWTS near certain waters listed as impaired under Section 303(d) of the Clean Water Act by bacteria (pathogens) or nitrogen compounds (nutrients) requiring development of a TMDL
- Requirements authorizing local agency implementation of the requirements; corrective action requirements; minimum monitoring requirements
- Conditional waiver of waste discharge requirements
- Connection to local sewer if within 200 feet and total costs are less than 200 percent of repair costs

Implementation of the OWTS Policy will be overseen by the SWRCB and the RWQCB. Local county agencies may implement LAMP, if approved by the CVRWQCB. Calaveras County has already adopted new septic system requirements in 2013. Amador and Calaveras County are both currently drafting LAMP documents for submittal in 2016.

Neither Amador nor Calaveras Counties expect immediate impacts to existing septic systems because of this new regulation. Only one impaired waterbody located in the Upper Mokelumne River or Camanche Watersheds is impacted by bacteria or nitrogen compounds and requiring a TMDL. Lower Rattlesnake Creek below Lower Bear River Reservoir is listed as impacted by *E. coli* based on samples collected in 2004 and 2005. Future actions by the RWQCBs related to the LAMP documents may increase water quality monitoring requirements for bacteria and nutrients in specific waterbodies, thus possibly listing additional waterbodies as impaired in the Upper Mokelumne Watershed.

As of the 2010 Integrated Report¹, impaired waters located in the Upper Mokelumne River and Camanche Watersheds under Section 303(d) of the Clean Water Act, categories 4 and 5, requiring development of a TMDL include the following:

- Pardee Reservoir: Mercury (category 5, TMDL estimated 2021; for example, seven of 44 samples collected at two locations exceeded the USEPA fish tissue criterion for human health)
- Bear River (Lower Bear River Reservoir to Mokelumne River, North Fork): Copper (category 5, TMDL estimated 2021)
- Bear River (from Allen to Upper Bear River Reservoir): pH (category 5, TMDL estimated 2021)
- Rattlesnake Creek (at confluence with Mokelumne River, North Fork): *E. coli* (category 5, TMDL estimated 2021)
- Camanche Reservoir: Copper (category 5, TMDL estimated 2020), Mercury (category 5, TMDL estimated 2021), Zinc (category 5, TMDL estimated 2021)

Lead Shot Use and Recovery Program

CHHP, operated by a concessionaire, is located on the North Shore of Camanche Reservoir, on 1500 acres of rolling hills and reservoir shoreline owned by EBMUD. EBMUD revised the Watershed Rules and Regulations so that lead shot is prohibited from use in the CHHP upland game bird hunting areas, beginning October 2009. Lead shot is now only allowed in the designated "Lead Reclamation Areas" where it will periodically be reclaimed and recycled.

In 2005, USEPA issued "BMPs for Lead at Outdoor Shooting Ranges". USEPA and the National Shooting Sports Foundation (NSSF) created a Shooting Initiative Environmental Stewardship program under which shooting ranges and hunt facilities could apply for certification. CHHP prepared a Draft Environmental Stewardship Plan (ESP) and submitted it to USEPA for review in 2009, documenting the present environmental conditions and prioritizing management actions. Later in 2009, USEPA canceled the Environmental Stewardship program.

CHHP also issued CHHP Lead Management Practices, March 2009:

- Lead will be reclaimed from designated "Lead Reclamation Areas" such as the Sporting Clay courses and the Trap and Skeet Range (approximately 28 acres).

¹ http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml

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- CHHP will not construct any shooting stations that would cause the spent lead to fall into water, wetlands, creeks or other environmentally sensitive areas.
- The shooting courses were built in a semi-circle formation, so that spent lead shot falls inside the course, concentrated into a 75-foot-wide area (calculations based on maximum load, typical shotgun and shot size)
- Shooting stands in steep terrain will have a v-ditch or berms installed to decrease lead shot mobility during periods of heavy rain.
- Periodically, all vegetation will be cut from the 75-foot strip; then a lead reclamation contractor will remove the lead shot along with the topsoil. The lead will either be reused (reloaded ammunition) or shipped to a lead reclamation facility.
- The soil will be replaced.

The first lead recovery at CHHP occurred in 2010, and the next is planned for 2021. Since the draft report was issued, several shooting courses were reevaluated and found to have the potential for lead shot to land in the reservoir wet areas. These shooting courses were realigned in 2011 to ensure that lead shot remains within the shooting course semi-circular area.

Structures, Dredging and Fill Management

Any person or public agency proposing to locate a structure, excavate, or discharge dredged or fill material into waters of the United States must obtain a Section 404 Dredged Material Discharge or Fill Material Placement Permit from the U.S. Army Corps of Engineers (USACE). Typical activities requiring permits include the construction or installation of artificial canals, artificial islands, boat ramps, breakwaters, bulkheads, dams, dikes, weirs, groins and jetties, intake pipes, levees, mooring buoys, outfall pipes, overhead power crossings, pipes and cables, piers and wharves, riprap, road fills, signs, and tunnels; or activities that result in dredging or filling, or the discharge of sand, gravel, dirt, clay, and stone.

The Federal Rivers and Harbors Act of 1899, and Section 404 of the Clean Water Act grant the USACE jurisdiction over all navigable waters within the United States. Recent legislation and court decisions have expanded the legal definition of navigable waters to include marshes, swamps, and diked lands, even though they may not, in fact, be navigable.

The decision whether to grant or deny a permit is based on a public interest review of the probable impacts of the proposed activity and its intended use. Benefits and detriments are balanced by considering effects on such concerns as: conservation, economics, wetlands, fish and wildlife values, flood hazards, navigation, water quality and the needs and welfare of the people. In addition, projects involving discharge or dredge or fill material must comply with the Section 404(b) (1) guidelines prepared by USEPA. The guidelines restrict discharges into aquatic areas when there are less environmentally damaging, practicable alternatives. Reasonable and practicable mitigation of unavoidable impacts

also will be required. A permit will be granted unless the project is found to be contrary to the public interest or fails to comply with the guidelines.

The USACE is required by federal law to consult with state and federal wildlife agencies regarding any impacts of a project on aquatic habitats.

Inspection, Surveillance, and Enforcement Procedures

EBMUD's programs for inspection, surveillance, and enforcement are described in the *EBMUD* portion of this section.

Emergency Response

SEMS in California and NIMS used across the country require all-hazards planning to enable local government agencies like EBMUD to respond to, work through and recover from the impact of disasters and other planned or unplanned emergency events.

Depending upon the type of emergency, any number of water quality contaminants may impact source water quality including turbidity, microbes, organics, and inorganics. Of particular concern are emergency scenarios that could result in contaminants being introduced within close proximity to a raw-water reservoir outlet tower or into a potable water storage tank.

EBMUD's Emergency Operations Plan (EOP) was completely rewritten in 2009 to fully adopt SEMS and NIMS, and to describe the overall EBMUD emergency management program through a phased approach: preparedness, alert and warning, activation of the emergency operations plan, District notification, response scaled to the incident, continuity of essential EBMUD business during the response, and recovery. The EOP outlines an all-hazards approach to a broad range of emergency scenarios. EOP Annexes describe EBMUD response planning for many situation specific scenarios, such as earthquake, aqueduct or levee failure, dam failure, hazardous materials spill or leak, major fires, severe storm or flood, civil disturbance, contamination of water supplies, sewage spill, widespread power outage, and a local or even national security emergency.

During a major disaster, EBMUD operates as part of the Statewide Emergency Management System. Local cities, special districts, counties, mutual aid regions, and state agencies participate in this response. In a disaster, natural or man-caused, EBMUD activates its Emergency Operations team (EOT), opens its Emergency Operations Center (EOC) in Oakland, and may activate its Alternate EOC and/or Mobile Emergency Command Center.

EBMUD uses the SEMS/NIMS Incident Command Systems (ICS) to standardize response. Between 2005 and the present, EBMUD has entered into a Mutual Assistance Agreement with Los Angeles Department of Water and Power (LADWP) to assist one another in the event of a regional emergency that impacts one agency but not the other.

EBMUD has developed strong working relationships with city and county police, sheriff's and fire/EMS agencies, trained its EOT to the intermediate and advanced levels of NIMS-required training, written and implemented business continuity plans across EBMUD, and dramatically improved its ability to communicate during an emergency. Through training, exercise and pre-planning coordination, EBMUD has greatly improved its ability to work in unified command with other first-responder agencies during emergencies.

EBMUD rangers are classified by the state as "wildland firefighters" and have the responsibility for initial response and mop-up of all fires on EBMUD-owned lands. In addition, they have the responsibility for fire road grading and maintenance, and fire prevention activities in accordance with the Annual Fire Plan. See earlier subsection EBMUD Emergency Response for additional details.

FERC Emergency Action Plan

At EBMUD's Pardee and Camanche Dams on the Mokelumne River in Amador and Calaveras Counties, EBMUD owns and operates the Dams and associated hydro-electric facilities, and small water treatment plants to serve local population and EBMUD facilities. These dams are regulated by FERC and EBMUD has a separate Emergency Action Plan (EAP) that is updated annually and exercised regularly.

The FERC EAP focuses on warning emergency agencies, upstream projects, and downstream inhabitants if there should be an impending or actual sudden release of water caused by an accident to, or failure of, EBMUD's Pardee and Camanche Dam facilities. FERC requires a Comprehensive EAP Exercise Program be held face-to-face once every five years with participants from the various response agencies to discuss emergency management and resource allocation; the program consists of a tabletop exercise and a functional exercise. During the tabletop exercise there is no time pressure and the participants discuss a particular dam break scenario and response. During the functional dam break exercise, the participants from the various agencies respond to messages under real-time conditions from "private" offices, followed by a debriefing. Although not required, EBMUD chooses to hold a face-to-face tabletop exercise annually. EBMUD's staff works with FERC, California Highway Patrol, Amador and Calaveras County Sheriff's Offices on both security and operational area response and planning issues related to EBMUD's facilities in this region.

The RWQCB, CDFW, Caltrans, and SWRCB Division of Drinking Water have responsibilities to mobilize personnel to oversee responses and cleanup following any spillages or releases of hazardous materials. If the situation should become a major crisis, the California Emergency Management Agency (Cal EMA) may step in to coordinate the overall emergency response, public notification and evaluation, and cleanup and abatement efforts.

Caltrans Emergency and Spill Response Requirements

Caltrans maintains a list titled *Drinking Water Reservoirs and Recharge Facilities* in the Caltrans District 10 Work Plan, as Table 4-1. This list is used to track sections of Caltrans roads adjacent to drinking water reservoirs where a hazardous material spill might

contaminate drinking water. The Caltrans District 10 Work Plan, Pardee Reservoir and the Mokelumne River (Main, North, South, and Middle Forks) will be listed, for sections of Highways 49 and 26 near the bridge river crossings. This list is used by Caltrans for response to accidental spills. When Caltrans issues contracts for work on the listed road, those contracts include enhanced spill response requirements.

Public Education

The Environmental Health Department of Amador County advises businesses individually on managing their hazardous waste and controlling pollutants. Free of charge, the County regularly collects household hazardous waste at a transfer station (latex paints, used oil, depleted batteries, etc.). County public schools have presented students with information on appropriate recycling and recycling practices, groundwater contamination prevention, and composting.

The Alpine Watershed Group is a locally organized, voluntary group established to assess the condition of the watershed and to build a work plan for restoration and protection activities within the watershed. Their current programs include water quality monitoring, maintaining erosion control BMPs, stream bank restoration projects, and monthly informational meetings.

EBMUD has recognized since the early 1970s that water suppliers have an obligation, as managers of an essential natural resource, to educate the public to conserve and protect that resource. Environmental education is a key component of EBMUD's Public Information Division and for their NRD. In addition, EBMUD provides ranger-naturalists to lead field trips to EBMUD reservoirs and watershed lands.

Stewardship through Education Program. In 2005, local teachers, the CSRC&D Council, and the UMRWA began a watershed education program for local schools. The Stewardship through Education Program is run by teachers and funded by local water agencies and EBMUD.

The annual Mokelumne River Cleanup Day is sponsored by EBMUD, the MCCT Council and various local businesses. Volunteers typically include kayakers, anglers, and other river lovers; representatives of the Foothill Conservancy, Mokelumne Wilderness Volunteers, Mokelumne Trailbusters, USFS, SNC, EBMUD, and Trout Unlimited, plus teams from local businesses and elected officials.

Fire and Fuels Management

BLM Lands

BLM runs a Fuel Wood Program where suitable dead and down material can be removed. Permits are sold on a case-by-case basis. The BLM Folsom Field Office FMP 2008 outlines wildland fire management strategies, including fire suppression and prescribed burn policies. Specific fire management strategies are listed for FMUs, and the Upper

Section 6. Watershed Control and Management

Mokelumne Watershed is covered by the Mokelumne FMU - CA-180-07. Specific data is presented for the FMU also includes fire history and total land. (Although BLM owns over 19,000 acres in this FMU, it is still only 3 percent of the total.)

National Forest Lands

NF BMPs for fire suppression and fuels management can be found in the document “USDA Water Quality Management for Forest Lands in California: Best Management Practices” The BMPs outline fire suppression and fuels management activities and require that water quality be protected while achieving management objectives. The BMPs cover prescribed burns and wildfires, considering fragile soils and steep slopes whenever possible.

In the 2004 SNFPA, described earlier, the first emphasis on fire and fuels management was placed on reducing fuels in the wildland urban interface (WUI), with a goal that 50 percent of initial fuel treatments are to be located in the WUI until all treatments in the WUI have been completed. The strategy of the 2004 SNFPA is based on the premise that disconnected fuel treatment areas overlapping across the general direction of fire spread will change fire spread, and thus, only a fraction of the acreage needs to be treated to yield desirable modifications to wildfire behavior. In essence, the SNFPA allows for fewer fuel treatments and less disturbance of the land. The 2004 SNFPA notes that only 0.3 percent of the standing inventory will be removed each year, which amounts to only 1/5 of the annual net growth. Thus, there is a net accumulation of fuel. The ROD recognizes the need for a better public understanding of the need to thin the forests.

The SNFPA lists guidelines for fuel management projects, and prescribes standards that reduce the impacts on habitat as defined by Home Range Core Areas and Protected Activity Centers, RCAs, and Critical Aquatic Refuges. California spotted owl and northern goshawk habitat especially place restrictions on fuel management activities.

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Section 7: Recommendations

The recommendations contained in Table 7-1 can help strengthen source protection, the first barrier against water quality degradation. By elevating the importance and strengthening the performance of the first barrier, the potential impacts on water treatment, the second barrier, are reduced.

Table 7-1 Summary of Recommendations

Recommendation	Responsible Agency	Description/Explanation
Continue water quality monitoring	The District	Continue water quality monitoring to protect source water and treated water quality. Implement regulatory monitoring as required by SWCRB and EPA, and operational monitoring as needed to optimize water treatment and distribution. Includes the second round of LT2ESWTR sampling, S2DBP monitoring, and reservoir limnological profiling.
Consider implementing a nutrient and algae study in Pardee Reservoir	The District	A new nutrient and algae study would investigate the role and source of nutrients affecting algae taste and odor events.
Continue event-specific follow-up water quality monitoring	The District, Caltrans	Monitor known spills or accidents entering reservoir or tributary, or with the potential to enter, that may significantly impact influent water quality.
Continue to implement 'No Wake Zone' along the reservoir shoreline	The District	Enforce 5-mph speed limit along the shoreline to reduce shoreline erosion.
Maintain outlet tower exclusion zone	The District	Provide additional protection for outlet towers against accidents (e.g., structural damage) and direct water quality impact (e.g., fuel leak from a boat).
Continue invasive species monitoring and vessel inspection program	The District	Prevent importation of invasive species that can negatively impact water quality and system infrastructure.
Maintain the no body contact policy in Pardee Reservoir and tributaries on District property	The District	Reduce potential for contamination.

Table 7-1 Summary of Recommendations (continued)

Recommendation	Responsible Agency	Description/Explanation
Continue to provide floating restrooms on Pardee Reservoir	The District	Reduce potential for contamination.
Maintain horse and dog restrictions	The District	Dogs are not allowed in or on Pardee Reservoir. Dogs are not allowed on trails outside the developed recreation areas. Horses are not allowed to enter or drink from waters other than developed drinking stations (applies to Pardee and Camanche Reservoirs and their tributaries on District property).
Continue trail maintenance and ground cover plantings	The District	Reduce erosion
Continue inspecting reservoir shoreline for erosion	The District	This is especially important when water level is lower than normal
Continue Penn Mine and Mine Tailing Ponds work, Camanche Watershed	The District	Continue ongoing compliance monitoring of the Penn Mine groundwater. Inspect conditions to ensure adequate storm water control measures are implemented. Continue working with BLM to finalize and implement remediation plans at the Mining Tailings Ponds.
Install and maintain in-stream sediment control as needed	The District	Control sediment loading from runoff.
Continue coordination with CAL FIRE and USFS when wildfires occur	The District	Especially if wildfire may impact source water
Continue surveillance and emergency response program	The District	The District rangers patrol and work with County Sheriffs for routine law enforcement within the District owned watershed lands. The District has an EOP that is written and administered in accordance with the NRF, NIMS and California SEMS guidelines.
Continue participation in watershed educational programs	The District	Stewardship through Education Program, Mokelumne Volunteer Program (MVP), Ranger Led Environmental Education Program (RLEEP) and Ranger-led tours.

Section 7. Potential Corrective Actions

Table 7-1 Summary of Recommendations (continued)

Recommendation	Responsible Agency	Description/Explanation
Continue participating in relevant agencies and stakeholder groups	The District	CAL FIRE, USFS, Calaveras and Amador Counties, BLM, UMRWA. Topics of interest include water quality, stormwater runoff, future development, fire and fuel management, surveillance and emergency response, and public education/outreach.
Continue monitoring HABs in District water bodies	The District	Monitor and track HABs through visual reservoir inspections, reservoir water quality profiles, and water treatment plant sampling. Take necessary actions to report and mitigate harmful HAB effects.
Continue investing in emergency response, investigation and/or remediation, and technical consulting and report/plan preparation	The District	Improve environmental programs such as point source wastewater discharges, potable water discharges, hazardous air pollutants, hazardous materials, and hazardous waste management (including fuel tanks), due diligence compliance and audits, storm water management, soil and groundwater management.

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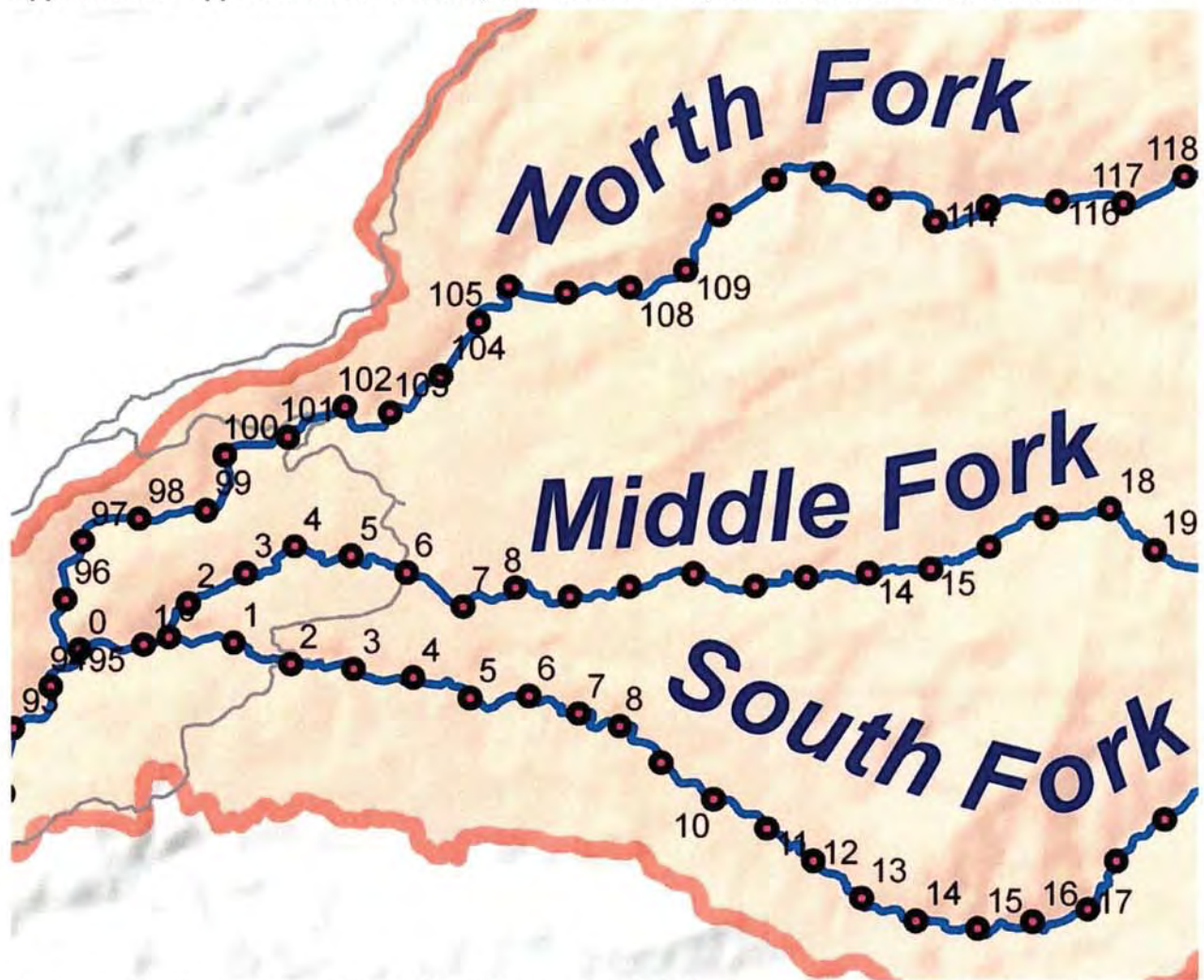
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Appendices

Appendix 3-1. Approximate River Miles, Mokelumne River, Section Above Pardee Reservoir (2 pages)

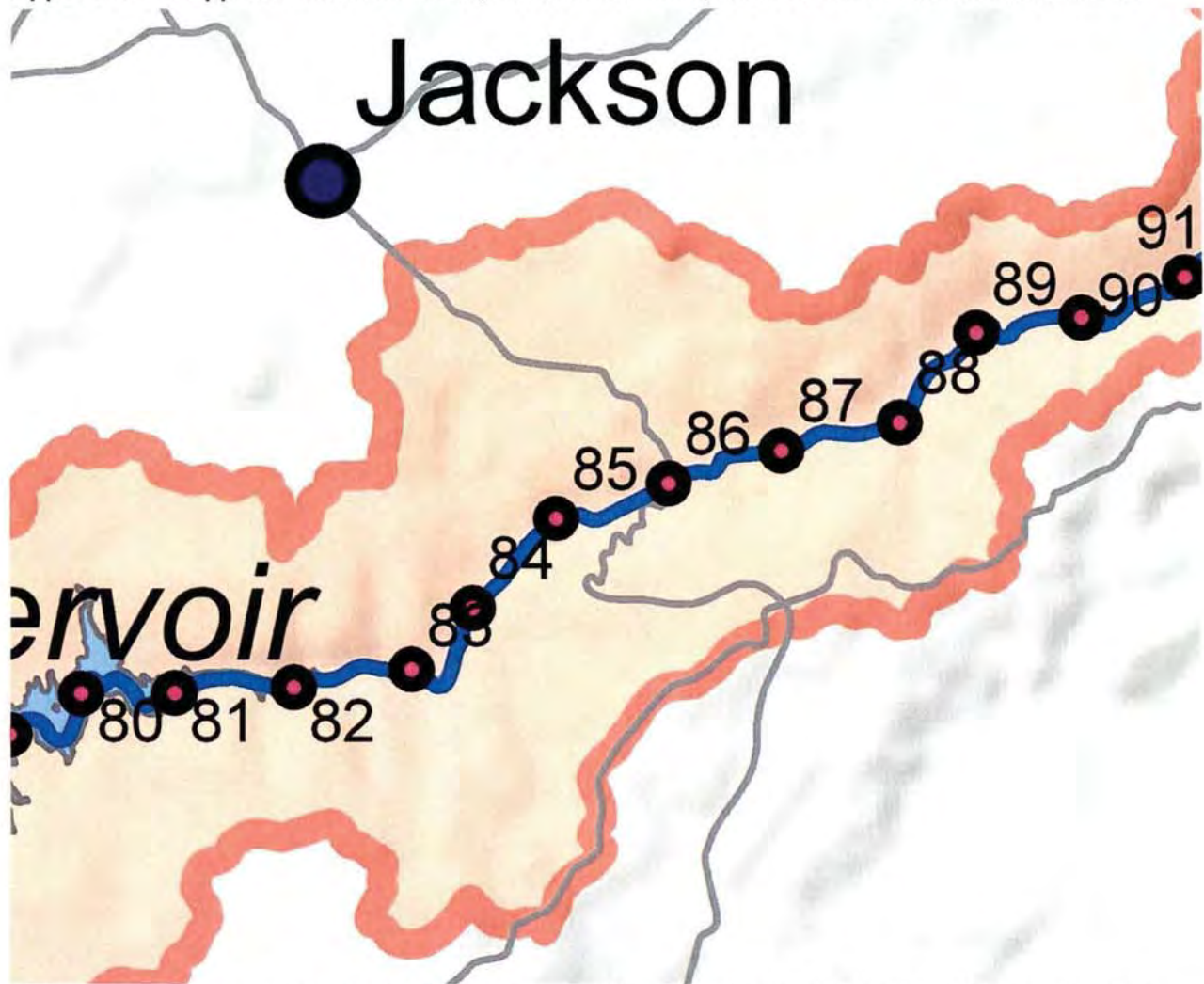
Estimated by James Jones, EBMUD Fisheries &
Wildlife, from 7.5-min USGS quadrangle maps

Appendix 3-1: Approximate River Miles, Mokelumne River, Section Above Pardee Reservoir #1



Estimated by James Jones, EBMUD Fisheries & Wildlife, from 7.5-minute USGS quadrangle maps

Appendix 3-1: Approximate River Miles, Mokelumne River, Section Above Pardee Reservoir #2



Estimated by James Jones, EBMUD Fisheries & Wildlife, from 7.5-minute USGS quadrangle maps

Appendix 3-2. Land Use Categories by County (1 page)

Appendix 3-2. Land Use Categories by County

Land Use Category	Calaveras		Amador		Alpine		El Dorado	
	Code	Description	Code	Description	Code	Description	Code	Description
Natural Resources	RM	Resource Management	AT	Agricultural Transition	OS	Open Space	--	Natural Resources
	RP	Resource Production	AG	Agricultural General				
	WL	Working Lands	GF	General Forest				
			OF	Open Forest				
Residential	RR	Rural Residential	RR	Rural Residential				
	RLD	Residential Low Density	RL	Residential Low Density				
	RMD	Residential Medium Density	RM	Residential Medium Density				
	RHD	Residential High Density						
Commercial	C	Commercial	C	Commercial				
	CR	Commercial Recreation						
Industrial	I	Industrial	I	Industrial				
Mixed Use	HC	Historic Center	TC	Town Center				
	CC	Community Center	RSC	Regional Service Center				
	FSP	Future Specific Plan	SPA	Special Planning Area				
			UA	Urban Planning Area				
Recreation	PR	Parks and Recreation	OR	Open Recreation	RS	Recreational Sites		
Wilderness			OW	Open Wilderness	W	Wilderness		
			W	Wilderness?				
Public Facility	PI	Public/ Institutional	PS	Public Service				
Mineral Resource	MR	Mineral Resource	MRZ	Mineral Resource Zone				
Other	RTA	Rural Transition – A	TTL	Tribal Trust Lands				
	RTB	Rural Transition - B	ROW	Right-of-Way				
	ROW	Right-of-Way	W	Water				
Unspecified			(Blank)					

Note that other land use designations appear in each of the counties' general plan. Only land uses that fall within the upper Mokelumne River Watershed boundary were summarized. Data was summarized from the Alpine County General Plan (revised 2009), Amador County General Plan (2016), Calaveras County General Plan (2019), Eldorado General Plan (parcel currency 2015), and associated GIS shapefiles.

Appendix 4-1. Title 22 Monitoring Plans

- Large East Bay System - Pardee Reservoir
- Pardee Center WTP - Pardee Reservoir
- Pardee Rec. Area WTP - Pardee Reservoir
- Camanche South Shore WTP - Camanche Reservoir

**Title 22 and EPA SDWA Monitoring Schedule
Pardee Reservoir – PWS 0110005 (large East Bay system)**

Parameter	2010 Projected Sampling Frequency ^a	Sampling Location ^b	Sample Collection ^c									
			2010 Monitoring Projections through 2019									
			2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Microbiological Contaminants ^d												
Cryptosporidium - LT2 Round 2	24M	PATW						X (9)	X(12)	X(3)		
Giardia - LT2 Round 2	24M	PATW						X (9)	X(12)	X(3)		
Total Coliform	M	PATW	X (12)	X (12)	X (12)	X (12)	X (12)	X (12)	X (12)	X (12)	X (12)	X (12)
E. Coli	M	PATW	X (12)	X (12)	X (12)	X (12)	X (12)	X (12)	X (12)	X (12)	X (12)	X (12)
Inorganics (IOCs)												
Asbestos ^e	1 X 9Y	PATW, SRAT02			X							
Fluoride ^f	A	PATW	C	X	X	X	X	X	X	X	X	X
Perchlorate	A (May to September)	PATW	C	X	X	X	X	X	X	X	X	X
Remaining IOCs ^g	A	LAFWTP Eff, ORWTP Eff & WC WTP Eff	C	X	X	X	X	X	X	X	X	X
Lead and Copper ^h	1 X 3Y	Consumer Taps and Distribution System		X			X			X	X	
Synthetic Organics (SOCs)												
All SOCs	2 X 3Y (spring and fall)	PATW			X X			X X			X X	
Radionuclides												
Gross alpha particle activity	1 X 9Y	PATW						X				
Gross beta, Radium 226 & 228, uranium	1 X 9Y	PATW						X				
Strontium-90, Tritium	1 X 9Y	PATW						X				
Volatile Organics (VOCs)												
All VOCs	A	PATW	X	X	X	X	X	X	X	X	X	X
Total Trihalomethanes ⁱ	Q	S2DBPR Taps	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
Haloacetic Acids (5) ^j	Q	S2DBPR Taps	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
Secondary Contaminants												
Thiobencarb	2 X 3Y (spring and fall)	PATW	W	W	X X	W	W	X X	W	W	X X	W
Remaining secondary contaminants ^g	A	LAFWTP Eff, ORWTP Eff & WC WTP Eff	W	X	X	X	X	X	X	X	X	X
EPA - UCMR ^j												
UCMR3	Q	EPTDS, DSMRT				X	XXXX	X				
UCMR4	Varies	S2DBPR Taps, EPTDS, PATW									XXX	X

a) Symbols for sampling frequency:

24M = 24 consecutive months
M = Monthly

Q = Quarterly

A = Annually, once per year

Y = Years

2 X 3Y = Twice per year every 3 years

1 X 3Y = Once per every 3 years

1 X 9Y = Once per every 9 years

b) Abbreviations for Sampling Locations:

PATW = Pardee Tower in Pardee Reservoir
ORWTP Eff = Orinda WTP Effluent

Lafayette Eff = Lafayette WTP Effluent
Walnut Creek Eff = Walnut Creek WTP Effluent

S2DBPR Taps = 16 taps in the distribution system
EPTDS = Entry points to the distribution system

DSMRT = Distribution system maximum residence time locations
SRAT02 = San Ramon Tap No. 2^{*}

c) Symbols for sample collection:

X = monitoring required

W = monitoring waived

d) In addition to source water monitoring, total coliform monitoring of distribution system (85 samples each week) occurs according to the Revised Total Coliform Rule Bacteriological Sample Siting Plan.

e) Asbestos samples are collected at PATW and in the distribution system at San Ramon Tap No. 2, which is served by asbestos-cement pipe.

f) In addition to source water monitoring, fluoride is also monitored daily in the distribution system per fluoride monitoring and compliance plan.

g) The remaining primary IOC's and secondary contaminants are measured in the treated water effluent of each water treatment plant, in lieu of sampling at the reservoirs, for compliance purposes.

h) Lead and Copper Rule requires first draw samples at 50 consumer taps once every three years. Water quality testing for pH and alkalinity is required every 3 years at 10 selected taps: 5 taps in January and 5 taps in June.

i) Total trihalomethanes (TTHM) and five haloacetic acids (HAAs) are disinfection byproducts regulated as part of the Stage 2 Disinfectants and Disinfection Byproduct Rule (S2DBPR). They are monitored quarterly at 16 monitoring locations in the distribution system.

j) The Unregulated Contaminant Monitoring Rule (UCMR) requires systems to collect data on unregulated contaminants that are suspected to be present in drinking water.

• UCMR3 monitoring conducted 2013 - 2015, quarterly for a year, when plants were in service, for various VOCs, SOCs, perfluorinated compounds (PFAs), metals, and hormones. All parameters monitored at EPTDS locations and some were also collected at DSMRT.

• UCMR4 monitoring conducted 2018 - 2019 for 30 different contaminants at varying locations and frequency when plants were in service: 10 cyanotoxins monitored biweekly at EPTDS for four consecutive months, various other contaminants (pesticides, metals, alcohols, and semivolatile organic chemicals) monitored quarterly for a year at EPTDS, and 3 HAA groups monitored quarterly at S2DBPR Taps. Two parameters that are indicators for HAAs, bromide and total organic carbon (TOC), monitored quarterly in the source water (PATW).

EBMUD - Pardee Center (System No. 0500053)

Water Quality Monitoring Plan

(Updated November 2015)

Note: Pardee Center is classified as a Nontransient-noncommunity water system.

Source Names: Station Numbers (for lab reporting):
 Pardee Reservoir-Raw 0500053-001
 Treatment Plant-Treated 0500053-002

The matrix is divided into 4 quarters per year. If there is an X or a specific chemical(s) in one of the boxes, monitoring for that chemical or chemical category needs to be conducted during the designated quarter(s) or designated month. Note: "Q" represents a quarter, which should be separated by 3 months.

YEAR	2016				2017				2018			
Source Monitoring – All Results To Be Transmitted by EDT												
Test	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Inorganics			X July				X July				X July	
Gen Mineral/ Gen Physical			Optional				Optional				Optional	
Nitrate (as N) (Annually)			X July				X July				X July	
Nitrite (Every 3 years)											X July	
Reg. VOC (Every 6 years)											X July	
Reg. SOC (see page 2)												
Gross Alpha (Every 9 years)		X April										
Perchlorate		1 Sample between May & September				1 Sample between May & September				1 Sample between May & September		
Hexavalent Chromium (Cr 6) * (Annually)				X December				X Dec				X Dec
Distribution Monitoring – Send All Results To Division of Drinking Water, Stockton District Office												
Lead & Copper (Every 3 years)							X June – Sept					
TTHM/HAA5 (Annually)			X July				X July				X July	
Max. Residual Disinfectant Level (Monthly)	X Monthly	X Monthly	X Monthly	X Monthly	X Monthly	X Monthly	X Monthly	X Monthly	X Monthly	X Monthly	X Monthly	X Monthly

* Hexavalent chromium was first required for monitoring in Dec. 2015, then required monitoring was rescinded in Sep. 2017.

Pardee Center Water Quality Monitoring

Source Monitoring-All results to be transmitted to Division of Drinking Water by Electronic Data Transfer (EDT)

- **Gen Mineral/Gen Physical** frequency: Optional since system is a Nontransient-noncommunity water system. However, EBMUD has been conducting monitoring on an ongoing basis for many years.
- **Inorganics** frequency: Annually
- **Nitrate** (as N) frequency: Annually
- **Nitrite** frequency: Every 3 years (next due in July 2017)
- **Reg. VOC** = Regulated Volatile Organic Chemicals. Frequency: Every 6 years. Next VOC monitoring due in July 2018.
- **Reg. SOC** = Regulated Synthetic Organic Chemicals monitoring has been waived.
- **Gross Alpha**: Two quarters of monitoring in January and April 2007 had results less than the DLR and the remaining two quarters were waived. The next single sample for Gross Alpha will be required in April 2016.
- **Perchlorate**: Annually between May and September.
- **Hexavalent Chromium** (Cr 6): Initial monitoring before January 1, 2015, specifically for Hexavalent Chromium. For subsequent routine monitoring, total chromium results may be used in lieu of hexavalent chromium monitoring if the chromium results are less than the total chromium detection limit for reporting (DLR) of 10 ug/L. Next Sample due in December 2015.

Distribution System Monitoring – All results to be sent to Division of Drinking Water, Stockton District Office

Note: Additionally, annual TTHM & HAA5 results shall be transmitted electronically (EDT) to the Division of Drinking Water

- **Lead and copper tap monitoring (5 samples) to be conducted between June and September 2017.** Frequency: Every 3 years.
- **TTHM and HAA5:** TTHM/HAA5 monitoring at one sample per year during July to be taken from the sample site at the Main Office. Reporting forms to be sent to Division's Stockton office with August reports. **Note that Stage 2 began with the July 2014 monitoring and the results from 2014 and thereafter shall be transmitted to the Division via EDT using the Station Code: 0500053-900.**
- **Maximum Residual Disinfectant Level (MRDL):** Monthly MRDL monitoring at the same points in the distribution system and at the same time as total coliform are sampled. Reporting forms to be sent to the Division each quarter.

Pardee Recreation Area (System No. 0301038)

Water Quality Monitoring Plan

(Updated November 2015)

Note: Pardee Recreation Area is classified as a nontransient-noncommunity water system.

Source Names: Station Numbers (for lab reporting):
 Pardee Reservoir-Raw 0301038-001
 Treatment Plant-Treated 0301038-002

The matrix is divided into 4 quarters per year. If there is an X or a specific chemical(s) in one of the boxes, monitoring for that chemical or chemical category needs to be conducted during the designated quarter(s) or designated month. **Note:** "Q" represents a quarter, which should be separated by 3 months.

YEAR	2016				2017				2018			
Source Monitoring – All Results To Be Transmitted by EDT												
Test	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Inorganics (Annually)	X January				X January				X January			
Nitrate (as N) (Annually)		X April				X April				X April		
Nitrite (Every 3 years)						X April						
Reg. VOC (Every 6 years)	X January											
Reg. SOC (see page 2)	X January											
Gross Alpha (Every 9 years)	X January											
Perchlorate (Initial Sampling 2016)	1 Sample January	1 Sample between May & September				1 Sample between May & September				1 Sample between May & September		
Hexavalent Chromium (Cr 6) * (Initial Sampling 2016)	X January				X January				X January			
Asbestos (Every 9 years)	X January											
Distribution Monitoring – Send All Results To Division of Drinking Water, Stockton District Office												
Lead & Copper (Initial Monitoring)	10 samples Feb		10 samples August				10 samples June – Sept				10 samples June – Sept	
TTHM/HAA5 (Annually)	X Initial Sample		X July				X July				X July	
Max. Residual Disinfectant Level (Monthly)	X Monthly	X Monthly	X Monthly	X Monthly	X Monthly	X Monthly	X Monthly	X Monthly	X Monthly	X Monthly	X Monthly	X Monthly

* Required monitoring for hexavalent chromium was rescinded Sep. 2017.

Pardee Recreation Area Water Quality Monitoring

Source Monitoring-All results to be transmitted to Division of Drinking Water by Electronic Data Transfer (EDT)

- **Inorganics** frequency: Annually
- **Nitrate** (as N) frequency: Annually
- **Nitrite** frequency: Every 3 years (next due in April 2017)
- **Reg. VOC** = Regulated Volatile Organic Chemicals. Frequency: Every 6 years. Next VOC monitoring due in January 2016.
- **Reg. SOC** = Atrazine and Simazine monitoring is required every 9 years. Next due in January 2016.
- **Gross Alpha**: The next single sample for Gross Alpha will be required in January 2016.
- **Perchlorate**: Initial perchlorate monitoring requires systems to collect two samples in a year, five to seven months apart. At least one of these samples has to be collected during the period of May 1 through September 30. The first sample is due in January 2016.
- **Hexavalent Chromium** (Cr 6): Initial monitoring before January 31, 2016, specifically for Hexavalent Chromium. For subsequent routine monitoring, total chromium results may be used in lieu of hexavalent chromium monitoring if the chromium results are less than the total chromium detection limit for reporting (DLR) of 10 ug/L.

Distribution System Monitoring – All results to be sent to Division of Drinking Water, Stockton District Office

Note: Additionally, annual TTHM & HAA5 results shall be transmitted electronically (EDT) to the Division of Drinking Water

- **Lead and copper tap monitoring (10 samples)**: Initial sampling for lead and copper requires systems to collect standard tap monitoring for two consecutive six-month periods. These samples are due in February 2016 and August 2016.
- **TTHM and HAA5**: System is to submit a Stage 2 Disinfection Byproduct Rule (ST2DBPR) Monitoring Plan to the Division by January 31, 2016. System must identify the location(s) which would have the highest potential levels of disinfection byproducts. Once the Monitoring Plan has been approved by the Division, monitoring should be conducted immediately. Following this initial sample, all subsequent samples should be taken on an annual basis, during the month of the highest potential disinfection byproduct level. The scheduled **sample** above matches the typical month of ST2DBPR sampling for East Bay MUD's other upcountry systems.
- **Maximum Residual Disinfectant Level (MRDL)**: Monthly MRDL monitoring at the same points in the distribution system and at the same time as total coliform are sampled. Reporting forms to be sent to the Division each quarter.

Camanche South Shore – EBMUD (System No. 0510012)

Water Quality Monitoring Plan

(Updated October 2015)

Source Names: Station Numbers (for lab reporting):
Camanche Lake-Treated 0510012-001
Camanche Lake Intake-Raw 0510012-002
ST2DBP – Campground Space 97 0510012-900

The matrix is divided into 4 quarters per year. If there is an X or a specific chemical(s) in one of the boxes, monitoring for that chemical or chemical category needs to be conducted during the designated quarter(s) or designated month. **Note:** “Q” represents a quarter, which shall be separated by 3 months.

YEAR	2016				2017				2018			
Source Monitoring – All Results To Be Transmitted by EDT												
Test	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Gen Mineral, Gen Physical, & Inorganics (Annually)		X May				X May				X May		
Nitrate (as N) (Annually)		X May				X May				X May		
Nitrite (Every 3 years)										X May		
Reg. VOC (Every 6 years)												
Reg. SOC (See note Page 2)												
Gross Alpha (See note Page 2)												
Perchlorate (Annually)		One sample between May and September				One sample between May and September				One sample between May and September		
Hexavalent Chromium (Cr 6) *			X Aug.				X Aug.				X Aug.	
Distribution Monitoring – Send All Results to Division of Drinking Water - Stockton District Office												
Lead & Copper (Every 3 years)			X June - Sept									
TTHM/HAA5 (Quarterly)	X	X	X	X	X	X	X	X	X	X	X	X
Max. Residual Disinfectant Level (MRDL)	X Monthly	X Monthly	X Monthly	X Monthly	X Monthly	X Monthly	X Monthly	X Monthly	X Monthly	X Monthly	X Monthly	X Monthly

* Required monitoring for hexavalent chromium was rescinded Sep. 2017.

Camanche South Shore Recreation Area - Water Quality Monitoring

Source Monitoring-All results to be transmitted to Division of Drinking Water by Electronic Data Transfer (EDT)

- **Gen Min/Gen Phys.**= General Mineral & General Physical.Frequency: Annually
- **Inorganics** Frequency: Annually
- **Nitrate** (as NO₃) Frequency: Annually
- **Nitrite Frequency:** Every 3 years. Next due in May 2018.
- **Reg. VOC** = Regulated Volatile Organic Chemicals. Frequency: Every 6 years. Next due in May 2020.
- **Reg. SOC** = Regulated Synthetic Organic Chemicals.
Frequency: Atrazine and Simazine once every 9 years in April. Next due in April 2021.
- **Gross Alpha** frequency: California Radionuclide Rule allows reduced monitoring.
Camanche Lake source qualifies for reduced monitoring of one sample every nine years (last done in 1/2010).
Next single sample to be taken in January 2019.
- **Perchlorate:** Sampling shall be annual between May and September.
- **Hexavalent Chromium (Cr 6):** Initial monitoring before January 1, 2015, specifically for Hexavalent Chromium. For subsequent routine monitoring, total chromium results may be used in lieu of hexavalent chromium monitoring if the chromium results are less than the total chromium detection limit for reporting (DLR) of 10 ug/L.

Distribution System Monitoring – All results to be sent to Division of Drinking Water - Stockton District Office

Note: Additionally, annual TTHM & HAA5 results shall be transmitted electronically (EDT) to the Division of Drinking Water

- **Lead and Copper tap monitoring to be conducted between June and September 2016.** Frequency: Every 3 years.
- **TTHM and HAA5:** Due to permanent population <500, TTHM/HAA5 monitoring at one sample per year during July to be taken from the sample site at Camp Site 97. Reporting forms to be sent to Division's Stockton District office with August reports and results also to be transmitted via EDT using Primary Station Code: **0510012-900**
- **Maximum Residual Disinfectant Level (MRDL):** Monthly MRDL at the same points in the distribution system and at the same time as total coliform are sampled. Reporting forms to be sent to Division of Drinking Water each quarter.

Appendix 4-2. Consumer Confidence Reports (CCRs), 2015 - 2019

- Large East Bay System (2019, 2018, 2017, 2016, 2015)
- Camanche South Shore WTP (2019, 2018, 2017, 2016, 2015)
- Pardee Center WTP (2019, 2018, 2017, 2016, 2015)
- Pardee Recreation Area WTP (2019, 2018, 2017, 2016, 2015)

EAST BAY MUNICIPAL UTILITY DISTRICT

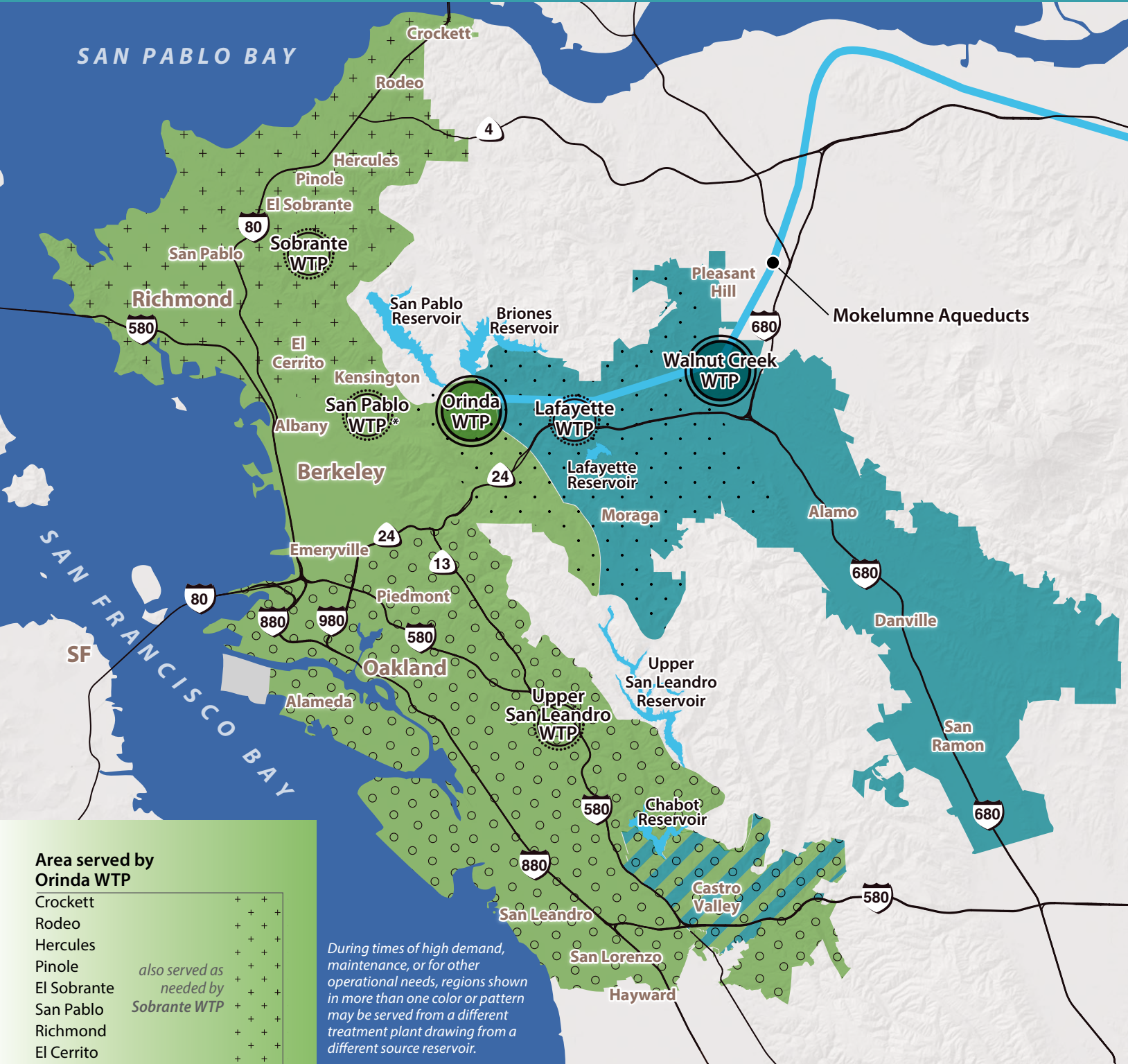
2019 **ANNUAL WATER QUALITY REPORT** for January through December

EBMUD is pleased to report that in 2019 your drinking water quality met or surpassed every state and federal requirement that safeguards public health.



San Pablo Reservoir

EBMUD SERVICE AREA



- Area served by Orinda WTP**
- Crockett
 - Rodeo
 - Hercules
 - Pinole
 - El Sobrante
 - San Pablo
 - Richmond
 - El Cerrito
 - Kensington

- Area served by Walnut Creek WTP**
- Orinda
 - Moraga
 - Piedmont
 - Oakland
 - Alameda
 - San Leandro
 - San Lorenzo
 - Castro Valley
 - Hayward
 - Albany
 - Berkeley
 - Emeryville

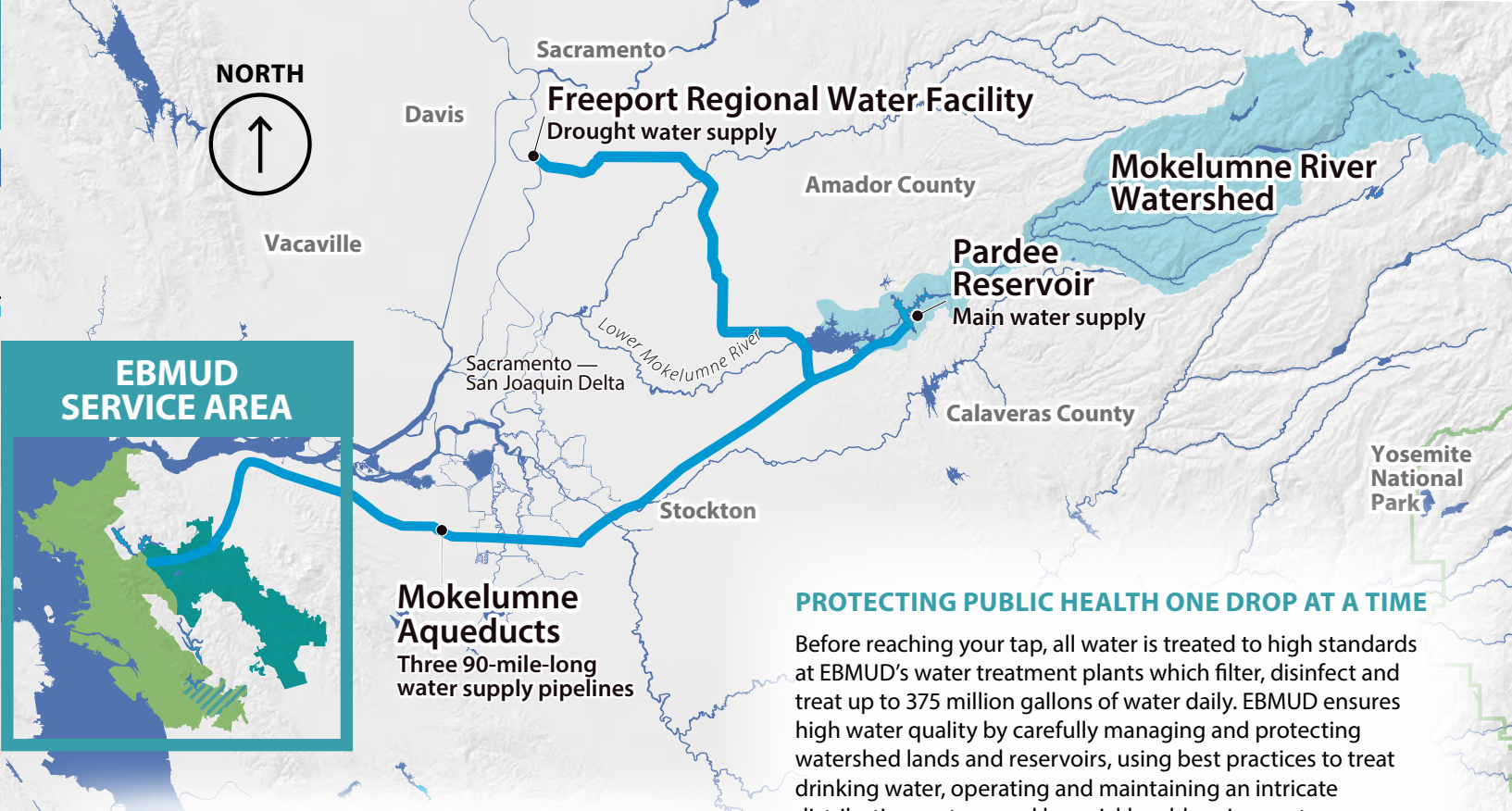
During times of high demand, maintenance, or for other operational needs, regions shown in more than one color or pattern may be served from a different treatment plant drawing from a different source reservoir.

- Area served by Walnut Creek WTP**
- Orinda
 - Moraga
 - Lafayette
 - Pleasant Hill
 - Walnut Creek
 - Alamo
 - Danville
 - San Ramon
 - Castro Valley

Water treatment plant (WTP)	Area served	Primary reservoir
Walnut Creek		Pardee
Lafayette		Pardee
Orinda		Pardee, Briones
Sobrante		San Pablo
Upper San Leandro		Upper San Leandro

* San Pablo WTP is a standby plant and was not in operation during 2019

Year-round WTPs Seasonal WTPs



FROM SNOWFLAKE TO THE BAY

The water flowing out of the taps of 1.4 million East Bay customers originates almost entirely from the 577-square mile Mokelumne River watershed on the western slope of the Sierra Nevada. This area consists mostly of national forest, EBMUD-owned lands and other undeveloped lands little affected by human activity. This is where our high water quality begins.

Snowmelt from Alpine, Amador and Calaveras counties flows into Pardee Reservoir near Valley Springs. Three large aqueducts transport water 90 miles from Pardee Reservoir to every customer, hydrant and fire service in EBMUD's service area. During drought or for operational needs, EBMUD may draw water from local watersheds in the East Bay or purchase water from other watersheds like the Sacramento River.

EBMUD's skilled employees operate a complex network of reservoirs, pipes, pumps and water treatment plants. This infrastructure is rarely seen, but it—and EBMUD staff—works around the clock to provide safe, reliable drinking water every day.

SOURCE WATER PROTECTION

EBMUD completed an initial source water assessment in 2002, and conducts watershed sanitary surveys for the Mokelumne River Watershed and East Bay (local) Watersheds every five years. The latest were completed in 2015 and include data for the period of 2010-2014. These surveys evaluate the sanitary conditions, water quality, results of watershed management activities, and identify potential contamination sources that may affect the watersheds. Potential contaminant sources include fire and fuels management, geologic hazards, erosion, wildlife and livestock, sanitation facilities, recreation, urban runoff, and transportation corridors. Ongoing efforts to identify and protect the source waters from all potential contaminating activities are an integral part of EBMUD's water quality management. To review these reports, contact EBMUD or the State Water Resources Control Board.

PROTECTING PUBLIC HEALTH ONE DROP AT A TIME

Before reaching your tap, all water is treated to high standards at EBMUD's water treatment plants which filter, disinfect and treat up to 375 million gallons of water daily. EBMUD ensures high water quality by carefully managing and protecting watershed lands and reservoirs, using best practices to treat drinking water, operating and maintaining an intricate distribution system, and by quickly addressing customer questions or concerns.

EBMUD samples and tests your water extensively to ensure it is safe to drink. We look for more than 100 substances including microorganisms, pesticides, herbicides, asbestos, lead, copper, petroleum products and by-products of industrial and water treatment processes. More than 20,000 laboratory tests each year ensure the safety of your drinking water.

UPHOLDING HIGH WATER QUALITY

We continually invest ratepayer dollars into our infrastructure to ensure we continue to deliver the highest quality water.

One by one, we are upgrading our water treatment plants to improve performance, increase reliability, and ensure safety for staff, neighbors and the environment.

EBMUD is adding ultraviolet light disinfection at the Orinda Water Treatment Plant, adding new disinfection basins at three water treatment plants, improving chemical storage and handling facilities, adding clarification basins to improve removal of particles from the water, and making electrical improvements at Sobrante Water Treatment Plant to ensure reliability.

At San Pablo Reservoir, a project is underway to improve water quality by adding oxygen to the bottom of the reservoir. This will prevent release of nutrients and metals from the sediments, discouraging the growth of algae and improving water quality. A similar oxygenation system has been in place in our Upper San Leandro Reservoir for more than a decade.

These large, multi-year capital projects will modernize the treatment plants, improve worker and environmental safety, and improve our capability to treat challenging source waters. As the climate changes, we expect to see more frequent and severe weather events such as droughts and intense storms. Our treatment plant improvement program will help meet these challenges.



Sobrante Water Treatment Plant uses ozone to control taste and odor. The ozone equipment was recently upgraded to make it more reliable and energy efficient. Solar panels (above) help keep EBMUD green by generating clean power.

WHERE YOUR WATER IS TREATED

Before reaching your tap, EBMUD treats the water at one of the water treatment plants in the East Bay. Some customers receive water from different treatment plants depending on the time of the year. The taste and odor of your tap water may change throughout the year because of operational changes (such as when a treatment plant is shut down for maintenance) or due to changes in the source water.

These water treatment plant locations are shown on the map on page 2.

WHAT WAS DETECTED AND REPORTED

In 2019, EBMUD treated raw water from multiple sources and consistently provided high-quality drinking water, meeting or surpassing every public health requirement set by the State Water Resources Control Board (State Water Board) and the U.S. Environmental Protection Agency (USEPA).

The tables on the following pages show the measured amounts of contaminants detected in 2019 or in the most recent year sampling was required. Samples were collected in EBMUD’s source waters, at water treatment plants, in the distribution system and at customers’ taps.

Although EBMUD tests for more than 100 substances, this report only lists those detected at or above the state or federal level required for reporting. In this case, no news is good news!

Table 1 – Regulated for public health

These contaminants are regulated to protect your health. They have maximum contaminant levels, known as primary MCLs, set by the State Water Board or the USEPA. These levels are set as close to the established public health goals as is economically and technologically feasible.

Table 2 – Regulated for drinking water aesthetics

These contaminants are regulated to maintain aesthetic qualities such as smell, taste and appearance of drinking water. They have maximum contaminant levels, also known as secondary MCLs, set by the State Water Board.

Table 3 – Unregulated contaminants

These contaminants are not currently regulated. Unregulated contaminant monitoring helps the State Water Board and the USEPA determine where certain contaminants occur and whether the contaminants need to be regulated. The results under the Unregulated Contaminant Monitoring Rule part 4 (UCMR4) must be reported if detected. This table also includes other contaminants that have state notification levels and water agencies are encouraged—but not required—to report results to consumers.

Table 4 – Other parameters of interest to customers

These water measurements, such as pH, hardness and alkalinity, may be of interest to customers.

HOW TO READ THE WATER QUALITY TABLE

Find your location on the map on page 2. Note which water treatment plant(s) serve that area.

- 1

Go to the first column in the tables on pages 6–8 to find the contaminant you are interested in. Remember – no news is good news!
- 2

Column two lists the state or federal goal. At that amount or lower, there is no known or expected risk to health from the contaminant’s presence in drinking water. Not all listed contaminants have state or federal goals.
- 3

Column three notes the highest amount the State Water Board or the USEPA allows. This amount is usually not as low as the public health goal in column two.
- 4

Column four lists the average amount detected across the EBMUD service area or at designated locations.
- 5

Find the column that corresponds to the water treatment plant or plants that serve you. This is the range of concentration of the contaminant detected in your area’s water.
- 6

The last column lists how the contaminant typically gets into your drinking water.

1		2		3		4		5		6		
Regulated for public health Primary MCL (Unit)		State or federal goal PHG, MCLG or MDDL/G		Highest amount allowed MCL, MDDL or AL		System average		Water treatment plants			Typical sources	
								Walnut Creek	Lafayette	Orinda		Sobrante
Microbiological	Total Coliform	state rule	0	5%	NA	0.6% was the highest percentage found in any month					Naturally present in the environment	
		federal rule	NA	TT		met requirement						
	Turbidity (NTU)		NA	1	0.03	0.02 – 0.10	0.01 – 0.09	0.02 – 0.10	0.02 – 0.10	0.02 – 0.10	Soil runoff	
			NA	95% ≤ 0.3	100%	100%	100%	100%	100%	100%		
Inorganic	Aluminum (ppb)		600	1000	<50	<50	<50	<50	<50 – 59	<50	Erosion of natural deposits; water treatment residue	
	Fluoride ^a (ppm)		1	2	0.7	0.7 – 0.8	0.7 – 0.8	0.6 – 0.8	0.7 – 0.8	0.7 – 0.8	Erosion of natural deposits; water additive that promotes strong teeth	
Organic	Bromate (ppb)		0.1	10	1.7 ^b	NA	NA	NA	<1 – 6.2	<1 – 1.4	By-product of drinking water disinfection	
	Chloramine as chlorine ^c (ppm)		4	4	2.3 ^b	0.08 – 3.4					Drinking water disinfectant added for treatment	
	Control of DBP precursors – TOC		NA	TT	NA	NA	NA	NA	met requirement		Various natural and man-made sources	

In 2019, your drinking water was consistently the highest quality, surpassing every public health requirement set by the State Water Resources Control Board Division of Drinking Water and the U.S. Environmental Protection Agency.



EBMUD’s Senior Water Distribution Operators, like Arcelio, monitor and control the water distribution system around the clock to ensure adequate flow and pressure to all parts of the system.

UNITS

- gpg grains per gallon
- NTU nephelometric turbidity unit, a measure of the cloudiness of water
- ppm parts per million. One ppm is like 1 second in 11.5 days. (mg/L)
- ppb parts per billion. One ppb is like 1 second in nearly 32 years. (µg/L)
- ppt parts per trillion. One ppt is like 1 second in nearly 32,000 years. (ng/L)
- TON threshold odor number, a measure of odor in water
- µS/cm microsiemens per centimeter, a measure of electrical conductance

EBMUD 2019 ANNUAL WATER QUALITY REPORT

1 Regulated for public health Primary MCL (Unit)			State or federal goal PHG, MCLG or MRDLG	Highest amount allowed MCL, MRDL or AL	System average	Water treatment plants				Typical sources	
						Walnut Creek	Lafayette	Orinda	Sobranite	Upper San Leandro	
Microbiological	Total Coliform	state rule	0	5%	NA	0.6% was the highest percentage found in any month					Naturally present in the environment
		federal rule	NA	TT		met requirement					
	Turbidity (NTU)		NA	1	0.03	0.02 – 0.10	0.01 – 0.09	0.02 – 0.10	0.02 – 0.10	0.02 – 0.10	Soil runoff
			NA	95% ≤ 0.3	100%	100%	100%	100%	100%	100%	
Inorganic	Aluminum (ppb)		600	1000	<50	<50	<50	<50	<50 – 59	<50	Erosion of natural deposits; water treatment residue
	Fluoride ^a (ppm)		1	2	0.7	0.7 – 0.8	0.7 – 0.8	0.6 – 0.8	0.7 – 0.8	0.7 – 0.8	Erosion of natural deposits; water additive that promotes strong teeth
D/DBP's	Bromate (ppb)		0.1	10	1.7 ^b	NA	NA	NA	<1 – 6.2	<1 – 1.4	By-product of drinking water disinfection
	Chloramine as chlorine ^c (ppm)		4	4	2.3 ^b	0.08 – 3.4					Drinking water disinfectant added for treatment
	Control of DBP precursors – TOC		NA	TT	NA	NA	NA	NA	met requirement		Various natural and man-made sources
	Haloacetic acids, 5 species (ppb)		NA	60	51 ^d	23 – 51	26 – 29	21 – 39	16 – 70	17 – 37	By-product of drinking water disinfection
	Trihalomethanes (ppb)		NA	80	50 ^d	32 – 65	30 – 48	38 – 56	29 – 65	32 – 60	By-product of drinking water disinfection

2 Regulated for drinking water aesthetics Secondary MCL (Unit)		State or federal goal PHG or MCLG	Highest amount allowed MCL	System average	Water treatment plants					Typical sources
					Walnut Creek	Lafayette	Orinda	Sobrante	Upper San Leandro	
Aluminum (ppb)		NA	200	<50	<50	<50	<50	<50 – 59	<50	Erosion of natural deposits; water treatment residue
Chloride (ppm)		NA	250	6	3 – 5	3 – 4	4 – 6	13 – 16	16 – 17	Runoff/leaching from natural deposits
Color (color units)		NA	15	1	1	1	1	1	1	Naturally-occurring organic materials
Specific conductance (µS/cm)		NA	900	106	54	54	54 – 102	284	388	Substances that form ions when in water
Sulfate (ppm)		NA	250	7	1 – 2	1	1 – 9	27 – 37	45 – 48	Runoff/leaching from natural deposits
Total dissolved solids (ppm)		NA	500	65	35 – 53	32 – 46	33 – 63	140 – 190	220 – 260	Runoff/leaching from natural deposits
Turbidity (NTU)		NA	5	0.03	0.02 – 0.10	0.01 – 0.09	0.02 – 0.10	0.02 – 0.10	0.02 – 0.10	Soil runoff

KEY TERMS

- AL** Regulatory action level. The concentration which, if exceeded, triggers treatment or other requirements that a water system must follow.
- DBP** Disinfection by-products. These are formed when chlorine and/or ozone reacts with natural constituents in water. Trihalomethanes (THMs), haloacetic acids (HAAs), chlorate, and bromate are disinfection by-products.
- D/DBPs** Disinfection by-products, disinfection residuals and disinfection by-product precursors.
- MCL** Maximum contaminant level. The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs or MCLGs as is economically and technologically feasible. Secondary MCLs address odor, taste and appearance of drinking water.
- MCLG** Maximum contaminant level goal. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the USEPA.

- MRDL** Maximum residual disinfectant level. The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
- MRDLG** Maximum residual disinfectant level goal. The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.
- NA** Not applicable.
- primary drinking water standard** These standards regulate contaminants that affect health by setting MCLs, MRDLs, and treatment techniques (TT) along with their monitoring and reporting requirements.
- PHG** Public health goal. The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California EPA.
- TOC** Total organic carbon. A measure of organic content in the water.

- turbidity** A measure of the cloudiness of water. Turbidity is monitored because it is a good indication of the effectiveness of our filtration systems.
- TT** Treatment technique. A required process intended to reduce the level of a contaminant in drinking water.

NOTES

- a)** See page 11 for additional information about fluoride in drinking water.
- b)** Highest running annual average.
- c)** Chloramine residuals in the distribution system are measured as an equivalent quantity of chlorine. When the chloramine residual cannot be detected, the sample is further analyzed to ensure that microbiological water quality is in compliance with regulations.
- d)** This value is the highest locational running annual average, which compliance is based on. Water treatment plant values show the range of individual sample results.



Maintaining our infrastructure ensures reliable water quality. Here, a new roof is installed at Larkey Reservoir in Walnut Creek. The project includes replacing the roof, recoating the inside of the tank and installing electrical improvements.

3 Unregulated contaminants <i>No established MCL (Unit)</i>		Year sampled	State NL	System average	Water treatment plants				Upper San Leandro
UCMR4	Bromide in source water (ppb)	2018-2019	NA	<5	<5	<5	<5	22 – 26	35 – 46
	Haloacetic acids, 5 species (ppb)	2018-2019	NA	35	24 – 40	27 – 37	23 – 46	40 – 58	19 – 57
	Haloacetic acids, 9 species (ppb)	2018-2019	NA	36	25 – 41	28 – 37	24 – 47	43 – 66	25 – 68
	Haloacetic acids, 6 brominated species (ppb)	2018-2019	NA	2	0.3 – 2	0.4 – 1	0.4 – 2	3 – 10	0.6 – 12
	Manganese (ppb)	2018-2019	500	1	<0.4	<0.4	<0.4	<0.4 – 13	2 – 4
	TOC in source water (ppm)	2018-2019	NA	2.5	1.5 – 2.3	1.5 – 2.3	1.5 – 3.0	3.4 – 5.5	5.3 – 7.2
Others ^e	Boron (ppb)	2019	1000	<100	<100	<100	<100	<100	107
	Chlorate (ppb)	2019	800	90	52	120	82 – 92	73 – 220	58 – 110
	N-Nitrosodimethylamine (NDMA) (ppt)	2019	10	2	<1 – 2	1 – 2	1 – 2	3 – 5	1 – 2

4 Other parameters of interest to customers (<i>Unit</i>)		Water treatment plants				Upper San Leandro
		Walnut Creek	Lafayette	Orinda	Sobrante	
Alkalinity, Total as CaCO ₃ (ppm)		21 – 33	21 – 32	22 – 44	74 – 89	140 – 150
Calcium (ppm)		4 – 6	4	4 – 8	17 – 23	30 – 35
Hardness as CaCO ₃	(gpg ^f)	1	1	1 – 2	4 – 5	8 – 9
	(ppm)	13 – 24	12 – 23	14 – 34	70 – 94	140 – 150
Magnesium (ppm)		1	1	1 – 2	6 – 8	12 – 14
pH (pH)		9.3 – 9.4	9.2 – 9.4	9.2 – 9.4	8.1 – 8.9	8.2 – 8.6
Potassium (ppm)		<1 – 1	<1 – 1	<1 – 1	1	2
Silica (ppm)		8 – 12	8 – 12	8 – 12	9 – 11	9 – 10
Sodium (ppm)		5 – 6	5 – 6	5 – 9	20 – 26	27 – 32

WATER QUALITY REGULATIONS

In order to ensure that tap water is safe to drink, the State Water Board and the USEPA prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. California Department of Public Health (CDPH) and United States Food and Drug Administration regulations establish limits for contaminants in bottled water that provide the same protection for public health. Additional information on bottled water is available on the CDPH website at www.cdph.ca.gov/Programs/CEH/DFDCS/Pages/FDBPrograms/FoodSafetyProgram/Water.aspx.

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water include:

Microbial contaminants, such as viruses, bacteria and protozoa, such as *Cryptosporidium*, that may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.

Inorganic contaminants, such as salts and metals, that can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.

Pesticides and herbicides that may come from a variety of sources, such as agriculture, urban stormwater runoff and residential uses.

Organic chemical contaminants, including synthetic and volatile organic chemicals, that are by-products of industrial processes and petroleum production and can also come from gas stations, urban stormwater runoff, agricultural application and septic systems.

Radioactive contaminants that can be naturally occurring or be the result of oil and gas production and mining activities.

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects is available online at www.epa.gov/ground-water-and-drinking-water. Contact your healthcare provider or visit the Centers for Disease Control and Prevention (CDC) website for guidelines on using tap water for health or medical purposes.

Vulnerable populations

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly and some infants can be particularly at risk from infections.

These people should seek advice about drinking water from their health care providers. USEPA/CDC guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and *Giardia* and other microbial contaminants are available online at www.cdc.gov/parasites/crypto/index.html.

Cryptosporidium and Giardia

Cryptosporidium and *Giardia* are microbial contaminants that are naturally present in the environment and found in surface water throughout the United States. Filtration is highly effective in removing these contaminants, however the most commonly used filtration methods cannot guarantee 100 percent removal. In 2019 our monitoring detected *Cryptosporidium* and *Giardia* in our source water prior to reaching EBMUD water treatment plants.

Cryptosporidium and *Giardia* must be ingested to cause disease, and it may spread through means other than drinking water. Most healthy individuals can overcome the disease within a few weeks. However, immuno-compromised people, infants and small children, and the elderly are at greater risk of developing life-threatening illness. We encourage these individuals to consult their physician regarding appropriate precautions to take to avoid infection.

KEY TERMS

NL Notification level. A health-based advisory level established by the State Water Board for contaminants in drinking water that lack MCLs.

UCMR4 The federal unregulated contaminant monitoring rule part 4.

NOTES

- e)** Parameters with a notification level.
- f)** Grains per gallon (gpg) is a measure of water hardness. Knowing the amount can help improve the function of dishwashers, cooling equipment and other industrial processes. Refer to your appliance manufacturer’s instruction manual for the optimum grains per gallon level.

Disinfection Byproducts

Chlorine is used to kill pathogens in drinking water to protect public health. However, chlorine also reacts with naturally-occurring organic compounds to form unwanted disinfection byproducts. Disinfection byproducts are present in all chlorinated drinking water.

EBMUD continues to invest in long-term projects to provide more water treatment flexibility and reliability. We are making improvements to the disinfection systems at water treatment plants to ensure continued compliance with the disinfection requirements while minimizing formation of byproducts.

Lead in drinking water

If present, elevated levels of lead can cause serious health problems. Pregnant women, infants and young children are typically more vulnerable to lead in drinking water than the general population.

Lead in drinking water is primarily from materials and components associated with lead in water distribution pipes and home plumbing. EBMUD replaced all known lead service pipes in its service area in the 1990s and continues to actively seek out and replace any remaining lead materials. We maintain an aggressive corrosion control program to reduce lead leaching from our water mains and customer piping. Still, it is possible that lead may be present as a legacy of older plumbing practices. According to the USEPA, homes built before 1986 are more likely to have lead pipes or fixtures and solder that contain lead.

Our latest lead and copper sampling results at 53 customers’ homes were below the action levels for lead and copper and the 90th percentile values were below the detection limit. Lead and copper sampling was last completed in 2018. Due to low results, EBMUD samples for lead and copper every three years.

If you are concerned about elevated lead levels in your home’s water, you may have your water tested. EBMUD offers our customers one free lead test per year for their water. More than 1,300 customers have requested a free lead test voucher since the program began in 2017. Lead concentration from these customer samples continues to be very low (less than 1 ppb for 90 percent of the samples). Request a lead test voucher by calling Customer Service at 866-403-2683 or email customerservice@ebmud.com.

Also, if you suspect you have lead in your fixtures, anytime your water has been sitting for several hours, you can minimize the potential for lead exposure by running your faucet for 30 seconds to 2 minutes before using water for drinking or cooking. Capture and reuse this water for other uses such as watering ornamental plants.



From the Mokelumne Watershed to your tap, EBMUD inspects and tests water each step of the way. Water System Inspectors like Ben perform daily water quality checks from over 300 locations throughout EBMUD’s service area. Adequate chlorine turns the color pink in this sample bottle.



EBMUD customers can be confident in the quality of their drinking water.

Lead testing in schools

Sampling for lead in schools began in 2017 and completed in January 2020. EBMUD provided comprehensive lead testing at pre-kindergarten through 12th grade schools. All public schools and 41 percent of private schools in the service area were tested. Results to date are less than 5 ppb in 95 percent of the samples and less than 1 ppb in 77 percent of the samples. More than 7,800 samples were collected and made publicly available on the State Water Board’s website: www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/leadsamplinginschools.html.

In 2019, EBMUD received lead sampling requests from 32 schools. Information on lead in drinking water, testing methods and steps you can take to minimize lead exposure is available at www.ebmud.com/lead and from the USEPA at www.epa.gov/lead.

Fluoridation

EBMUD is required by state law to add fluoride to drinking water to help prevent dental decay in consumers. Current regulations require fluoride levels in the treated water be maintained between 0.6 to 1.2 ppm with an optimum dose of 0.7 ppm. Our monitoring showed that fluoride levels in the treated water distribution system averaged 0.7 ppm.

According to the American Dental Association and CDC, it is safe to use optimally fluoridated water for preparing infant formula. If an infant is primarily fed infant formula prepared with fluoridated water, there may be an increased chance for mild enamel fluorosis, but enamel fluorosis does not affect the health of the infant or the health of the infant’s teeth. To lessen this chance, deionized, purified, distilled or demineralized bottled water can be used.

If you have additional questions about fluoride, contact your health provider. Additional information can be found at www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/Fluoridation.shtml or www.cdc.gov/fluoridation websites.

REPORT A WATER QUALITY CONCERN

Do you have a question or concern about your water quality? Call 866-403-2683. EBMUD inspectors respond to calls within one business day regarding water which appears dirty, colored, has foreign particles or unusual taste or odor.

HOW TO CONTACT EBMUD

For more information about water quality or to report a water quality concern, call 866-403-2683 or visit www.ebmud.com/waterquality.

If you would like this report mailed to you, email customerservice@ebmud.com or call 510-986-7555. View this report online at www.ebmud.com/wqr.

EBMUD has a seven-member Board of Directors publicly elected from wards within the EBMUD service area. We invite the public to participate in decisions affecting drinking water quality and other matters at its Board of Directors meetings held the second and fourth Tuesdays of each month at 375 Eleventh Street, 2nd Floor, Oakland. See www.ebmud.com/board-meetings.

General Manager
Alexander R. Coate

ADDITIONAL CONTACTS

State Water Resources Control Board
Division of Drinking Water • 510-620-3474

Alameda Public Health Department • 510-267-8000

Contra Costa Public Health Division • 925-313-6712



375 Eleventh Street
Oakland, CA 94607
1-866-403-2683
www.ebmud.com

Susan manages EBMUD's water quality programs, tracks changing regulatory requirements and ensures stringent lab testing needed to meet day to day—and longer term—challenges.

PUB. 148 3/20 2M

This is important information about your drinking water. Translate it, or speak with someone who understands it.

Este documento contiene información importante sobre el agua potable que usted consume. Tradúzcalo o hable con alguien que lo entienda.

這是有關您飲用水的重要資訊。請翻譯資訊，或與瞭解其內容的人討論。

Ito ay isang mahalagang impormasyon tungkol sa inyong iniinom na tubig. Isaling-wika ito, o makipag-usap sa isang tao na naiintindihan ito.

Đây là thông tin quan trọng về nước uống của quý vị. Hãy chuyển ngữ tài liệu này, hoặc nói chuyện với người có thể hiểu về thông tin này.

여러분의 식수에 대한 중요한 정보입니다. 본 안내문을 번역하거나 내용을 이해하는 사람과 이야기하십시오.

این متن حاوی اطلاعات مهمی درباره آب آشامیدنی شما است. آن را ترجمه کرده یا با فردی که آن را متوجه می شود صحبت کنید.

Ce sont des renseignements importants concernant votre eau potable. Traduisez-les ou parlez-en avec quelqu'un en mesure de les comprendre.

यह महत्वपूर्ण जानकारी आपके पीने के पानी के बारे में है। इसका अनुवाद करें, या किसी ऐसे व्यक्ति से बात करें जो इसे समझता हो।

هذه معلومات هامة حول مياه الشرب التي تتناولها. ترجمها، أو تحدث إلى شخص يستطيع فهمها.

Здесь представлена важная информация о качестве вашей питьевой воды. Переведите эту информацию или попросите человека, знающего английский язык, пересказать ее вам.

これは、あなたの飲料水に関する重要な情報です。翻訳するか、理解できる方にご相談ください。

Dies ist eine wichtige Information zu Ihrem Trinkwasser. Übersetzen Sie sie oder sprechen Sie mit jemandem, der die Information versteht.

Este documento contém informações importantes sobre a sua água para consumo. Traduza-o ou fale com alguém que o compreenda.

Queste sono informazioni importanti sulla vostra acqua potabile. Fatele tradurre o parlate con qualcuno in grado di comprenderle.

ນີ້ແມ່ນຂໍ້ມູນສໍາຄັນກ່ຽວກັບນໍ້າດື່ມຂອງທ່ານ. ແປຂໍ້ມູນນີ້, ຫຼື ລິມັກັບບາງຄົນທີ່ເຂົ້າໃຈຂໍ້ມູນນີ້.

នេះគឺជាព័ត៌មានសំខាន់ អំពីទឹកផឹករបស់អ្នក។ សូមអ្នកផ្សព្វផ្សាយ ឬពិព្រោះជាមួយនឹងអ្នកណាដែលយល់វា។

یہ آپ کے پینے کے پانی کے بارے میں اہم معلومات ہے۔ اس کا ترجمہ کریں، یا اسے سمجھنے والے کسی شخص سے بات کریں۔

ຂໍ້ມູນນີ້ເປັນຂໍ້ມູນສໍາຄັນເຖິງກັບນໍ້າດື່ມຂອງທ່ານ ຂໍໃຫ້ແປຂໍ້ມູນນີ້ຫຼືພາບພາບກັບຜູ້ທີ່ເຂົ້າໃຈຂໍ້ມູນ

מדובר על מידע חשוב בנוגע למי השתייה שלך. תרגם את זה או שתפנה לאדם המבין את זה.

Ovo je važna informacija o pijaćoj vodi. Prevedite je, ili razgovarajte s nekim ko je razume.

Οι παρούσες είναι σημαντικές πληροφορίες σχετικά με το νερό που πίνετε. Μεταφράστε τις ή μιλήστε με κάποιον που τις καταλαβαίνει.

આ તમારા પીવાના પાણી વિશે મહત્વની માહિતી છે. તેનું ભાષાંતર કરો અથવા કોઈક એવી વ્યક્તિ સાથે વાત કરો જે તેને સમજતી હોય.

EAST BAY MUNICIPAL UTILITY DISTRICT

2018 **ANNUAL WATER QUALITY REPORT** for January through December

EBMUD is pleased to report that in 2018 your drinking water quality was equal to or better than state and federal requirements that safeguard public health.



Pardee Dam & Spillway

EBMUD SERVICE AREA



- Area served by Orinda WTP**
- Crockett
 - Rodeo
 - Hercules
 - Pinole
 - El Sobrante
 - San Pablo
 - Richmond
 - El Cerrito
 - Kensington

- Area served by Walnut Creek WTP**
- Orinda
 - Moraga
 - Piedmont
 - Oakland
 - Alameda
 - San Leandro
 - San Lorenzo
 - Castro Valley
 - Hayward
 - Albany
 - Berkeley
 - Emeryville

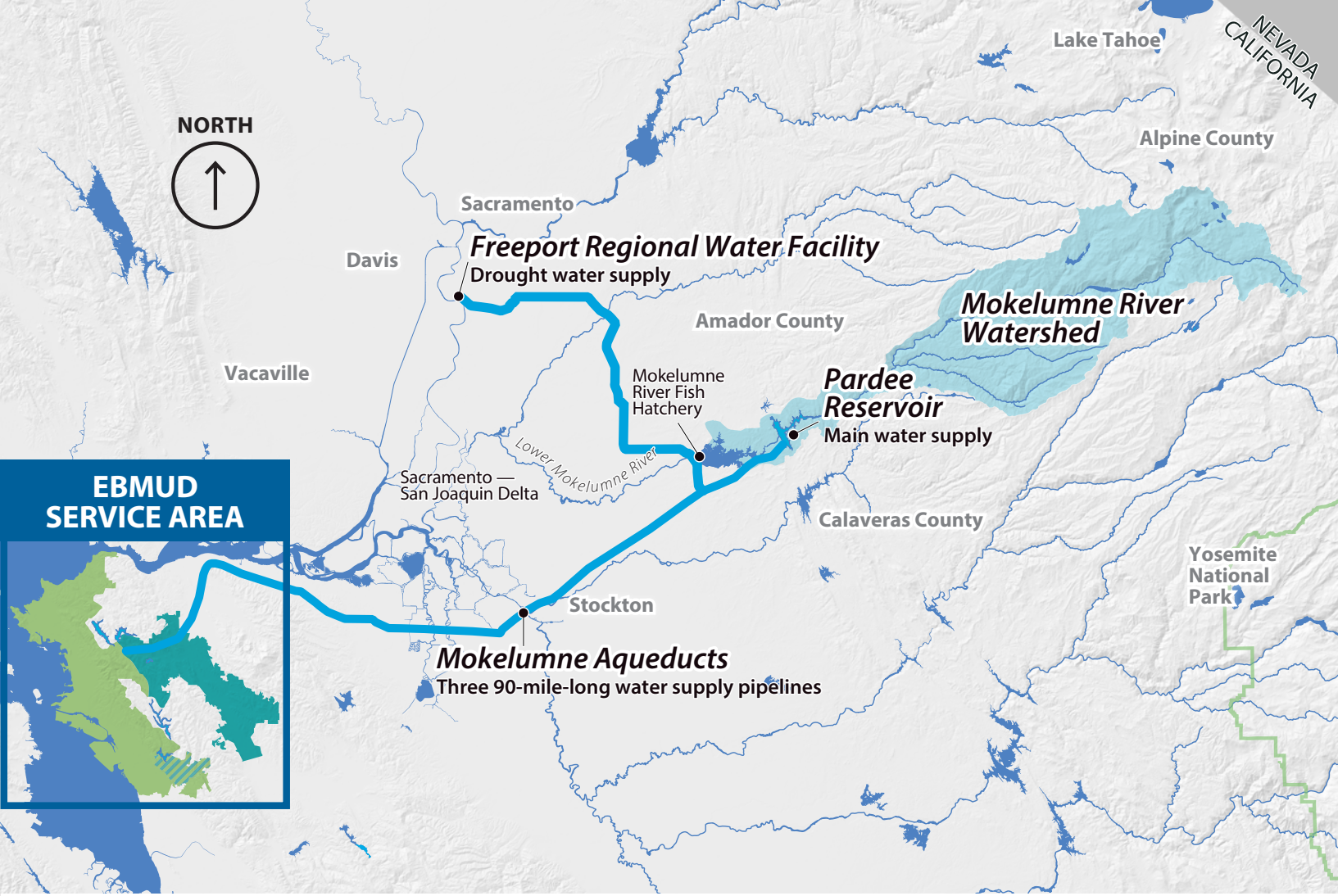
During times of high demand, maintenance, or for other operational needs, regions shown in more than one color or pattern may be served from a different treatment plant drawing from a different source reservoir.

- Area served by Walnut Creek WTP**
- Orinda
 - Moraga
 - Lafayette
 - Pleasant Hill
 - Walnut Creek
 - Alamo
 - Danville
 - San Ramon
 - Castro Valley

Water treatment plant (WTP)	Area served	Primary reservoir
Walnut Creek		Pardee
Lafayette		Pardee
Orinda		Pardee, Briones
Sobrante		San Pablo
Upper San Leandro		Upper San Leandro

* San Pablo WTP is a standby plant and was not in operation during 2018

Year-round WTPs Seasonal WTPs



SNOWFLAKE TO THE BAY

In the East Bay, 1.4 million customers rely on high-quality EBMUD water. Almost all of EBMUD's water comes from the 577-square mile watershed of the Mokelumne River on the western slope of the Sierra Nevada. This area consists mostly of national forest, EBMUD-owned lands and other undeveloped lands little affected by human activity.

EBMUD's water system begins in the Sierra Nevada, where snowmelt from Alpine, Amador and Calaveras counties flows into Pardee Reservoir near Valley Springs. Three large aqueducts transport water 90 miles from Pardee Reservoir to every customer, hydrant and fire service in EBMUD's service area. During drought or for operational needs, EBMUD may draw water from other watersheds (like the Sacramento River) or from local watersheds in the East Bay.

EBMUD's skilled employees operate a complex network of reservoirs, pipes, pumps and water treatment plants. This infrastructure is rarely seen, but works around the clock to provide safe, reliable drinking water every day.

HOW WE MANAGE WATER QUALITY

All water is treated at one of the EBMUD water treatment plants before it reaches your tap. These treatment plants can filter and process up to 375 million gallons of water daily. EBMUD ensures high water quality by carefully managing and protecting watershed lands and reservoirs, using best practices to treat drinking water, operating and maintaining an intricate

distribution system, and by quickly addressing customer questions or concerns.

EBMUD samples and tests your water extensively to ensure it is safe to drink. We look for more than 100 substances including microorganisms, pesticides, herbicides, asbestos, lead, copper, petroleum products and by-products of industrial and water treatment processes. More than 20,000 laboratory tests each year ensure the safety of your drinking water.

NEW SYSTEMS FOR NEW CHALLENGES

EBMUD invests your rate dollars to efficiently provide the highest quality water.

We have completed replacement of the ozone systems at Upper San Leandro and Sobrante water treatment plants. Ozone removes traces of naturally occurring compounds that can impart taste and odor to the water.

Ozone has been used at these water treatment plants since the 1990s. These new capital improvements will improve their resilience to changes in source water with significantly improved energy efficiency.

We are upgrading all of our water treatment plants to improve performance, increase reliability, and ensure safety for staff, neighbors and the environment. It will take years to complete, but careful planning and design will ensure continued production of high quality water into the future.



Orinda Water Treatment Plant, which delivers water to 800,000 East Bay customers, received \$22 million in upgrades.

WHERE YOUR WATER IS TREATED

Most of our water comes from the Mokelumne River watershed in the Sierra Nevada foothills. The remaining water comes from water collected in the East Bay watershed.

Before reaching your tap, EBMUD treats the water at one of the water treatment plants in the East Bay. Some customers receive water from different treatment plants at different times of the year. The taste and odor of your tap water may change throughout the year because of operational changes (such as when a treatment plant is shut down for maintenance) or due to changes in the source water.

WHAT WAS DETECTED AND REPORTED

In 2018, EBMUD treated raw water from multiple sources and consistently provided high-quality drinking water, meeting or surpassing every public health requirement set by the State Water Resources Control Board (State Board) and the U.S. Environmental Protection Agency (USEPA).

The tables on the following pages show the measured amounts of contaminants detected in 2018 or in the most recent year sampling was required. Samples were collected in EBMUD’s source waters, at water treatment plants, in the distribution system or at customers’ taps.

Although EBMUD tests for more than 100 substances, this report only lists those detected at or above the state or federal level required for reporting. In this case, no news is good news!

Table 1 – Regulated for public health

These contaminants are regulated to protect your health. They have maximum contaminant levels, known as primary MCLs, set by the State Board or the USEPA. These levels are set as close to the established public health goals as is economically and technologically feasible.

Table 2 – Regulated for drinking water aesthetics

These contaminants are regulated to maintain aesthetic qualities such as smell, taste and appearance of drinking water. They have maximum contaminant levels, also known as secondary MCLs, set by the State Board.

Table 3 – Unregulated contaminants

These contaminants are not currently regulated. Unregulated contaminant monitoring helps the State Board and the USEPA to determine where certain contaminants occur and whether the contaminants need to be regulated. The results under Unregulated Contaminant Monitoring Rule (UCMR3 and UCMR4) must be reported if detected. The UCMR4 is an extended list of unregulated contaminant monitoring that started in 2018 and will continue through 2019. This table also includes other contaminants that have state notification levels and water agencies are encouraged—but not required—to report results to consumers.

Table 4 – Other parameters of interest to customers

These water measurements, such as pH, hardness and alkalinity, may be of interest to customers.

HOW TO READ THE WATER QUALITY TABLE

Find your location on the map on page 2. Note which water treatment plant(s) serve that area.

- 1

Go to the first column in the tables on pages 6–8 to find the contaminant you are interested in. Remember – no news is good news!
- 2

Column two lists the state or federal goal. At that amount or lower, there is no known or expected risk to health from the contaminants’ presence in drinking water. Not all listed contaminants have state or federal goals.
- 3

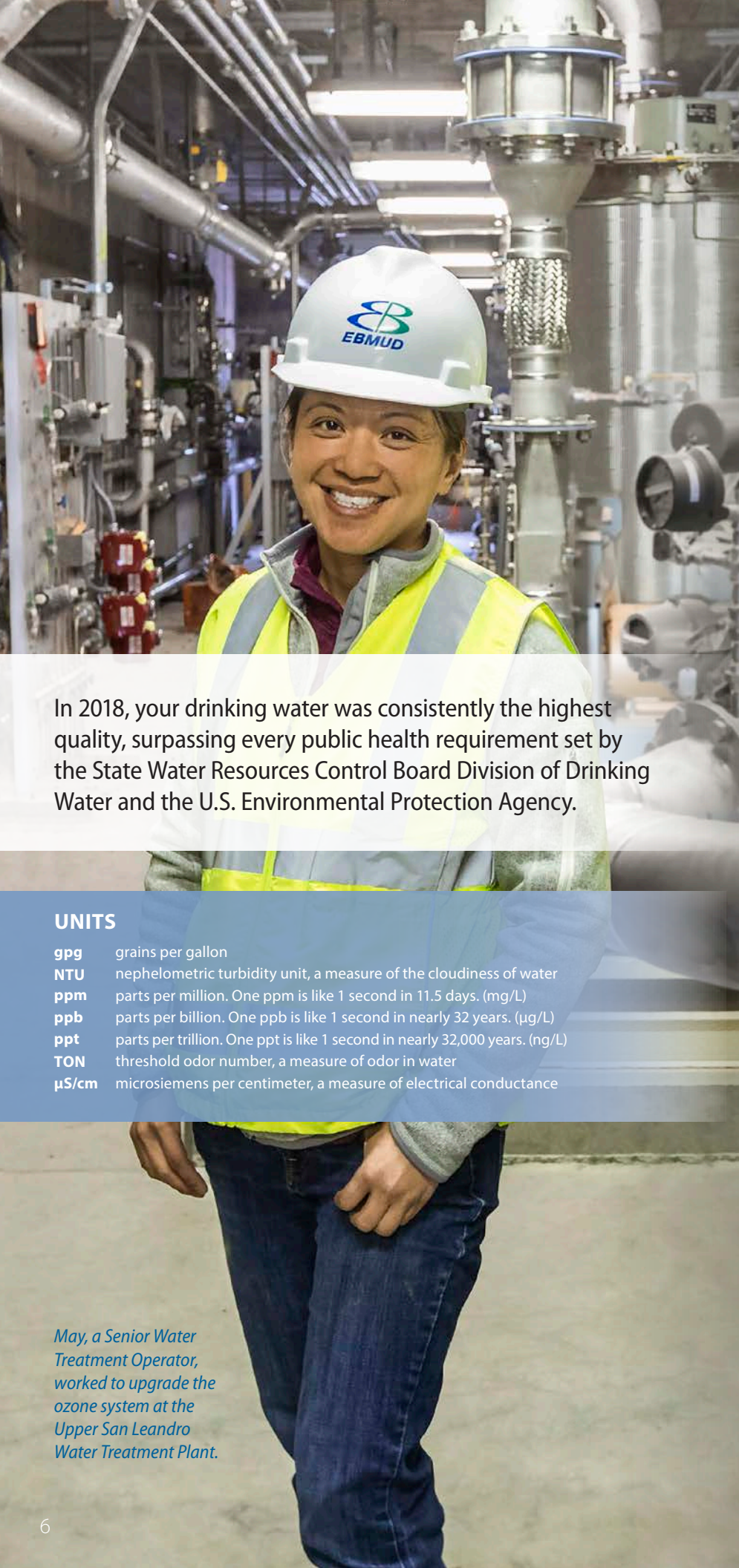
Column three notes the highest amount that the State Board or the USEPA allows. This amount is usually not as low as the public health goal in column two.
- 4

Column four lists the average amount detected across the EBMUD service area or at designated locations.
- 5

Find the column that corresponds to the water treatment plant or plants that serve you. This is the amount of the contaminant detected in your area’s water.
- 6

The last column lists how the contaminant typically gets into your drinking water.

1		2		3		4		5					6			
1 Regulated for public health Primary MCL (Unit)			State or federal goal PHG, MCLG or MRLDG		Highest amount allowed MCL, MRLD or AL		System average		Water treatment plants				Upper San Leandro		Typical sources	
									Walnut Creek	Lafayette	Orinda	Sobranite				
Microbiological	Total Coliform	state rule	0		5%		NA		0.3% was the highest percentage found in any month						Naturally present in the environment	
		federal rule	NA		TT				met requirement							
	Turbidity (NTU)		NA		1		0.03		0.02 – 0.10	0.01 – 0.10	0.02 – 0.10	0.02 – 0.10	0.02 – 0.10	Soil runoff		
		NA		95% ≤ 0.3		100%		100%	100%	100%	100%	100%				
Inorganic	Aluminum (ppb)		600		1000		<50		<50	<50 – 60	<50	<50 – 52	<50 – 55	Erosion of natural deposits; water treatment residue		
	Copper (ppb)		300		1300		90 th percentile = 37		0 out of 55 sites were above the regulatory action level						Corrosion of household plumbing; erosion of natural deposits	
	Fluoride in source water ^a (ppm)		1		2		<0.1		<0.1	<0.1	<0.1	<0.1	0.14	Erosion of natural deposits; water additive		
	Lead ^b (ppb)		0.2		15		90 th percentile = 2.4		0 out of 55 sites was above the regulatory action level						Corrosion of household plumbing; erosion of natural deposits	
Organic	Bromate (ppb)		0.1		10		<1 ^c		NA	NA	NA	<1 – 3	<1.3	By-product of drinking water disinfection		
	Chloramine as chlorine ^d (ppm)		4		4		2.1 ^e		<0.05 – 3.2						Drinking water disinfectant added for treatment	
	Control of DBP precursors – TOC		NA		TT		NA		NA	NA	NA	met requirement		Various natural and man-made sources		



EBMUD 2018 ANNUAL WATER QUALITY REPORT

In 2018, your drinking water was consistently the highest quality, surpassing every public health requirement set by the State Water Resources Control Board Division of Drinking Water and the U.S. Environmental Protection Agency.

UNITS

- gpg** grains per gallon
- NTU** nephelometric turbidity unit, a measure of the cloudiness of water
- ppm** parts per million. One ppm is like 1 second in 11.5 days. (mg/L)
- ppb** parts per billion. One ppb is like 1 second in nearly 32 years. (µg/L)
- ppt** parts per trillion. One ppt is like 1 second in nearly 32,000 years. (ng/L)
- TON** threshold odor number, a measure of odor in water
- µS/cm** microsiemens per centimeter, a measure of electrical conductance

May, a Senior Water Treatment Operator, worked to upgrade the ozone system at the Upper San Leandro Water Treatment Plant.

1 Regulated for public health Primary MCL (Unit)			State or federal goal PHG, MCLG or MRDLG	Highest amount allowed MCL, MRDL or AL	System average	Water treatment plants					Typical sources
						Walnut Creek	Lafayette	Orinda	Sobrante	Upper San Leandro	
Microbiological	Total Coliform	state rule	0	5%	NA	0.3% was the highest percentage found in any month					Naturally present in the environment
		federal rule	NA	TT		met requirement					
	Turbidity (NTU)		NA	1	0.03	0.02 – 0.10	0.01 – 0.10	0.02 – 0.10	0.02 – 0.10	0.02 – 0.10	Soil runoff
			NA	95% ≤ 0.3	100%	100%	100%	100%	100%	100%	
Inorganic	Aluminum (ppb)		600	1000	<50	<50	<50 – 60	<50	<50 – 52	<50 – 55	Erosion of natural deposits; water treatment residue
	Copper (ppb)		300	1300	90 th percentile = 37	0 out of 55 sites were above the regulatory action level					Corrosion of household plumbing; erosion of natural deposits
	Fluoride in source water ^a (ppm)		1	2	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	Erosion of natural deposits; water additive
	Lead ^b (ppb)		0.2	15	90 th percentile = 2.4	0 out of 55 sites were above the regulatory action level					Corrosion of household plumbing; erosion of natural deposits
D/DBPs	Bromate (ppb)		0.1	10	<1 ^c	NA	NA	NA	<1 – 3	<1	By-product of drinking water disinfection
	Chloramine as chlorine ^d (ppm)		4	4	2.1 ^c	<0.05 – 3.4					Drinking water disinfectant added for treatment
	Control of DBP precursors – TOC		NA	TT	NA	NA	NA	NA	met requirement		Various natural and man-made sources
	Haloacetic acids, 5 species (ppb)		NA	60	47 ^e	11 – 36	23 – 33	23 – 46	36 – 52	21 – 52	By-product of drinking water disinfection
	Trihalomethanes (ppb)		NA	80	54 ^e	28 – 45	42 – 51	39 – 58	34 – 54	35 – 62	By-product of drinking water disinfection

2 Regulated for drinking water aesthetics Secondary MCL (Unit)	State or federal goal PHG or MCLG	Highest amount allowed MCL	System average	Water treatment plants					Typical sources
				Walnut Creek	Lafayette	Orinda	Sobrante	Upper San Leandro	
Aluminum (ppb)	NA	200	<50	<50	<50 – 60	<50	<50 – 52	<50 – 55	Erosion of natural deposits; water treatment residue
Chloride (ppm)	NA	250	6	4 – 5	4 – 5	4 – 8	8 – 15	16 – 19	Runoff/leaching from natural deposits
Color (color units)	NA	15	4	6	3	3	2	1	Naturally-occurring organic materials
Manganese (ppb)	500 ^f	50	<20	<20	<20	<20	<20 – 41	<20	Leaching from natural deposits
Odor (TON)	NA	3	<1	<1	<1	<1	1	1	Naturally-occurring organic materials
Specific conductance (µS/cm)	NA	900	125	66	63	65-163	237	379	Substances that form ions when in water
Sulfate (ppm)	NA	250	9	1	1	1 – 20	25 – 29	47 – 52	Runoff/leaching from natural deposits
Total dissolved solids (ppm)	NA	500	72	37 – 50	37 – 50	33 – 110	140 – 160	230 – 240	Runoff/leaching from natural deposits
Turbidity (NTU)	NA	5	0.03	0.02 – 0.10	0.01 – 0.10	0.02 – 0.10	0.02 – 0.10	0.02 – 0.10	Soil runoff

KEY TERMS

- AL** Regulatory action level. The concentration which, if exceeded, triggers treatment or other requirements that a water system must follow.
- DBP** Disinfection by-products. These are formed when chlorine and/or ozone reacts with natural constituents in water. Trihalomethanes (THMs), haloacetic acids (HAAs), chlorate, and bromate are disinfection by-products.
- D/DBPs** Disinfection by-products, disinfection residuals and disinfection by-product precursors.
- MCL** Maximum contaminant level. The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs or MCLGs as is economically and technologically feasible. Secondary MCLs address odor, taste and appearance of drinking water.
- MCLG** Maximum contaminant level goal. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the USEPA.

- MRDL** Maximum residual disinfectant level. The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
- MRDLG** Maximum residual disinfectant level goal. The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.
- NA** Not applicable.
- primary drinking water standard** These standards regulate contaminants that affect health by setting MCLs, MRDLs, and treatment techniques (TT) along with their monitoring and reporting requirements.
- PHG** Public health goal. The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California EPA.
- TOC** Total organic carbon. A measure of organic content in the water.

- turbidity** A measure of the cloudiness of water. Turbidity is monitored because it is a good indication of the effectiveness of our filtration systems.
- TT** Treatment technique. A required process intended to reduce the level of a contaminant in drinking water.
- 90th percentile** A measure that indicates 90 percent of the samples had a lower result.

NOTES

a) See page 11 for additional information about fluoride in drinking water. **b)** 135 schools requested lead sampling. See Page 10 for additional information about lead in drinking water. **c)** Highest running annual average. **d)** Chloramine residuals in the distribution system are measured as an equivalent quantity of chlorine. When the chloramine residual cannot be detected, the sample is further analyzed to ensure that microbiological water quality is in compliance with regulations. **e)** Compliance is determined based on the highest locational running annual average results. Water treatment plant values show the range of individual sample results. **f)** Parameters with a notification level.



3	Unregulated contaminants <i>No established MCL (Unit)</i>	Year sampled	State NL	System average	Water treatment plants				Upper San Leandro
					Walnut Creek	Lafayette	Orinda	Sobrante	
UCMR3	Chlorate (ppb)	2013-2015	800	174	91 – 220	84 – 210	68 – 160	100 – 290	84 – 480
	Chromium, hexavalent (ppb)	2013-2015	NA	0.05	0.04 – 0.07	0.03 – 0.06	<0.03 – 0.06	0.03 – 0.09	<0.03 – 0.22
	Molybdenum (ppb)	2013-2015	NA	<1	<1	<1	<1	<1 – 1	<1 – 1
	Strontium (ppb)	2013-2015	NA	97	31 – 44	35 – 100	32 – 110	52 – 190	44 – 320
	Vanadium (ppb)	2013-2015	50	0.7	0.3 – 0.4	0.2 – 0.4	0.2 – 0.4	0.4 – 1.9	0.3 – 2.4
UCMR4	Bromide (ppb)	2018	NA	9	<5	<5	<5 – 16	22 – 26	35 – 41
	Haloacetic acids, 5 species (ppb)	2018	NA	36	24 – 40	30 – 37	26 – 46	39 – 58	26 – 57
	Haloacetic acids, 9 species (ppb)	2018	NA	38	25 – 41	30 – 37	28 – 47	42 – 66	26 – 68
	Haloacetic acids, 6 brominated species (ppb)	2018	NA	2	0.3 – 2	0.4 – 1	0.4 – 2	3 – 10	1 – 12
	Manganese (ppb)	2018	500	1	<0.4	<0.4	<0.4	0.4 – 1.3	2
	TOC (ppm)	2018	NA	2.6	1.5 – 2.3	1.5 – 2.3	1.5 – 3	3.8 – 5.5	5.5 – 7.2
Others ^f	Boron (ppb)	2018	1000	<100	<100	<100	<100	<100	127
	Chlorate (ppb)	2018	800	146	81	210	140 – 210	69 – 290	65 – 150
	N-Nitrosodimethylamine (NDMA) (ppt)	2018	10	<1	<1 – 2	<1 – 3	<1 – 2	2 – 13	<1 – 1

4	Other parameters of interest to customers (<i>Unit</i>)	Water treatment plants				Upper San Leandro
		Walnut Creek	Lafayette	Orinda	Sobrante	
	Alkalinity, Total as CaCO ₃ (ppm)	21 – 33	24 – 34	21 – 53	70 – 84	130 – 140
	Calcium (ppm)	4 – 6	5	4 – 15	17 – 21	30 – 32
Hardness as CaCO ₃	(gpg ^g)	1	1	1 – 3	4 – 5	8
	(ppm)	16 – 21	18 – 20	16 – 54	68 – 82	140
	Magnesium (ppm)	1	1	1 – 4	6 – 7	13
	pH (pH)	9.3	9.2 – 9.4	9.0 – 9.4	8.0 – 9.0	8.4 – 8.6
	Potassium (ppm)	<1	<1	<1 – 1	1	2
	Silica (ppm)	8 – 11	8 – 11	7 – 10	8 – 12	8 – 10
	Sodium (ppm)	5 – 6	6	5 – 16	19 – 24	26 – 30

KEY TERMS

- NL

Notification level. A health-based advisory level established by the State Board for contaminants in drinking water that lack MCLs.
- UCMR

The federal unregulated contaminant monitoring rule parts 3 and 4.

NOTES

- f

Parameters with a notification level.
- g

Grains per gallon (gpg) is a measure of water hardness. Knowing the amount can help improve the function of dishwashers, cooling equipment and other industrial processes. Refer to your appliance manufacturer’s instruction manual for the optimum grains per gallon level.

WATER QUALITY REGULATIONS

This report reflects changes in drinking water regulatory requirements during 2018. To ensure that tap water is safe to drink, the State Board and the USEPA prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. California Department of Public Health (CDPH) and United States Food and Drug Administration regulations establish limits for contaminants in bottled water that provide the same protection for public health. Additional information on bottled water is available on the CDPH website at www.cdph.ca.gov/Programs/CEH/DFDCS/Pages/FDBPrograms/FoodSafetyProgram/Water.aspx.

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water include:

Microbial contaminants

, such as viruses, bacteria and protozoa, such as *Cryptosporidium*, that may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.

Inorganic contaminants

, such as salts and metals, that can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.

Pesticides and herbicides

that may come from a variety of sources, such as agriculture, urban stormwater runoff and residential uses.

Organic chemical contaminants

, including synthetic and volatile organic chemicals, that are by-products of industrial processes and petroleum production and can also come from gas stations, urban stormwater runoff, agricultural application and septic systems.

Radioactive contaminants

that can be naturally occurring or be the result of oil and gas production and mining activities.

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects is available online at www.epa.gov/ground-water-and-drinking-water. Contact your healthcare provider or visit the Centers for Disease Control and Prevention (CDC) website for guidelines on using tap water for health or medical purposes.

Vulnerable populations

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly and some infants can be particularly at risk from infections.

These people should seek advice about drinking water from their health care providers. USEPA/CDC guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available online at www.cdc.gov/parasites/crypto/index.html.

Cryptosporidium and Giardia

Cryptosporidium is a microbial contaminant found in surface water throughout the United States. Although filtration is highly effective in removing *Cryptosporidium*, the most commonly used filtration methods cannot guarantee 100 percent removal. In 2018 our monitoring detected *Cryptosporidium* in our source water.

Cryptosporidium must be ingested to cause disease, and it may be spread through means other than drinking water. Most healthy individuals can overcome the disease within a few weeks. However, immuno-compromised people, infants and small children, and the elderly are at greater risk of developing life-threatening illness. We encourage these individuals to consult their physician regarding appropriate precautions to take to avoid infection.

Giardia is a microbial contaminant that is naturally present in the environment. Our monitoring detected one *Giardia* in one sample of our source water.

Photo: Briones Reservoir in Orinda

Disinfection Byproducts

Chlorine is used to kill pathogens in drinking water to protect public health. However, chlorine also reacts with naturally-occurring organic compounds to form unwanted disinfection byproducts. Disinfection byproducts are present in all chlorinated drinking water.

EBMUD continues to invest in long-term projects to provide more water treatment flexibility and reliability. We are making improvements to the disinfection systems at water treatment plants to ensure continued compliance with the disinfection requirements while minimizing formation of byproducts.

Water quality improvement projects

EBMUD is designing a project for the San Pablo Reservoir to improve water quality by adding oxygen to the bottom of the reservoir. This will prevent release of nutrients and metals from the sediments, discouraging the growth of algae and improving water quality. Other upcoming improvements include new disinfection tanks at the water treatment plants, improvements to our chemical storage and handling facilities, and new clarification basins to enable greater removal of particles in the water. These large capital projects will modernize the treatment plants, improve worker and environmental safety, and improve our capability to treat challenging source waters.

REPORT A WATER QUALITY CONCERN

Do you have a question or concern about your water quality? Call 866-403-2683. EBMUD inspectors respond to calls within one business day regarding water which appears dirty, colored, has foreign particles or unusual taste or odor.

Lead in drinking water

If present, elevated levels of lead can cause serious health problems. Pregnant women, infants and young children are typically more vulnerable to lead in drinking water than the general population.

Lead in drinking water is primarily from materials and components associated with lead in water distribution pipes and home plumbing. EBMUD replaced all known lead service pipes in its service area in the 1990s and continues to actively seek and replace lead materials wherever they are found. We maintain an aggressive corrosion control program to reduce lead leaching from our water mains and customer piping. Still, it is possible that lead may be present as a result of materials used in your home's plumbing. According to the USEPA, homes built before 1986 are more likely to have lead pipes or fixtures and solder that contain lead.

Sierra snowmelt makes up 90 percent of EBMUD's water. In the East Bay, we can confidently drink straight from the sink.



Elzie, a Water System Inspector, takes water samples as part of EBMUD's program to sample lead in schools. This program helps schools to ensure that the water at drinking fountains does not contain lead.

If you suspect you have lead in your fixtures and if your water has been sitting for several hours, you can minimize the potential for lead exposure by running your faucet for 30 seconds to 2 minutes before using water for drinking or cooking. Capture and reuse this water for other uses such as watering ornamental plants.

EBMUD samples and tests your water in accordance with all state and federal drinking water requirements, and will provide a list of results upon request. If you are concerned about elevated lead levels in your home's water, you may wish to have your water tested. In 2017, EBMUD started a new program to provide our customers with free lead testing for their water. Request a voucher by calling Customer Service at 866-403-2683 or email customerservice@ebmud.com for more information.

Lead testing in schools

In 2018, EBMUD received lead sampling requests from 135 schools (preschools through 12th grade). During 2017-2018, 452 schools in the EBMUD service area were sampled for lead. All public schools and roughly 30 percent of the private schools have reported lead sampling results to the State Board as part of EBMUD's lead sampling program. Lead sampling information and results can be found on the State Board website at www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/leadsamplinginschools.html. Per state requirements, the deadline for school lead sampling requests is November 1, 2019.

Information on lead in drinking water, testing methods and steps you can take to minimize lead exposure is available at www.ebmud.com/lead and from the USEPA at www.epa.gov/lead.

Fluoridation

EBMUD is required by state law to add fluoride to drinking water to help prevent dental decay in consumers. Current regulations require fluoride levels in the treated water be maintained between 0.6 to 1.2 ppm with an optimum dose of 0.7 ppm. Our monitoring showed that fluoride levels in the treated water distribution system averaged 0.7 ppm.

According to the American Dental Association and CDC, it is safe to use optimally fluoridated water for preparing infant formula. If an infant is primarily fed infant formula prepared with fluoridated water, there may be an increased chance for mild enamel fluorosis, but enamel fluorosis does not affect the health of the infant or the health of the infant's teeth. To lessen this chance, deionized, purified, distilled or demineralized bottled water can be used.

If you have additional questions about fluoride, contact your health provider. Additional information can be found at www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/Fluoridation.shtml or www.cdc.gov/fluoridation websites.

HOW TO CONTACT EBMUD

For more information about water quality or to report a water quality concern, call 866-403-2683 or visit www.ebmud.com/waterquality.

If you would like this report mailed to you, email customerservice@ebmud.com or call 510-986-7555. View this report online at www.ebmud.com/wqr.

EBMUD encourages public participation in decisions affecting drinking water quality and other matters at its Board of Directors meeting held the second and fourth Tuesdays of each month at 1:15 pm, 375 Eleventh Street, 2nd Floor, Oakland.

EBMUD has a seven-member Board of Directors publicly elected from wards within the EBMUD service area. See www.ebmud.com/board.

General Manager
Alexander R. Coate

ADDITIONAL CONTACTS

State Water Resources Control Board
Division of Drinking Water • 510-620-3463

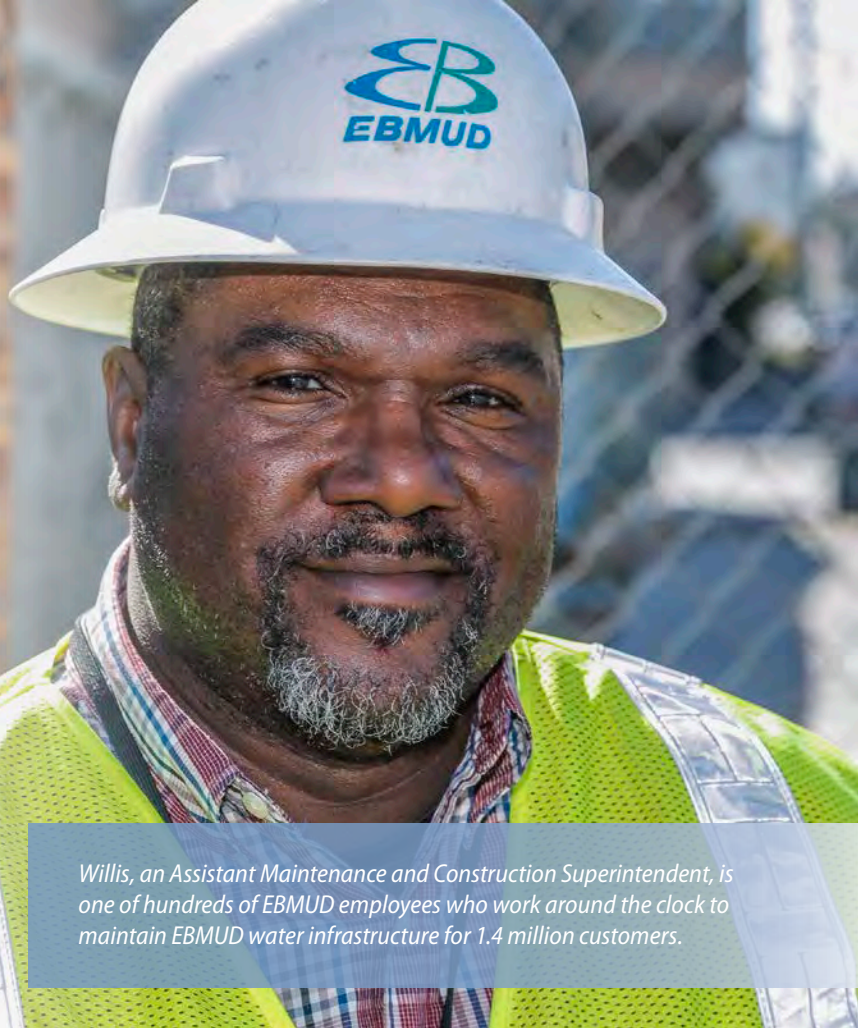
Alameda Public Health Department • 510-267-8000

Contra Costa Public Health Division • 925-313-6712



375 Eleventh Street
Oakland, CA 94607
1-866-40-EBMUD
www.ebmud.com

PUB. 146 5/19 2M 30% Post-consumer waste



Willis, an Assistant Maintenance and Construction Superintendent, is one of hundreds of EBMUD employees who work around the clock to maintain EBMUD water infrastructure for 1.4 million customers.

This is important information about your drinking water. Translate it, or speak with someone who understands it.

Este documento contiene información importante sobre el agua potable que usted consume. Tradúzcalo o hable con alguien que lo entienda.

這是有關您飲用水的重要資訊。請翻譯資訊，或與瞭解其內容的人討論。

Ito ay isang mahalagang impormasyon tungkol sa inyong iniinom na tubig. Isaling-wika ito, o makipag-usap sa isang tao na naiintindihan ito.

Đây là thông tin quan trọng về nước uống của quý vị. Hãy chuyển ngữ tài liệu này, hoặc nói chuyện với người có thể hiểu về thông tin này.

여러분의 식수에 대한 중요한 정보입니다. 본 안내문을 번역하거나 내용을 이해하는 사람과 이야기하십시오.

این متن حاوی اطلاعات مهمی درباره آب آشامیدنی شما است. آن را ترجمه کرده یا با فردی که آن را متوجه می شود صحبت کنید.

Ce sont des renseignements importants concernant votre eau potable. Traduisez-les ou parlez-en avec quelqu'un en mesure de les comprendre.

यह महत्वपूर्ण जानकारी आपके पीने के पानी के बारे में है। इसका अनुवाद करें, या किसी ऐसे व्यक्ति से बात करें जो इसे समझता हो।

هذه معلومات هامة حول مياه الشرب التي تتناولها. ترجمها، أو تحدث إلى شخص يستطيع فهمها.

Здесь представлена важная информация о качестве вашей питьевой воды. Переведите эту информацию или попросите человека, знающего английский язык, пересказать ее вам.

これは、あなたの飲料水に関する重要な情報です。翻訳するか、理解できる方にご相談ください。

Dies ist eine wichtige Information zu Ihrem Trinkwasser. Übersetzen Sie sie oder sprechen Sie mit jemandem, der die Information versteht.

Este documento contém informações importantes sobre a sua água para consumo. Traduza-o ou fale com alguém que o compreenda.

Queste sono informazioni importanti sulla vostra acqua potabile. Fatele tradurre o parlate con qualcuno in grado di comprenderle.

ນີ້ແມ່ນຂໍ້ມູນສໍາຄັນກ່ຽວກັບນໍ້າດື່ມຂອງທ່ານ. ແປຂໍ້ມູນນີ້, ຫຼື ລິມັກັບບາງຄົນທີ່ເຂົ້າໃຈຂໍ້ມູນນີ້.

ဤသည်သည်သောက်သုံးရန် အရေးကြီးသော သတင်းအချက်အလက်များကို ပြောဆိုထားသည်။ သို့မဟုတ် သိရှိသူများနှင့် ဖော်ပြပါ အချက်အလက်များကို ဖော်ပြပါ။

یہ آپ کے پینے کے پانی کے بارے میں اہم معلومات ہے۔ اس کا ترجمہ کریں، یا اسے سمجھنے والے کسی شخص سے بات کریں۔

ข้อมูลนี้เป็นข้อมูลสำคัญเกี่ยวกับน้ำดื่มของคุณ ขอให้แปลข้อมูลนี้หรือพูดคุยกับผู้ที่เข้าใจข้อมูล

מדובר על מידע חשוב בנוגע למי השתייה שלך. תרגם את זה או שתפנה לאדם המבין את זה.

Ovo je važna informacija o pijaćoj vodi. Prevedite je, ili razgovarajte s nekim ko je razume.

Οι παρούσες είναι σημαντικές πληροφορίες σχετικά με το νερό που πίνετε. Μεταφράστε τις ή μιλήστε με κάποιον που τις καταλαβαίνει.

આ તમારા પીવાના પાણી વિશે મહત્વની માહિતી છે. તેનું ભાષાંતર કરો અથવા કોઈક એવી વ્યક્તિ સાથે વાત કરો જે તેને સમજતી હોય.

EAST BAY MUNICIPAL UTILITY DISTRICT



Healthy, economical, delicious:
www.ebmud.com/drinktap

2017 ANNUAL WATER QUALITY REPORT

EBMUD is pleased to report that in 2017, your drinking water met or surpassed every state and federal public health requirement.

SNOWFLAKE TO THE BAY

In the East Bay, 1.4 million customers rely on high-quality EBMUD water every minute of every day. Almost all of EBMUD's water comes from the 577-square mile watershed of the Mokelumne River on the western slope of the Sierra Nevada. This area is mostly national forest, EBMUD-owned lands and other undeveloped lands little affected by human activity.

The Mokelumne watershed collects snowmelt from Alpine, Amador and Calaveras counties, which flows into Pardee Reservoir near the town of Valley Springs. Three large aqueducts carry water 90 miles from Pardee Reservoir to the East Bay. During times of drought, high water demand, system maintenance or for operational needs, EBMUD may draw water from other watersheds (like the Sacramento River) or from local watersheds here in the East Bay.

EBMUD's skilled employees and network of reservoirs, pipelines, pumps and water treatment plants provide reliable drinking water every day.

HOW WE MANAGE WATER QUALITY

Regardless of the source, all water is treated at one of six EBMUD water treatment plants before it reaches your tap. These treatment plants can filter and process more than 375 million gallons of water daily. EBMUD takes

many steps to ensure high water quality including carefully managing and protecting watershed lands and reservoirs, treating the water, operating a complex distribution system, maintaining facilities and addressing customer concerns.

EBMUD samples and tests your water extensively to ensure it is safe to drink. We look for more than 100 substances including microorganisms, pesticides, herbicides, asbestos, lead, copper, petroleum products and by-products of industrial and water treatment processes. More than 20,000 laboratory tests each year ensure the safety of your drinking water.

NEW CHALLENGES, NEW PROGRAMS

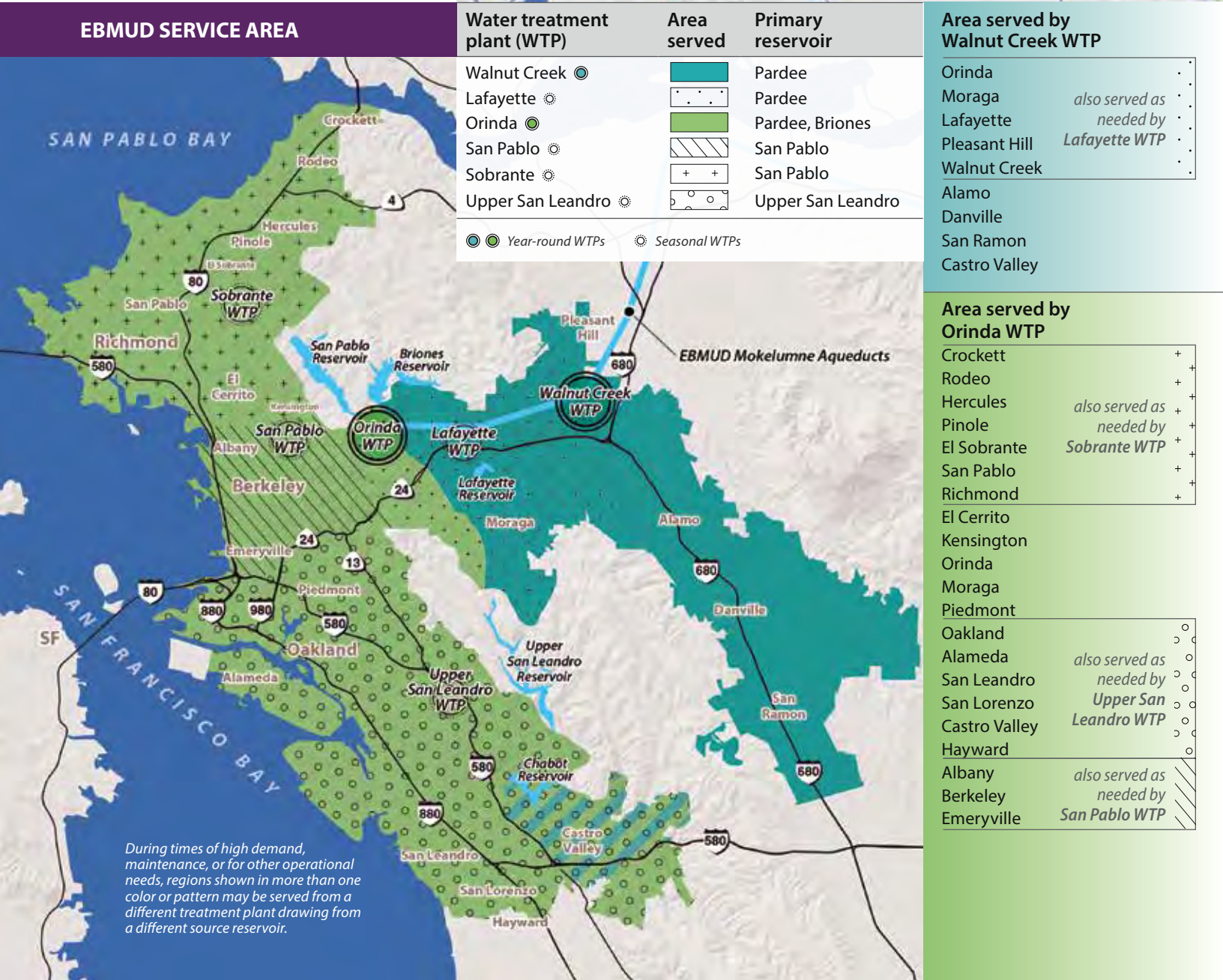
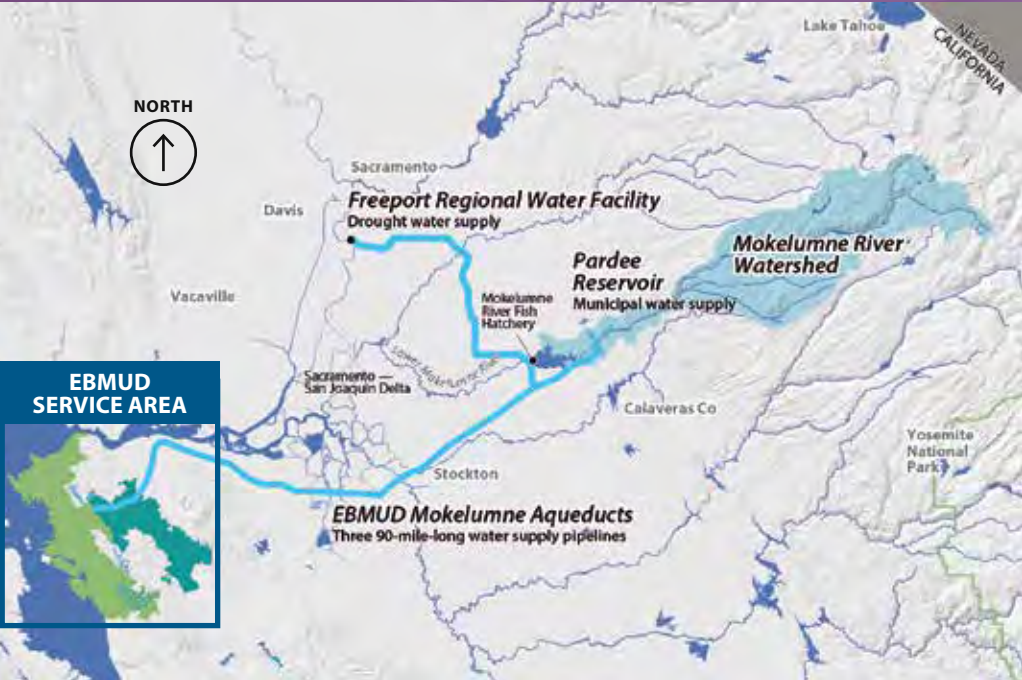
Exceptional events during the past few years have challenged water quality experts. These include increased public concern about lead in water after the crisis in Flint, Michigan, and a historic drought with high temperatures and algae blooms, and resulting higher levels of disinfection byproducts in drinking water. To address lead concerns and empower customers, EBMUD began a free lead testing program in spring 2017. With this new program, customers can have a certified lab test their home tap water for lead at no charge. EBMUD also continues to reduce disinfection byproducts with long-term capital improvements that will make water treatment plants more resilient to changes in source water.



WHERE YOUR WATER IS TREATED

EBMUD’s water system is built to be redundant so customers can count on us to deliver clean drinking water when you need it. Most of our water comes from the Mokelumne River watershed in the Sierra Nevada foothills.

Before reaching your tap, EBMUD water is treated at one of six water treatment plants in the East Bay. Some customers receive water from different treatment plants at different times of the year. The taste and smell of your tap water may change throughout the year because of operational changes (such as when a treatment plant is shut down for maintenance) or due to drought-related changes at the source.



WHAT WAS DETECTED AND REPORTED

In 2017, EBMUD treated raw water from multiple sources and consistently provided high-quality drinking water, meeting or surpassing every public health requirement set by the State Water Resources Control Board (State Board) and the U.S. Environmental Protection Agency (USEPA).

The tables on the following pages show the measured amounts of contaminants detected in 2017 or in the most recent year sampling was required. Samples were collected in EBMUD’s source waters, at water treatment plants, in the distribution system or at customers’ taps.

Although EBMUD tests for more than 100 substances, this report only lists those detected at or above the state or federal level required for reporting. In this case, no news is good news!

Table 1 – Regulated for public health

These contaminants are regulated to protect your health. They have maximum contaminant levels, known as primary MCLs, set by the State Board or the USEPA. These levels are set as close to the established public health goals as is economically and technologically feasible.

Table 2 – Regulated for drinking water aesthetics

These contaminants are regulated to maintain aesthetic qualities such as smell, taste and appearance of drinking water. They have maximum contaminant levels, also known as secondary MCLs, set by the State Board.



Table 3 – Unregulated contaminants

The first five listed contaminants must be reported, if detected, under the federal Unregulated Contaminant Monitoring Rule 3 (UCMR3). The last two listed contaminants have state notification levels and water systems are encouraged, but not required, to report results to consumers.

Table 4 – Other parameters of interest to customers

These water measurements, such as pH, hardness and alkalinity, may be of interest to customers.

HOW TO READ THE WATER QUALITY TABLE

Find your location on the map on page 2. Note which water treatment plant(s) serve that area.

- Go to the table on page 4 to find the contaminant you are interested in. Remember – no news is good news!
- Column two lists the most recent year the contaminant was tested.
- Column three lists the state or federal goal. At that amount or lower, there is no known or expected risk to health from the contaminants’ presence in drinking water. Not all listed contaminants have state or federal goals.

- Column four notes the highest amount that the State Board or the USEPA allows. This amount is usually not as low as the public health goal in column three.
- Column five lists the average amount detected across the EBMUD service area or at designated locations.
- Find the column that corresponds to the water treatment plant or plants that serve you. This is the amount of the contaminant detected in your area’s water.
- The last column lists how the contaminant typically gets into your drinking water.

	1	2	3	4	5	6	7
	Regulated for public health Primary MCL (unit)	Year sampled	Federal goal (MCL, action level, or other)	Amount allowed (MCL, action level, or other)	System average	Water treatment plants Orinda, Lafayette, Upper San Leandro, San Pablo	Typical sources
Microbial	Total Coliform state rule federal rule	2017 2017	0 NA	5% T1	NA NA	Not detected in more than 4,500 samples from the distribution system	Naturally present in the environment
	Turbidity (NTU)	2017 2017	NA NA	1 95% ≤ 0.3	0.03 100%	0.02 – 0.57* 100%	Soil runoff
	Aluminum (ppb)	2017	600	1000	<50	<50	Erosion of natural deposits; water treatment residue
	Copper (ppb)	2017	300	1300	90th percentile = 89	0 out of 55 sites were above the regulatory action level	Corrosion of household plumbing; erosion of natural deposits
	Fluoride in source water ¹ (ppm)	2017	1	2	<0.1	<0.1	Erosion of natural deposits; water additive
	Lead ² (ppb)	2017	0.2	15	90th percentile = 1	1 out of 55 sites were above the regulatory action level	Corrosion of household plumbing; erosion of natural deposits
	Nitrate as nitrogen (ppm)	2017	10	10	<0.4	<0.4	Runoff from fertilizer use; erosion of natural deposits
	Nitrate and nitrite as nitrogen (ppm)	2017	10	10	<0.4	<0.4	Runoff from fertilizer use; erosion of natural deposits
	Chloramine as chlorine ³ (ppm)	2017	4	4	2.1	<0.4	Drinking water disinfectant added for treatment
	Trihalomethanes (THM) (ppm)	2017	NA	NA	NA	NA	Byproduct of disinfection

EBMUD 2017 ANNUAL WATER QUALITY REPORT

In 2017, your drinking water was consistently the highest quality, surpassing every public health requirement set by the State Water Resources Control Board (State Board) Division of Drinking Water and the U.S. Environmental Protection Agency (USEPA).

KEY TERMS

- AL** Regulatory action level. The concentration which, if exceeded, triggers treatment or other requirements that a water system must follow.
- DBP** Disinfection by-products. These are formed when chlorine and/or ozone reacts with natural constituents in water. Trihalomethanes (THMs), haloacetic acids (HAAs), chlorate, and bromate are disinfection by-products.
- D/DBPs** Disinfection by-products, disinfection residuals and disinfection by-product precursors.
- MCL** Maximum contaminant level. The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs or MCLGs as is economically and technologically feasible. Secondary MCLs address odor, taste and appearance of drinking water.
- MCLG** Maximum contaminant level goal. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the USEPA.
- MRDL** Maximum residual disinfectant level. The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
- MRDLG** Maximum residual disinfectant level goal. The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.
- NA** Not applicable.
- notification level (NL)** A health-based advisory level established by the State Board for contaminants in drinking water that lack MCLs.
- primary drinking water standard** These standards regulate contaminants that affect health by setting MCLs and MRDLs along with their monitoring, reporting and water treatment requirements.
- PHG** Public health goal. The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California EPA.
- TOC** Total organic carbon. A measure of organic content in the water.
- turbidity** A measure of the cloudiness of water. Turbidity is monitored because it is a good indication of the effectiveness of our filtration systems.
- TT** Treatment technique. A required process intended to reduce the level of a contaminant in drinking water.
- 90th percentile** A measure that indicates 90 percent of the samples had a lower result.

UNITS

- gpg** grains per gallon
- NTU** nephelometric turbidity unit, a measure of the cloudiness of water
- ppm** parts per million. One ppm is like 32 seconds in one year. (mg/L)
- ppb** parts per billion. One ppb is like 3 seconds in 100 years. (µg/L)
- ppt** parts per trillion. One ppt is like 3 seconds in 100,000 years. (ng/L)
- TON** threshold odor number, a measure of odor in water
- µS/cm** microsiemens per centimeter, a measure of electrical conductance

1 Regulated for public health Primary MCL (Unit)			Year sampled	State or federal goal PHG, MCLG or MRDLG	Highest amount allowed MCL, MRDL or AL	System average	Walnut Creek	Lafayette	Orinda	Sobrante	Upper San Leandro	San Pablo	Typical sources
Microbiological	Total Coliform	state rule	2017	0	5%	NA	Not detected in more than 4,500 samples from the distribution system						Naturally present in the environment
		federal rule	2017	NA	TT								
	Turbidity (NTU)		2017	NA	1	0.03	0.02 – 0.57	0.02 – 0.09	0.02 – 0.10	0.02 –1.5	0.03 – 0.10	0.02 – 0.10	Soil runoff
			2017	NA	95% ≤ 0.3	100%	>99.9%	100%	100%	>99.9%	100%	100%	
Inorganic	Aluminum (ppb)		2017	600	1000	<50	<50	<50	<50	<50 – 57	<50 – 74	<50	Erosion of natural deposits; water treatment residue
	Copper (ppb)		2017	300	1300	90th percentile = 69	0 out of 55 sites were above the regulatory action level						Corrosion of household plumbing; erosion of natural deposits
	Fluoride in source water ^a (ppm)		2017	1	2	<0.1	<0.1	<0.1	<0.1 – 0.11	<0.1	0.14	<0.1	Erosion of natural deposits; water additive
	Lead ^b (ppb)		2017	0.2	15	90th percentile = 3	1 out of 55 sites was above the regulatory action level.						Corrosion of household plumbing; erosion of natural deposits
	Nitrate as nitrogen (ppm)		2017	10	10	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4 – 0.4	<0.4	Runoff from fertilizer use; erosion of natural deposits
	Nitrate and nitrite as nitrogen (ppm)		2017	10	10	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4 – 0.4	<0.4	Runoff from fertilizer use; erosion of natural deposits
D/DBPs	Chloramine as chlorine ^d (ppm)		2017	4	4	2.1 ^c	<0.05 – 3.2						Drinking water disinfectant added for treatment
	Control of DBP precursors - TOC		2017	NA	TT	NA	NA	NA	NA	met requirement			Various natural and man-made sources
	Haloacetic acids, 5 species (ppb)		2017	NA	60	47 ^e	19 – 58	24 – 41	14 – 71	24 – 52	22 – 32	15 – 31	By-product of drinking water disinfection
	Trihalomethanes (ppb)		2017	NA	80	75 ^e	29 – 78	42 – 87	24 – 88	30 – 58	32 – 56	26 – 50	By-product of drinking water disinfection

2 Regulated for drinking water aesthetics Secondary MCL (Unit)			Year sampled	State or federal goal PHG or MCLG	Highest amount allowed MCL	System average	Walnut Creek	Lafayette	Orinda	Sobrante	Upper San Leandro	San Pablo	Typical sources
Aluminum (ppb)			2017	NA	200	<50	<50	<50	<50	<50 – 57	<50 – 74	<50	Erosion of natural deposits; water treatment residue
Chloride (ppm)			2017	NA	250	8	3 – 9	4 – 9	4 – 6	12 – 16	14 – 17	13 – 14	Runoff/leaching from natural deposits
Color (color units)			2017	NA	15	3	3	3	3 – 4	2	1	4	Naturally-occurring organic materials
Odor (TON)			2017	NA	3	<1	<1	<1 – 8	<1	<1	<1	<1	Naturally-occurring organic materials
Specific conductance (µS/cm)			2017	NA	900	146	52 – 163	42 – 167	50 – 94	259	326	278	Substances that form ions when in water
Sulfate (ppm)			2017	NA	250	14	1 – 22	1 – 22	1 – 12	26 – 38	35 – 56	30 – 40	Runoff/leaching from natural deposits
Total dissolved solids (ppm)			2017	NA	500	91	34 – 120	28 – 120	32 – 80	140 – 180	200 – 240	150 – 190	Runoff/leaching from natural deposits
Turbidity (NTU)			2017	NA	5	0.03	0.02 – 0.57	0.02 – 0.09	0.02 – 0.10	0.02 –1.5	0.03 – 0.10	0.02 – 0.10	Soil runoff

3 Unregulated contaminants No established MCL (Unit)			Year sampled	State or federal goal PHG or MCLG	State notification level	System average	Walnut Creek	Lafayette	Orinda	Sobrante	Upper San Leandro	San Pablo ^g	Typical sources
UCMR3	Chlorate (ppb)		2013-2015	NA	800	174	91 – 220	84 – 210	68 –160	100 – 290	84 – 480	NA	By-product of drinking water disinfection
	Chromium, hexavalent ^f (ppb)		2013-2015	0.02	NA	0.05	0.04 – 0.07	0.03 – 0.06	<0.03 – 0.06	0.03 – 0.09	<0.03 – 0.22	NA	Erosion of natural deposits; release of industrial chemicals
	Molybdenum (ppb)		2013-2015	NA	NA	<1	<1	<1	<1	<1 – 1	<1 – 1	NA	Erosion of natural deposits; release of industrial chemicals
	Strontium (ppb)		2013-2015	NA	NA	97	31 – 44	35 – 100	32 – 110	52 – 190	44 – 320	NA	Erosion of natural deposits; release of industrial chemicals
	Vanadium (ppb)		2013-2015	NA	50	0.7	0.3 – 0.4	0.2 – 0.4	0.2 – 0.4	0.4 – 1.9	0.3 – 2.4	NA	Erosion of natural deposits; release of industrial chemicals
Others ⁱ	Chlorate (ppb)		2017	NA	800	106	66 – 79	140	110 – 130	47 – 190	46 – 150	68 – 140	By-product of drinking water disinfection
	N-Nitrosodimethylamine ^h (NDMA) (ppt)		2017	3	10	3	1 – 2	1 – 4	2 – 4	4 – 9	1 – 2	NA	By-product of drinking water disinfection



NOTES

- a)** See page 7 for additional information about fluoride in drinking water.
- b)** 317 schools requested lead sampling. See Page 7 for additional information about lead in drinking water.
- c)** Highest running annual average.
- d)** Chloramine residuals in the distribution system are measured as an equivalent quantity of chlorine. When the chloramine residual cannot be detected, the sample is further analyzed to ensure that microbiological water quality is in compliance with regulations.
- e)** Compliance is determined based on the highest locational running annual average results. Water treatment plant values show the range of individual sample results.
- f)** There is currently no MCL for hexavalent chromium. The previous MCL of 10 ppb was withdrawn on September 11, 2017, and all sample results are well below the previous MCL.
- g)** San Pablo Water Treatment Plant is a standby plant and was not in operation during the required UCMR3 monitoring period. NDMA monitoring is not required.
- h)** Sampling locations are chosen to represent worst case scenarios.
- i)** Parameters with a Notification Level.

4 Other parameters of interest to customers (Unit)		Walnut Creek	Lafayette	Water treatment plants		Upper San Leandro	San Pablo
				Orinda	Sobrante		
Alkalinity, bicarbonate as CaCO ₃ (ppm)		10 – 42	13 – 46	11 – 24	70	76	76
Alkalinity, carbonate as CaCO ₃ (ppm)		8	2 – 3	5 – 7	<0.1	<0.1	<0.1
Calcium (ppm)		3 – 15	2 – 16	2 – 9	18 – 23	23 – 32	17 – 23
Hardness as CaCO ₃	(gpg*)	1 – 3	1 – 3	1 – 2	4 – 6	6 – 8	4 – 5
	(ppm)	11 – 59	9 – 58	10 – 32	63 – 96	98 – 140	67 – 94
Magnesium (ppm)		1 – 4	1 – 4	1 – 2	6 – 9	10 – 13	6 – 8
pH (pH)		9.0 – 9.4	8.8 – 9.4	9.0 – 9.4	8.3 – 8.8	8.4 – 8.7	8.4 – 8.8
Potassium (ppm)		<1 – 1	<1 – 1	<1 – 1	1 – 2	2	1 – 2
Silica (ppm)		8 – 12	8 – 12	7 – 12	11 – 14	6 – 14	11 – 13
Sodium (ppm)		5 – 15	4 – 14	5 – 13	21 – 27	26 – 30	25 – 29

* Grains per gallon (gpg) is a measure of water hardness. Knowing the amount can help improve the function of dishwashers, cooling equipment and other industrial processes. Refer to your appliance manufacturer's instruction manual for the optimum grains per gallon level.

WATER QUALITY REGULATIONS

This report reflects changes in drinking water regulatory requirements during 2017. In order to ensure that tap water is safe to drink, the USEPA and the State Board prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. California Department of Public Health (CDPH) and United States Food and Drug Administration regulations establish limits for contaminants in bottled water that provide the same protection for public health. Additional information on bottled water is available on the CDPH website at www.cdph.ca.gov/Programs/CEH/DFDCS/Pages/FDBPrograms/FoodSafetyProgram/Water.aspx.

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water include:

Microbial contaminants, such as viruses, bacteria and protozoa, such as *Cryptosporidium*, that may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.

Inorganic contaminants, such as salts and metals, that can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.

Pesticides and herbicides that may come from a variety of sources, such as agriculture, urban stormwater runoff and residential uses.

Organic chemical contaminants, including synthetic and volatile organic chemicals, that are by-products of industrial processes and petroleum production and can also come from gas stations, urban stormwater runoff, agricultural application and septic systems.

Radioactive contaminants that can be naturally occurring or be the result of oil and gas production and mining activities.

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects is available online at www.epa.gov/ground-water-and-drinking-water. Contact your healthcare provider or visit the Centers for Disease Control and Prevention (CDC) website for guidelines on using tap water for health or medical purposes.

Populations with low resistance

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly and some infants can be particularly at risk from infections.

These people should seek advice about drinking water from their health care providers. USEPA/CDC guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available online at www.cdc.gov/parasites/crypto/index.html.

Cryptosporidium

Cryptosporidium is a microbial contaminant found in surface water throughout the United States. Although filtration is highly effective in removing *Cryptosporidium*, the most commonly used filtration methods cannot guarantee 100 percent removal. Our monitoring in 2017 indicates no presence of these organisms in our source water.

Cryptosporidium must be ingested to cause disease, and it may be spread through means other than drinking water. Most healthy individuals can overcome the disease within a few weeks. However, immuno-compromised people, infants and small children, and the elderly are at greater risk of developing life-threatening illness. We encourage these individuals to consult their physician regarding appropriate precautions to take to avoid infection.

Disinfection Byproducts

Disinfection byproducts are present in all chlorinated drinking water. They form when chlorine, used to kill pathogens, reacts with naturally-occurring organic material. Levels of certain byproducts called trihalomethanes (THMs) increased during 2016-early 2017, but did not exceed state and federal standards. The increase was caused in part by heavy precipitation following several years of drought, resulting in runoff that increased the organic material in EBMUD's source water from the Mokelumne River watershed. EBMUD immediately took short- and long-term actions to reduce disinfection byproducts, including increasing sampling and flushing, adjusting water treatment operations, increasing production from treatment plants with lower THMs, reducing residence time of water in the distribution system, and installing a THM-removal system. EBMUD drinking water continues to meet every federal and state standard, and EBMUD continues to work to reduce future formation of disinfection byproducts.

Lead in drinking water

If present, elevated levels of lead can cause serious health problems. Pregnant women, infants and young children are typically more vulnerable to lead in drinking water than the general population.

Lead in drinking water is primarily from materials and components associated with lead in water distribution pipes and home plumbing. EBMUD replaced all known lead service pipes in its service area in the 1990s and continues to actively seek and replace lead materials wherever they are found. We maintain an aggressive corrosion control program to reduce lead leaching from our water mains. Still, you may have lead in your home plumbing. It is possible that lead levels at your home may be higher than at other homes in the community as a result of materials used in your home's plumbing. According to USEPA, homes built before 1986 are more likely to have lead pipes, fixtures and solder.

If you suspect you have lead in your fixtures and if your water has been sitting for several hours, you can minimize the potential for lead exposure by running your faucet for 30 seconds to 2 minutes before using water for drinking or cooking. Capture and reuse this water for other uses such as watering ornamental plants.

EBMUD samples and tests your water in accordance with all state and federal drinking water requirements, and will provide a list of results upon request. If you are concerned about elevated lead levels in your home's water, you may wish to have your water tested. In 2017, EBMUD started a new program to provide our customers with lead testing for their water. Request a voucher by calling Customer Service at 866-403-2683 or email customerservice@ebmud.com for more information.

Lead testing in schools

In early 2017, the State Board issued amendments to the domestic water supply permits of community water systems including EBMUD. The amendments allow schools that are served by a public water system to request water sampling for lead and receive technical assistance if elevated lead levels are found. Later in 2017, Governor Jerry Brown signed AB 746 which is effective January 1, 2018 and requires community water systems

like EBMUD to provide lead testing of drinking water at public kindergarten through 12th grade schools, and preschools and child care facilities located on public school property constructed prior to 2010. This mandatory schools testing must be completed by July 1, 2019.

To support the lead in schools testing program, EBMUD issued a letter to public and private schools within the EBMUD service area (approximately 387 public schools and 162 private schools). In 2017, a total of 317 schools submitted requests to EBMUD to be sampled for lead. EBMUD collected up to 5 samples at each school where testing was completed.

Information on lead in drinking water, testing methods and steps you can take to minimize lead exposure is available at www.ebmud.com/lead or from the USEPA at www.epa.gov/lead.

Fluoridation

EBMUD is required by state law to add fluoride to drinking water to help prevent dental decay in consumers. Current regulations require fluoride levels in the treated water be maintained between 0.6 to 1.2 ppm with an optimum dose of 0.7 ppm. Our monitoring showed that fluoride levels in the treated water distribution system averaged 0.7 ppm.

According to the American Dental Association and CDC, it is safe to use optimally fluoridated water for preparing infant formula. If an infant is primarily fed infant formula prepared with fluoridated water, there may be an increased chance for mild enamel fluorosis, but enamel fluorosis does not affect the health of the infant or the health of the infant's teeth. To lessen this chance, deionized, purified, distilled or demineralized bottled water can be used.

If you have additional questions about fluoride, contact your health provider. Additional information can be found at www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/Fluoridation.shtml or www.cdc.gov/fluoridation websites.



HOW TO CONTACT EBMUD

For more information about water quality or to report a water quality concern, call 866-403-2683 or visit www.ebmud.com/waterquality.

If you would like this report mailed to you, email customerservice@ebmud.com or call 510-986-7555. View this report online at www.ebmud.com/wqr.

EBMUD encourages public participation in decisions affecting drinking water quality and other matters at its Board of Directors meeting held the second and fourth Tuesdays of each month at 1:15 pm, 375 Eleventh Street, 2nd Floor, Oakland.

EBMUD has a seven-member Board of Directors publicly elected from wards within the EBMUD service area. See www.ebmud.com/board.

General Manager

Alexander R. Coate

ADDITIONAL CONTACTS

State Water Resources Control Board
Division of Drinking Water • 510-620-3463

Alameda Public Health Department • 510-267-8000

Contra Costa Public Health Division • 925-313-6712



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This is important information about your drinking water. Translate it, or speak with someone who understands it.

Este documento contiene información importante sobre el agua potable que usted consume. Tradúzcalo o hable con alguien que lo entienda.

這是有關您飲用水的重要資訊。請翻譯資訊，或與瞭解其內容的人討論。

Ito ay isang mahalagang impormasyon tungkol sa inyong iniinom na tubig. Isaling-wika ito, o makipag-usap sa isang tao na naiintindihan ito.

Đây là thông tin quan trọng về nước uống của quý vị. Hãy chuyển ngữ tài liệu này, hoặc nói chuyện với người có thể hiểu về thông tin này.

여러분의 식수에 대한 중요한 정보입니다. 본 안내문을 번역하거나 내용을 이해하는 사람과 이야기하십시오.

این متن حاوی اطلاعات مهمی درباره آب آشامیدنی شما است. آن را ترجمه کرده یا با فردی که آن را متوجه می شود صحبت کنید.

Ce sont des renseignements importants concernant votre eau potable. Traduisez-les ou parlez-en avec quelqu'un en mesure de les comprendre.

यह महत्वपूर्ण जानकारी आपके पीने के पानी के बारे में है। इसका अनुवाद करें, या किसी ऐसे व्यक्ति से बात करें जो इसे समझता हो।

هذه معلومات هامة حول مياه الشرب التي تتناولها. ترجمها، أو تحدث إلى شخص يستطيع فهمها.

Здесь представлена важная информация о качестве вашей питьевой воды. Переведите эту информацию или попросите человека, знающего английский язык, пересказать ее вам.

これは、あなたの飲料水に関する重要な情報です。翻訳するか、理解できる方にご相談ください。

Dies ist eine wichtige Information zu Ihrem Trinkwasser. Übersetzen Sie sie oder sprechen Sie mit jemandem, der die Information versteht.

Este documento contém informações importantes sobre a sua água para consumo. Traduza-o ou fale com alguém que o compreenda.

Queste sono informazioni importanti sulla vostra acqua potabile. Fatele tradurre o parlate con qualcuno in grado di comprenderle.

ນີ້ແມ່ນຂໍ້ມູນສໍາຄັນກ່ຽວກັບນໍ້າດື່ມຂອງທ່ານ. ແປຂໍ້ມູນນີ້, ຫຼື ລົມກັບບາງຄົນທີ່ເຂົ້າໃຈຂໍ້ມູນນີ້.

នេះគឺជាព័ត៌មានសំខាន់ អំពីទឹកផឹករបស់អ្នក។ សូមអ្នកផ្សព្វផ្សាយ ឬពិគ្រោះជាមួយនឹងអ្នកណាដែលយល់ដឹង។

یہ آپ کے پینے کے پانی کے بارے میں اہم معلومات ہے۔ اس کا ترجمہ کریں، یا اسے سمجھنے والے کسی شخص سے بات کریں۔

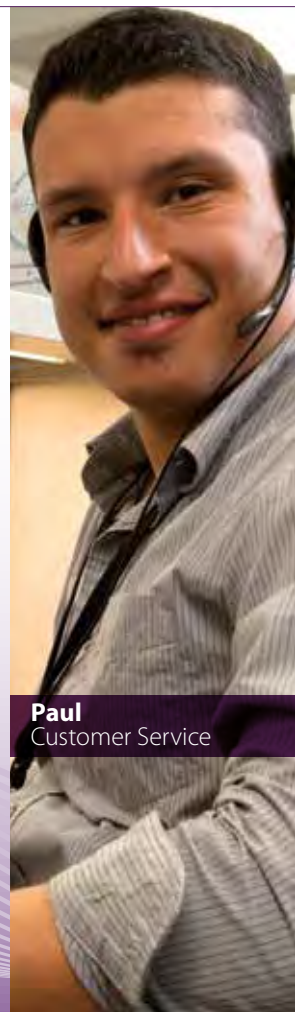
ข้อมูลนี้เป็นข้อมูลสำคัญเกี่ยวกับน้ำดื่มของคุณ ขอให้แปลข้อมูลนี้หรือพูดคุยกับผู้ที่เข้าใจข้อมูล

מדובר על מידע חשוב בנוגע למי השתייה שלך. תרגם את זה או שתפנה לאדם המבין את זה.

Ovo je važna informacija o pijaćoj vodi. Prevedite je, ili razgovarajte s nekim ko je razume.

Οι παρούσες είναι σημαντικές πληροφορίες σχετικά με το νερό που πίνετε. Μεταφράστε τις ή μιλήστε με κάποιον που τις καταλαβαίνει.

આ તમારા પીવાના પાણી વિશે મહત્વની માહિતી છે. તેનું ભાષાંતર કરો અથવા કોઈકે એવી વ્યક્તિ સાથે વાત કરો જે તેને સમજતી હોય.



Paul
Customer Service

EAST BAY MUNICIPAL UTILITY DISTRICT



Save money and protect the environment
www.ebmud.com/drinktap

2016 ANNUAL WATER QUALITY REPORT

EBMUD is pleased to report that in 2016, your drinking water met or surpassed every state and federal public health requirement.

PROTECTED SOURCE

In the East Bay, 1.4 million customers rely on high-quality EBMUD water. Almost all of EBMUD's water comes from the 577-square mile watershed of the Mokelumne River on the western slope of the Sierra Nevada. This area is mostly national forest, EBMUD-owned lands and other undeveloped lands little affected by human activity.

The Mokelumne watershed collects snowmelt from Alpine, Amador and Calaveras counties, which flows into Pardee Reservoir near the town of Valley Springs. Three large aqueducts carry water 90 miles from Pardee Reservoir to the East Bay. During times of drought, high water demand, system maintenance or for operational needs, EBMUD may draw water from other watersheds (like the Sacramento River) or from local watersheds here in the East Bay.

EBMUD's network of reservoirs, pipelines, pumps and water treatment plants are put to work to provide reliable drinking water every day, as reflected in this report.

END OF DROUGHT EMERGENCY

With our reservoirs refilling and water supply projections sufficient to meet demand, EBMUD declared an end to

our drought emergency on May 10, 2016. Because of investments in conservation, recycling and supplemental supplies, EBMUD and our customers rose to the challenge to meet the East Bay's water needs during a historic four-year drought. In fact, water demand in 2016 was at its lowest since 1978. Our customers made lasting conservation changes, boosting our reservoir levels and preparing us for the next drought — whenever it occurs.

HOW WE MANAGE WATER QUALITY

Regardless of the source, all water is treated at one of six EBMUD water treatment plants before it reaches your tap. EBMUD takes many steps to ensure high water quality including managing watershed lands and reservoirs, treating the water, operating a complex distribution system, maintaining facilities and addressing customer concerns.

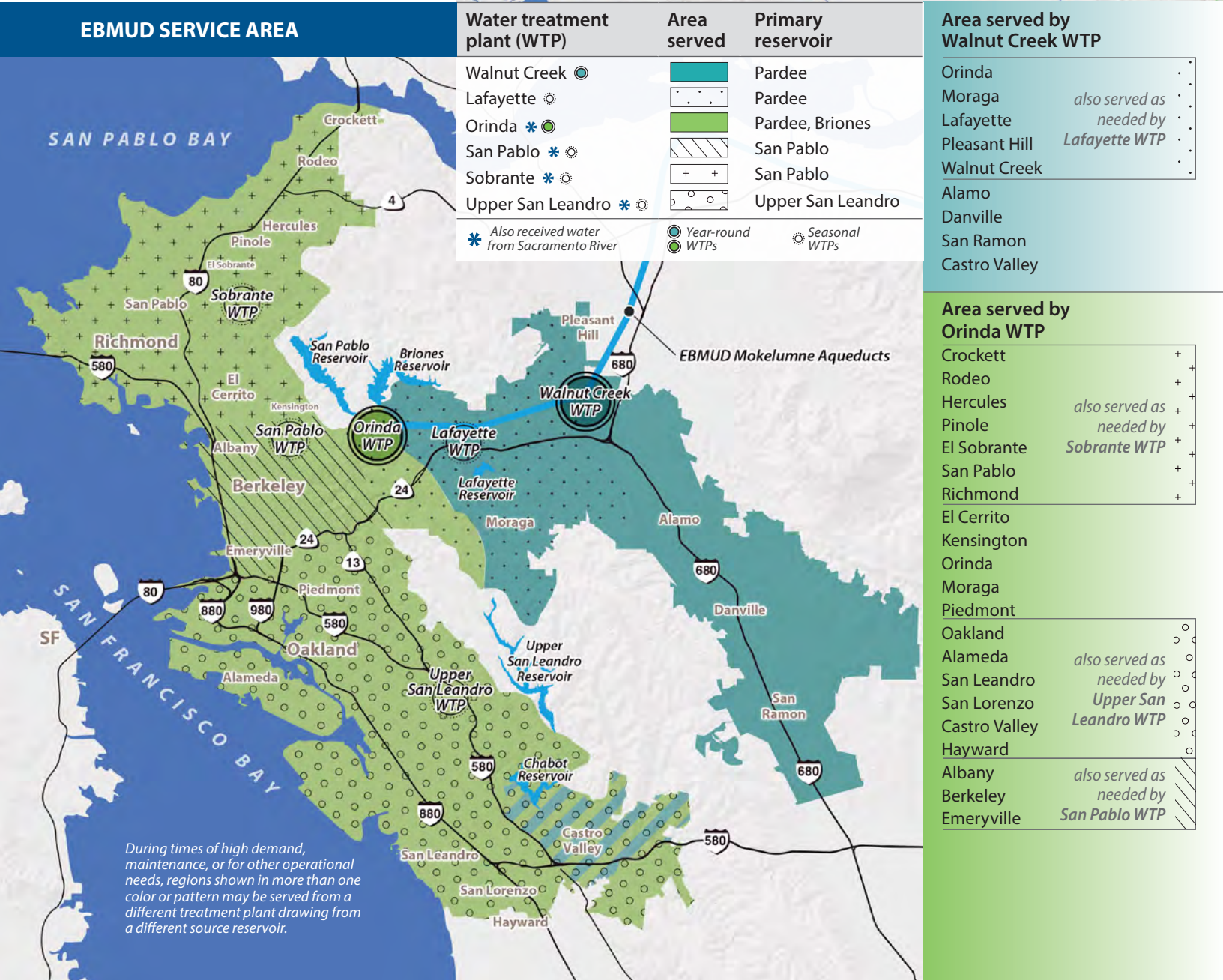
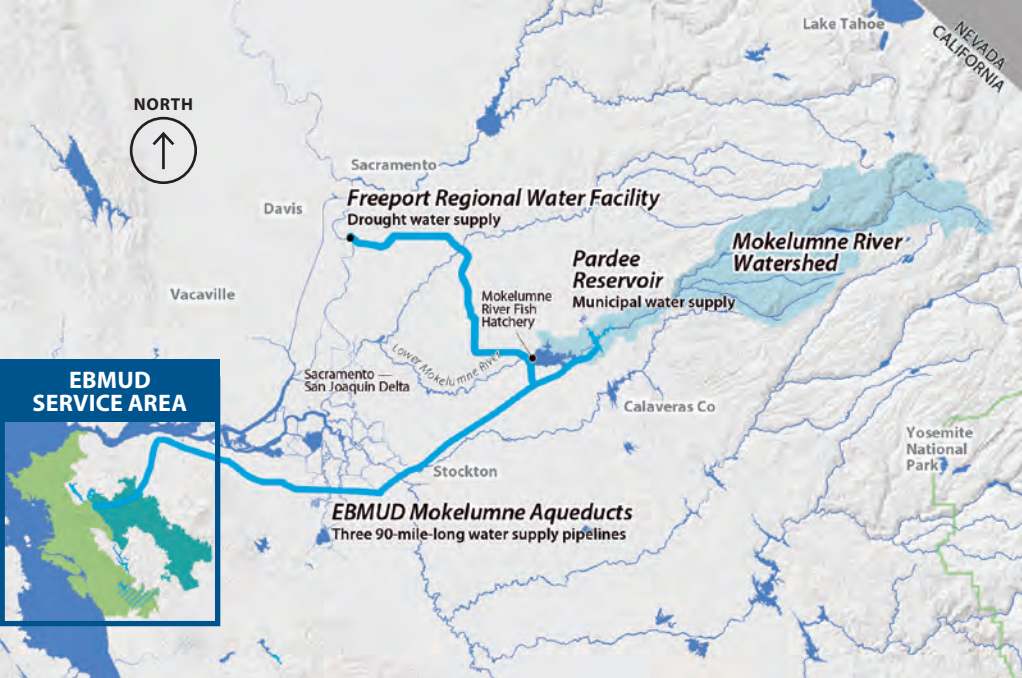
In laboratories and in the field, EBMUD samples and tests your water extensively to ensure it is safe to drink. We look for more than 100 substances including micro-organisms, pesticides, herbicides, asbestos, lead, copper, petroleum products and by-products of industrial and water treatment processes. More than 20,000 laboratory tests each year ensure the safety of your drinking water.



WHERE YOUR WATER IS TREATED

EBMUD's water system is built to be redundant so customers can count on us to deliver clean drinking water when you need it. Our water typically comes from the Mokelumne River watershed in the Sierra Nevada foothills.

Before reaching your tap, EBMUD water is treated at one of six water treatment plants in the East Bay. Some customers receive water from different treatment plants at different times of the year. The taste and smell of your tap water may fluctuate throughout the year because of operational changes (such as when a treatment plant is down for maintenance) or due to drought-related changes at the source.



WHAT WAS DETECTED AND REPORTED

In 2016, EBMUD treated raw water from multiple sources, including the Sacramento River, and consistently provided high-quality drinking water, meeting or surpassing every public health requirement set by the State Water Resources Control Board (State Board) and the U.S. Environmental Protection Agency (USEPA).

The tables on the following pages show the measured amounts of contaminants detected in 2016 or in the most recent year sampling was required. Samples were collected in EBMUD's source waters, at water treatment plants, in the distribution system or at customers' taps.

Although EBMUD tests for more than 100 substances, this report only lists those detected at or above the state or federal level required for reporting. In this case, no news is good news!

Table 1 – Regulated for public health

These contaminants are regulated to protect your health. They have maximum contaminant levels, known as primary MCLs, set by the State Board or the USEPA. These levels are set as close to the established public health goals as is economically and technologically feasible.

Table 2 – Regulated for drinking water aesthetics

These contaminants are regulated to maintain aesthetic qualities such as smell, taste and appearance of drinking water. They have maximum contaminant levels, also known as secondary MCLs, set by the State Board.



Table 3 – Unregulated contaminants

The first five listed contaminants must be reported, if detected, under the federal Unregulated Contaminant Monitoring Rule 3 (UCMR3). The last three listed contaminants have state notification levels and water systems are encouraged, but not required, to report results to consumers.

Table 4 – Other parameters of interest to customers

These water measurements, such as pH, hardness and alkalinity, may be of interest to customers.

HOW TO READ THE WATER QUALITY TABLE

Find your location on the map on page 2. Note which water treatment plant(s) serve that area.

- 1 Go to the table on page 4 to find the contaminant you are interested in. Remember – no news is good news!
- 2 Column two lists the most recent year the contaminant was tested.
- 3 Column three lists the state or federal goal. At that amount or lower, there is no known or expected risk to health from its presence in drinking water. Not all listed contaminants have state or federal goals.

- 4 Column four notes the highest amount that the State Board or the USEPA allows. This amount is usually not as low as the public health goal in column three.
- 5 Column five lists the average amount detected across the EBMUD service area or at designated locations.
- 6 Find the column that corresponds to the water treatment plant or plants that serve you. This is the amount of the contaminant detected in your area's water.
- 7 The last column lists how the contaminant typically gets into your drinking water.

	1	2	3	4	5	6	7						
1	Regulated for public health Primary MCL (Unit)	Year sampled	State or federal goal PHG, MCLG or MCLDL	Highest amount allowed MCL, MCLG or AL	System average	Walnut Creek	Lafayette	Orinda	Sobranite	Upper San Leandro	San Pablo	Typical sources	
Microbiological	Total Coliform	state rule	2016	0	5%	NA	0.6% was the highest percentage found in any month						Naturally present in the environment
		federal rule	2016	NA	TT	NA	met requirement, performed level 1 assessment						
	Turbidity (NTU)		2016	NA	1	0.03	0.02 – 0.09	0.01 – 0.09	0.01 – 0.27	0.02 – 0.17	0.02 – 0.09	0.02 – 0.48	Soil runoff
			2016	NA	95% ≤0.3	100%	100%	100%	100%	100%	100%	>99.9%	
Inorganic	Aluminum (ppb)		2016	600	1000	<50	<50	<50	<50	<50	<50 – 50	<50 – 55	Erosion of natural deposits; water treatment residue
	Copper (ppb)		2014	300	1300	90th percentile <50	0 out of 58 sites were above the regulatory action level (AL)						Corrosion of household plumbing; erosion of natural deposits
	Fluoride in source water ^a (ppm)		2016	1	2	<0.1	<0.1	<0.1	<0.1	<0.1	0.15	<0.1	Erosion of natural deposits; water additive
	Lead ^b (ppb)		2014	0.2	15	90th percentile <5	0 out of 58 sites were above the regulatory action level (AL)						Corrosion of household plumbing; erosion of natural deposits
Organic	Bromate (ppb)		2016	0.1	10	2 ^c	NA	NA	NA	<1 – 1	<1 – 2.1	NA	By-product of drinking water disinfection
	Chloramine as chlorine ^d (ppm)		2016	4	4	2.3 ^c	<0.05 – 3.6						Drinking water disinfectant added for treatment
	Control of DBP precursors – TOC		2016	NA	TT	NA	NA	NA	NA	met requirement		Various natural and man-made sources	
	Chloroform (ppb)		2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	By-product of drinking water disinfection
	Trihalomethanes (ppb)		2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	By-product of drinking water disinfection

EBMUD 2016 ANNUAL WATER QUALITY REPORT

In 2016, your drinking water was consistently the highest quality, surpassing every public health requirement set by the State Water Resources Control Board (State Board) Division of Drinking Water and the U.S. Environmental Protection Agency (USEPA).

KEY TERMS

- AL** Regulatory action level. The concentration which, if exceeded, triggers treatment or other requirements that a water system must follow.
- DBP** Disinfection by-products. These are formed when chlorine and/or ozone reacts with natural constituents in water. Trihalomethanes (THMs), haloacetic acids (HAAs), chlorate, and bromate are disinfection by-products.
- D/DBPs** Disinfection by-products, disinfection residuals and disinfection by-product precursors.
- level 1 assessment** A study of the water system to identify potential problems and determine (if possible) why total coliform bacteria have been found in our water system.
- MCL** Maximum contaminant level. The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs or MCLGs as is economically and technologically feasible. Secondary MCLs address odor, taste and appearance of drinking water.
- MCLG** Maximum contaminant level goal. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the USEPA.
- MRDL** Maximum residual disinfectant level. The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
- MRDLG** Maximum residual disinfectant level goal. The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.
- NA** Not applicable.
- notification level** A health-based advisory level established by the State Board for contaminants in drinking water that lack MCLs.
- primary drinking water standard** These standards regulate contaminants that affect health by setting MCLs and MRDLs along with their monitoring, reporting and water treatment requirements.
- PHG** Public health goal. The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California EPA.
- TOC** Total organic carbon. A measure of organic content in the water.
- turbidity** A measure of the cloudiness of water. Turbidity is monitored because it is a good indication of the effectiveness of our filtration systems.
- TT** Treatment technique. A required process intended to reduce the level of a contaminant in drinking water.
- 90th percentile** A measure that indicates 90 percent of the samples had a lower result.

UNITS

- gpg** grains per gallon
- NTU** nephelometric turbidity unit, a measure of the cloudiness of water
- ppm** parts per million. One ppm is like 32 seconds in one year. (mg/L)
- ppb** parts per billion. One ppb is like 3 seconds in 100 years. (µg/L)
- ppt** parts per trillion. One ppt is like 3 seconds in 100,000 years. (ng/L)
- TON** threshold odor number, a measure of odor in water
- µS/cm** microsiemens per centimeter, a measure of electrical conductance

1 Regulated for public health Primary MCL (Unit)			Year sampled	State or federal goal PHG, MCLG or MRDLG	Highest amount allowed MCL, MRDL or AL	System average	Water treatment plants						Typical sources
							Walnut Creek	Lafayette	Orinda	Sobrante	Upper San Leandro	San Pablo	
Microbiological	Total Coliform	state rule	2016	0	5%	NA	0.6% was the highest percentage found in any month						Naturally present in the environment
		federal rule	2016	NA	TT	NA	met requirement, performed level 1 assessment						
	Turbidity (NTU)		2016	NA	1	0.03	0.02 – 0.09	0.01 – 0.09	0.01 – 0.27	0.02 – 0.17	0.02 – 0.09	0.02 – 0.48	Soil runoff
			2016	NA	95% ≤0.3	100%	100%	100%	100%	100%	100%	>99.9%	
Inorganic	Aluminum (ppb)		2016	600	1000	<50	<50	<50	<50	<50	<50 – 50	<50 – 55	Erosion of natural deposits; water treatment residue
	Copper (ppb)		2014	300	1300	90th percentile <50	0 out of 58 sites were above the regulatory action level (AL)						Corrosion of household plumbing; erosion of natural deposits
	Fluoride in source water ^a (ppm)		2016	1	2	<0.1	<0.1	<0.1	<0.1	<0.1	0.15	<0.1	Erosion of natural deposits; water additive
	Lead ^b (ppb)		2014	0.2	15	90th percentile <5	0 out of 58 sites were above the regulatory action level (AL)						Corrosion of household plumbing; erosion of natural deposits
D/DBPs	Bromate (ppb)		2016	0.1	10	2 ^c	NA	NA	NA	<1 – 1	<1 – 2.1	NA	By-product of drinking water disinfection
	Chloramine as chlorine ^d (ppm)		2016	4	4	2.3 ^c	<0.05 – 3.6						Drinking water disinfectant added for treatment
	Control of DBP precursors - TOC		2016	NA	TT	NA	NA	NA	NA	met requirement			Various natural and man-made sources
	Haloacetic acids, 5 species (ppb)		2016	NA	60	39 ^e	27 – 43	16 – 42	10 – 47	11 – 46	11 – 47	27 – 36	By-product of drinking water disinfection
	Trihalomethanes (ppb)		2016	NA	80	58 ^e	22 – 73	33 – 77	29 – 76	20 – 58	19 – 68	44 – 67	By-product of drinking water disinfection

2 Regulated for drinking water aesthetics Secondary MCL (Unit)			Year sampled	State or federal goal PHG or MCLG	Highest amount allowed MCL	System average	Walnut Creek	Lafayette	Orinda	Sobrante	Upper San Leandro	San Pablo	Typical sources
Aluminum (ppb)			2016	NA	200	<50	<50	<50	<50	<50	<50 – 50	<50 – 55	Erosion of natural deposits; water treatment residue
Chloride (ppm)			2016	NA	250	10	4 – 7	4 – 6	4 – 9	13 – 16	15 – 18	12 – 15	Runoff/leaching from natural deposits
Color (color units)			2016	NA	15	2	3	2	1 – 2	2	<1	2	Naturally-occurring organic materials
Odor (TON)			2016	NA	3	1	<1	1	1 – 2	1	1	1	Naturally-occurring organic materials
Specific conductance (µS/cm)			2016	NA	900	181	63	63	60 – 156	261	337	254	Substances that form ions when in water
Sulfate (ppm)			2016	NA	250	15	1 – 2	1 – 2	1 – 16	19 – 30	33 – 39	23 – 27	Runoff/leaching from natural deposits
Total dissolved solids (ppm)			2016	NA	500	94	32 – 56	37 – 58	39 – 100	130 – 170	200 – 230	140 – 170	Runoff/leaching from natural deposits
Turbidity (NTU)			2016	NA	5	0.03	0.02 – 0.09	0.01 – 0.09	0.01 – 0.27	0.02 – 0.17	0.02 – 0.09	0.02 – 0.48	Soil runoff

3 Unregulated contaminants No established MCL (Unit)			Year sampled	State or federal goal PHG or MCLG	State notification level	System average	Walnut Creek	Lafayette	Orinda	Sobrante	Upper San Leandro	San Pablo ^g	Typical sources
UCMR3	Chlorate (ppb)		2013-2015	NA	800	174	91 – 220	84 – 210	68 – 160	100 – 290	84 – 480	NA	By-product of drinking water disinfection
	Chromium, hexavalent ^f (ppb)		2013-2015	0.02	NA	0.05	0.04 – 0.07	0.03 – 0.06	<0.03 – 0.06	0.03 – 0.09	<0.03 – 0.22	NA	Erosion of natural deposits; release of industrial chemicals
	Molybdenum (ppb)		2013-2015	NA	NA	<1	<1	<1	<1	<1 – 1	<1 – 1	NA	Erosion of natural deposits; release of industrial chemicals
	Strontium (ppb)		2013-2015	NA	NA	97	31 – 44	35 – 100	32 – 110	52 – 190	44 – 320	NA	Erosion of natural deposits; release of industrial chemicals
	Vanadium (ppb)		2013-2015	NA	50	0.7	0.3 – 0.4	0.2 – 0.4	0.2 – 0.4	0.4 – 1.9	0.3 – 2.4	NA	Erosion of natural deposits; release of industrial chemicals
Others ⁱ	Boron (ppb)		2016	NA	1000	<100	<100	<100	<100	<100	<100	109	Runoff/leaching from natural deposits
	Chlorate (ppb)		2016	NA	800	161	98	220	120 – 270	85 – 240	41 – 290	60 – 230	By-product of drinking water disinfection
	N-Nitrosodimethylamine ^h (NDMA) (ppt)		2016	3	10	4	1 – 5	2 – 4	1 – 5	3 – 9	2 – 4	NA	By-product of drinking water disinfection



NOTES

- a)** See page 7 for additional information about fluoride in drinking water. **b)** See Page 7 for additional information about lead in drinking water. **c)** Highest running annual average. **d)** Chloramine residuals in the distribution system are measured as an equivalent quantity of chlorine. When the chloramine residual cannot be

detected, the sample is further analyzed to ensure that microbiological water quality is in compliance with regulations. **e)** Highest locational running annual average. **f)** Hexavalent chromium has a California MCL of 10 ppb and all sample results are well below the MCL. **g)** San Pablo Water Treatment Plant is a standby plant
- and was not in operation during the required UCMR3 monitoring period. NDMA monitoring is not required. **h)** Sampling locations are chosen to represent worst case scenarios. **i)** Parameters with a Notification Level.

4 Other parameters of interest to customers (Unit)		Walnut Creek	Lafayette	Water treatment plants		Upper San Leandro	San Pablo
		Orinda	Sobrante				
Alkalinity, bicarbonate as CaCO ₃ (ppm)		7	6	16 – 38	78	120	76
Alkalinity, carbonate as CaCO ₃ (ppm)		15	16	8 – 12	5	<0.1	5
Calcium (ppm)		4 – 7	4 – 7	4 – 12	16 – 22	25 – 32	17 – 19
Hardness as CaCO ₃	(gpg*)	1 – 2	1	1 – 3	4 – 5	6 – 7	4
	(ppm)	10 – 27	10 – 25	14 – 44	60 – 84	100 – 120	60 – 75
Magnesium (ppm)		1	1	1 – 3	6 – 8	10 – 12	6 – 7
pH (pH)		9.2 – 9.4	9.1 – 9.3	9 – 9.6	8.2 – 8.9	8.3 – 8.7	8.4 – 8.9
Potassium (ppm)		<1	<1	<1 – 1	1 – 2	2	1 – 2
Silica (ppm)		9 – 12	8 – 12	8 – 13	10 – 13	6 – 12	11 – 12
Sodium (ppm)		6 – 7	6 – 8	6 – 14	19 – 26	25 – 33	24 – 31

* Grains per gallon (gpg) is a measure of water hardness. Knowing the amount can help improve the function of dishwashers, cooling equipment and other industrial processes. Refer to your appliance manufacturer's instruction manual for the optimum grains per gallon level.

WATER QUALITY REGULATIONS

This report reflects changes in drinking water regulatory requirements during 2016. In order to ensure that tap water is safe to drink, the USEPA and the State Board prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. California Department of Public Health (CDPH) and United States Food and Drug Administration regulations establish limits for contaminants in bottled water that provide the same protection for public health. Additional information on bottled water is available on the CDPH website at www.cdph.ca.gov/PROGRAMS/Pages/fdbBVW.aspx.

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water include:

- Microbial contaminants**, such as viruses, bacteria and protozoa, such as *Cryptosporidium*, that may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.
- Inorganic contaminants**, such as salts and metals, that can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.
- Pesticides and herbicides** that may come from a variety of sources, such as agriculture, urban stormwater runoff and residential uses.
- Organic chemical contaminants**, including synthetic and volatile organic chemicals, that are by-products of industrial processes and petroleum production and can also come from gas stations, urban stormwater runoff, agricultural application and septic systems.
- Radioactive contaminants** that can be naturally occurring or be the result of oil and gas production and mining activities.

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects is available from the USEPA's Safe Drinking Water Hotline at 800-426-4791 or online at www.epa.gov/safewater. Contact your healthcare provider or visit the Centers for Disease Control and Prevention (CDC) website for guidelines on using tap water for health or medical purposes.

Coliforms

Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other, potentially harmful, waterborne pathogens may be present or that a potential pathway exists through which contamination may enter the drinking water distribution system.

All water systems are required to comply with the state Total Coliform Rule. Beginning April 1, 2016, all water systems are also required to comply with the federal Revised Total Coliform Rule. The new federal rule maintains the purpose to protect public health by ensuring the integrity of the drinking water distribution system and monitoring for the presence of microbials (i.e., total coliform and *E. coli* bacteria). Water systems that exceed a specified frequency of total coliform occurrences are required to conduct an assessment to determine if any sanitary defects exist. If found, these must be corrected by the water system.

EBMUD found coliforms in 2016, indicating the need to look for potential problems in water treatment or distribution. When this occurred, we were required to conduct assessments to identify problems and to correct any problems that were found during these assessments. During the past year, we were required to conduct one Level 1 assessment and required to take one corrective action, which we completed.

USEPA anticipates greater public health protection as the new rule requires water systems that are vulnerable to microbial contamination to identify and fix problems.

Cryptosporidium

Cryptosporidium is a microbial contaminant found in surface water throughout the United States. Although filtration is highly effective in removing *Cryptosporidium*, the most commonly used filtration methods cannot guarantee 100 percent removal.

Our monitoring indicates the presence of these organisms in one of our source waters. Current test methods cannot determine if the organisms are dead or are capable of causing disease. Ingestion of *Cryptosporidium* may cause abdominal infection with symptoms including nausea, diarrhea and abdominal cramps.

Cryptosporidium must be ingested to cause disease, and it may be spread through means other than drinking water. Most healthy individuals can overcome the disease within a few weeks. However, immuno-compromised people, infants and small children, and the elderly are at greater risk of developing life-threatening illness. We encourage these individuals to consult their physician regarding appropriate precautions to take to avoid infection.

Populations with low resistance

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly and some infants can be particularly at risk from infections.

These people should seek advice about drinking water from their health care providers. USEPA/CDC guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the USEPA Safe Drinking Water Hotline at 800-426-4791 or www.epa.gov/safewater.

Lead in drinking water

If present, elevated levels of lead can cause serious health problems. Pregnant women, infants and young children are typically more vulnerable to lead in drinking water than the general population.

Lead in drinking water is primarily from materials and components associated with lead in water distribution pipes and home plumbing. EBMUD replaced all known lead service pipes in its service area in the 1990s and continues to actively seek and replace lead materials wherever they are found. We maintain an aggressive corrosion control program to reduce lead leaching from our water mains. Still, you may have lead in your home plumbing. It is possible that lead levels at your home may be higher than at other homes in the community as a result of materials used in your home's plumbing. According to USEPA, homes built before 1986 are more likely to have lead pipes, fixtures and solder.

If you suspect you have lead in your fixtures and if your water has been sitting for several hours, you can minimize the potential for

lead exposure by running your faucet for 30 seconds to 2 minutes before using water for drinking or cooking. Capture and reuse this water for other uses such as watering ornamental plants.

EBMUD samples and tests your water in accordance with all state and federal drinking water requirements, and will provide a list of results upon request. If you are concerned about elevated lead levels in your home's water, you may wish to have your water tested. In 2017, EBMUD started a new program to provide our customers with lead testing for their water; call 866-403-2683 for more information.

REPORT A WATER QUALITY CONCERN

Do you have a question or concern about your water quality? Call 866-403-2683. EBMUD inspectors respond to calls within one business day regarding water which appears dirty, colored, or has foreign particles or unusual taste or odor.

Information on lead in drinking water, testing methods and steps you can take to minimize exposure is available at www.ebmud.com/lead and from the USEPA Safe Drinking Water Hotline at 800-426-4791 or online at www.epa.gov/safewater/lead.

Fluoridation

EBMUD is required by state law to add fluoride to drinking water to help prevent dental decay in consumers. Current regulations require fluoride levels in the treated water be maintained between 0.6 to 1.2 ppm with an optimum dose of 0.7 ppm. Our monitoring showed that fluoride levels in the treated water distribution system averaged 0.7 ppm.

According to the American Dental Association and CDC, it is safe to use optimally fluoridated water for preparing infant formula. If an infant is primarily fed infant formula prepared with fluoridated water, there may be an increased chance for mild enamel fluorosis, but enamel fluorosis does not affect the health of the infant or the health of the infant's teeth. To lessen this chance, deionized, purified, distilled or demineralized bottled water can be used.

If you have additional questions about fluoride, contact your health provider. Additional information can be found at the State Board www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/Fluoridation.shtml or the CDC www.cdc.gov/fluoridation websites.



HOW TO CONTACT EBMUD

For more information about water quality or to report a water quality concern, call 866-403-2683 or visit www.ebmud.com/waterquality.

If you would like this report mailed to you, email customerservice@ebmud.com or call 510-986-7555. View this report online at www.ebmud.com/wqr.

EBMUD encourages public participation in decisions affecting drinking water quality and other matters at its Board of Directors meeting held the second and fourth Tuesdays of each month at 1:15 pm, 375 Eleventh Street, 2nd Floor, Oakland.

Board of Directors

John A. Coleman • Andy Katz • Doug Linney
Lesia R. McIntosh • Frank Mellon
William B. Patterson • Marguerite Young

General Manager

Alexander R. Coate

ADDITIONAL CONTACTS

State Water Resources Control Board
Division of Drinking Water • 510-620-3463

U.S. Environmental Protection Agency
Safe Drinking Water Hotline • 800-426-4791

Alameda Public Health Department • 510-567-8000

Contra Costa Public Health Division • 925-313-6712



375 Eleventh Street
Oakland, CA 94607
1-866-40-EBMUD
www.ebmud.com

PUB. 144 3/17 2M 30% Post-consumer waste

This is important information about your drinking water. Translate it, or speak with someone who understands it.

Este documento contiene información importante sobre el agua potable que usted consume. Tradúzcalo o hable con alguien que lo entienda.

這是有關您飲用水的重要資訊。請翻譯資訊，或與瞭解其內容的人討論。

Ito ay isang mahalagang impormasyon tungkol sa inyong iniinom na tubig. Isaling-wika ito, o makipag-usap sa isang tao na naiintindihan ito.

Đây là thông tin quan trọng về nước uống của quý vị. Hãy chuyển ngữ tài liệu này, hoặc nói chuyện với người có thể hiểu về thông tin này.

여러분의 식수에 대한 중요한 정보입니다. 본 안내문을 번역하거나 내용을 이해하는 사람과 이야기하십시오.

این متن حاوی اطلاعات مهمی درباره آب آشامیدنی شما است. آن را ترجمه کرده یا با فردی که آن را متوجه می شود صحبت کنید.

Ce sont des renseignements importants concernant votre eau potable. Traduisez-les ou parlez-en avec quelqu'un en mesure de les comprendre.

यह महत्वपूर्ण जानकारी आपके पीने के पानी के बारे में है। इसका अनुवाद करें, या किसी ऐसे व्यक्ति से बात करें जो इसे समझता हो।

هذه معلومات هامة حول مياه الشرب التي تتناولها. ترجمها، أو تحدث إلى شخص يستطيع فهمها.

Здесь представлена важная информация о качестве вашей питьевой воды. Переведите эту информацию или попросите человека, знающего английский язык, пересказать ее вам.

これは、あなたの飲料水に関する重要な情報です。翻訳するか、理解できる方にご相談ください。

Dies ist eine wichtige Information zu Ihrem Trinkwasser. Übersetzen Sie sie oder sprechen Sie mit jemandem, der die Information versteht.

Este documento contém informações importantes sobre a sua água para consumo. Traduza-o ou fale com alguém que o compreenda.

Queste sono informazioni importanti sulla vostra acqua potabile. Fatele tradurre o parlate con qualcuno in grado di comprenderle.

ນີ້ແມ່ນຂໍ້ມູນສໍາຄັນກ່ຽວກັບນໍ້າດື່ມຂອງທ່ານ. ແປຂໍ້ມູນນີ້, ຫຼື ລົມກັບບາງຄົນທີ່ເຂົ້າໃຈຂໍ້ມູນນີ້.

នេះគឺជាព័ត៌មានសំខាន់ អំពីទឹកផឹករបស់អ្នក។ សូមអ្នកផ្សព្វផ្សាយ ឬពិគ្រោះជាមួយនឹងអ្នកណាដែលយល់។

یہ آپ کے پینے کے پانی کے بارے میں اہم معلومات ہے۔ اس کا ترجمہ کریں، یا اسے سمجھنے والے کسی شخص سے بات کریں۔

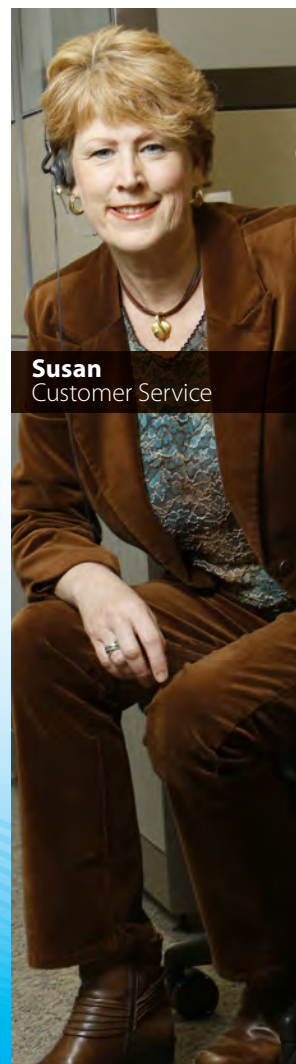
ຂ້ອມູນນີ້ເປັນຂ້ອມູນສໍາຄັນເຖິງກັບນໍ້າດື່ມຂອງທ່ານ. ຂໍໃຫ້ແປຂ້ອມູນນີ້ຫຼືພຽດຊາຍກັບຜູ້ທີ່ເຂົ້າໃຈຂ້ອມູນ.

מדובר במידע חשוב לגבי המים שאתם שותים. תרגמו, או תדברו עם מישהו שאתם יכולים להבין.

Ovo je važna informacija o pijaćoj vodi. Prevedite je, ili razgovarajte s nekim ko je razume.

Οι παρούσες είναι σημαντικές πληροφορίες σχετικά με το νερό που πίνετε. Μεταφράστε τις ή μιλήστε με κάποιον που τις καταλαβαίνει.

આ તમારા પીવાના પાણી વિશે મહત્વની માહિતી છે. તેનું ભાષાંતર કરો અથવા કોઈકે એવી વ્યક્તિ સાથે વાત કરો જે તેને સમજતી હોય.



Susan
Customer Service



EAST BAY MUNICIPAL UTILITY DISTRICT

2015 ANNUAL WATER QUALITY REPORT

KEEP SAVING

Latest drought information:
www.ebmud.com/drought

EBMUD is pleased to report that in 2015, your drinking water met or surpassed every state and federal public health requirement.

PROTECTED SOURCE

In the East Bay, 1.4 million customers rely on high-quality EBMUD water. Almost all of EBMUD's water comes from the 577-square mile watershed of the Mokelumne River on the western slope of the Sierra Nevada. This area is mostly national forest, EBMUD-owned lands and other undeveloped lands little affected by human activity.

The Mokelumne watershed collects snowmelt from Alpine, Amador and Calaveras counties, which flows into Pardee Reservoir near the town of Valley Springs. Three large aqueducts carry water 90 miles from Pardee Reservoir to the East Bay. During times of drought, high water demand, system maintenance or for operational needs, EBMUD may draw water from other watersheds (like the Sacramento River), or from local watersheds here in the East Bay.

EBMUD's network of reservoirs, pipelines, pumps and water treatment plants are put to work to provide reliable drinking water every day, as reflected in this report.

WATER IN DRY YEARS

During droughts and water shortages, EBMUD may draw water from the Sacramento River to meet customer needs. Continued drought in 2015 led EBMUD to use its dry year water supplies for the second consecutive year. More than 18 billion gallons, or about a four-month supply of water, flowed from the Sacramento River into the East Bay and customers' taps throughout the year.

Regardless of source, all water is treated at one of six EBMUD water treatment plants before it reaches your tap. EBMUD takes many steps to ensure high quality water that include managing watershed lands and reservoirs, treating the water, operating a complex distribution system, maintaining facilities and addressing customer concerns.

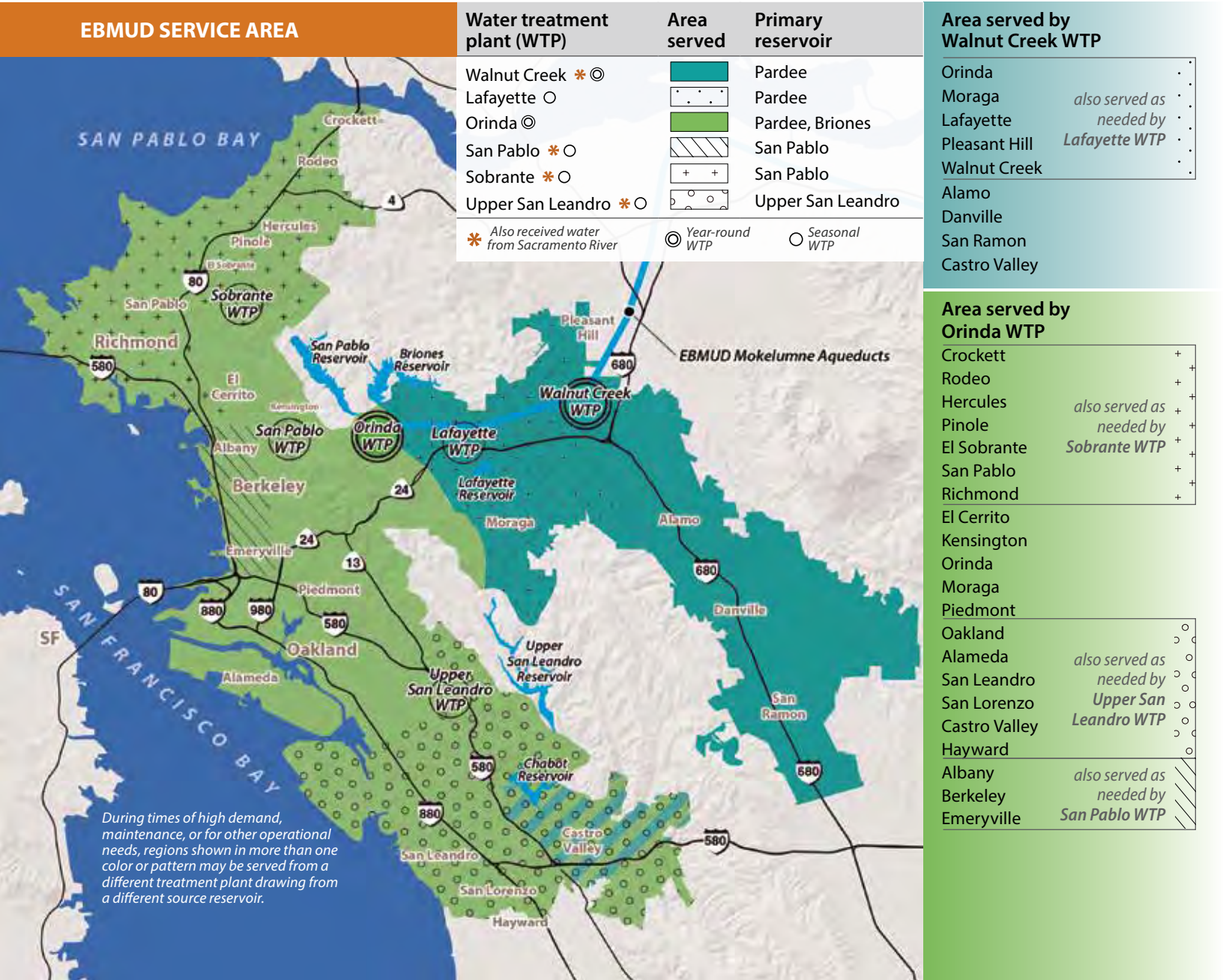
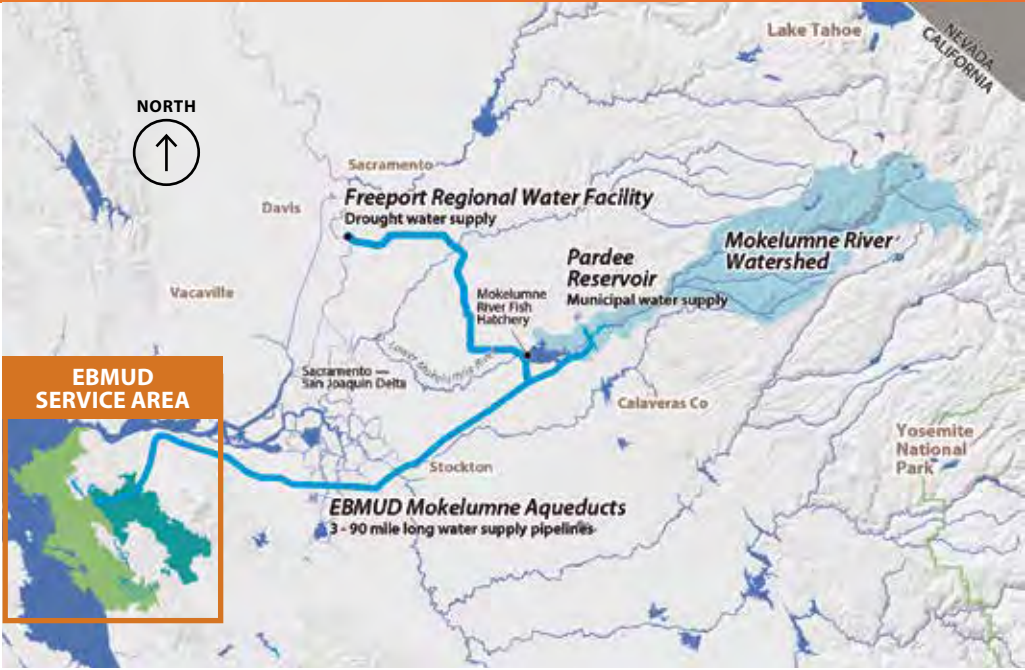
In laboratories and in the field, EBMUD samples and tests your water extensively to ensure it is safe to drink. We look for more than 100 substances including microorganisms, pesticides, herbicides, asbestos, lead, copper, petroleum products and by-products of industrial and water treatment processes. More than 20,000 laboratory tests each year ensure the safety of your drinking water.



WHERE YOUR WATER IS TREATED

EBMUD’s water system is built to be redundant so customers can count on us to deliver clean drinking water when they need it. Our water typically comes from the Mokelumne River watershed in the Sierra Nevada foothills.

Before reaching your tap, EBMUD water is treated at one of six water treatment plants in the East Bay. Some customers receive water from different treatment plants at different times of the year. The taste and smell of your tap water may fluctuate throughout the year because of operational changes (such as when a treatment plant is down for maintenance) or due to drought-related changes at the source.



WHAT WAS DETECTED AND REPORTED

In 2015, EBMUD treated raw water from multiple sources, including the Sacramento River, and consistently provided high-quality drinking water, meeting or surpassing every public health requirement set by the State Water Resources Control Board (State Board) and the U.S. Environmental Protection Agency (USEPA).

The tables on the following pages show the measured amounts of contaminants detected in 2015 or in the most recent year sampling was required. Samples were collected in EBMUD’s source waters, at water treatment plants, in the distribution system or at customers’ taps.

Although EBMUD tests for more than 100 substances, this report only lists those detected at or above the state or federal level required for reporting. In this case, no news is good news!

Table 1 – Regulated for public health

These contaminants are regulated to protect your health. They have maximum contaminant levels, known as primary MCLs, set by the State Board or the USEPA. These levels are set as close to the established public health goals as is economically and technologically feasible.

Table 2 – Regulated for drinking water aesthetics

These contaminants are regulated to maintain aesthetic qualities such as odor, taste and appearance of drinking water. They have maximum contaminant levels, also known as secondary MCLs, set by the State Board.



Table 3 – Unregulated contaminants

The first five listed contaminants must be reported, if detected, under the federal Unregulated Contaminant Monitoring Rule 3 (UCMR3). The last three listed contaminants have state notification levels and water systems are encouraged, but not required, to report results to consumers.

Table 4 – Other parameters of interest to customers

These water measurements, such as pH, hardness and alkalinity, may be of interest to customers.

HOW TO READ THE WATER QUALITY TABLE

Find your location on the map on page 2. Note which water treatment plant(s) serve that area.

- 1 Go to the table on page 4 to find the contaminant you are interested in. Remember – no news is good news!
- 2 Column two lists the most recent year the contaminant was tested.
- 3 Column three lists the state or federal goal. At that amount or lower, there is no known or expected risk to health from its presence in drinking water. Not all listed contaminants have state or federal goals.

- 4 Column four notes the highest amount the State Board or the USEPA allows. This amount is usually not as low as the public health goal in column three.
- 5 Column five lists the average amount detected across the EBMUD service area or at designated locations.
- 6 Find the column that corresponds to the water treatment plant or plants that serve you. This is the amount of the contaminant detected in your area’s water.
- 7 The last column lists how the contaminant typically gets into your drinking water.

	1	2	3	4	5	6						7
	Regulated for public health Primary MCL (Unit)	Year sampled	State or federal goal PHG, MCLG or MCL	Highest amount allowed MCL, MCLG or AL	System average	Water treatment plants					Typical sources	
						Walnut Creek	Lafayette	Orinda	Sobrante	San Leandro	San Pablo	
Microbiological	Total Coliform	2015	0	5%	NA	1.4% was the highest percentage found in any month					Naturally present in the environment	
		2015	NA	1	0.03	0.02 – 0.09	0.01 – 0.08	0.01 – 0.08	0.02 – 0.2	0.03 – 0.10	0.02 – 0.06	Soil runoff
	Turbidity (NTU)	2015	NA	95% ≤0.3	100%	100%	100%	100%	100%	100%	100%	
Inorganic	Aluminum (ppb)	2015	600	1000	<50	<50	<50	<50	<50 – 121	<50 – 66	<50	Erosion of natural deposits; water treatment residue
	Copper (ppm)	2014	300	1300	90th percentile <50	0 out of 58 sites were above the regulatory action level					Corrosion of household plumbing; erosion of natural deposits	
	Fluoride in source water ^a (ppm)	2015	1	2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Erosion of natural deposits; water additive
	Lead ^b (ppb)	2014	0.2	15	90th percentile <5	0 out of 58 sites were above the regulatory action level					Corrosion of household plumbing; erosion of natural deposits	
	Nitrate as nitrogen (ppm)	2015	10	10	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4 – 0.5	<0.4	Runoff from fertilizer use; erosion of natural deposits
	Nitrate and nitrite as nitrogen (ppm)	2015	10	10	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4 – 0.5	<0.4	Runoff from fertilizer use; erosion of natural deposits
Organic	Bromate (ppb)	2015	0.1	10	2 ^c	NA	NA	NA	<1 – 4.3	<1 – 4.6	NA	By-product of drinking water disinfection
	Chloramine as chlorine ^d (ppm)	2015	4	4	2 ^c	<0.05 – 3.1					Drinking water disinfectant added for treatment	
	Control of DBP precursors (TOD)	2015	NA	TT	NA	NA	NA	NA	met req	met req	met req	Various natural and man-made sources

EBMUD 2015 ANNUAL WATER QUALITY REPORT

In 2015, your drinking water was consistently the highest quality, meeting or surpassing every public health requirement set by the State Water Resources Control Board (State Board) Division of Drinking Water and the U.S. Environmental Protection Agency (USEPA).

KEY TERMS

- AL** Regulatory action level. The concentration which, if exceeded, triggers treatment or other requirements that a water system must follow.
 - DBP** Disinfection by-products. These are formed when chlorine and/or ozone reacts with natural constituents in water. Trihalomethanes (THMs), haloacetic acids (HAAs), chlorate, and bromate are disinfection by-products.
 - D/DBPs** Disinfection byproducts, disinfection residuals and disinfection byproduct precursors.
 - MCL** Maximum contaminant level. The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs or MCLGs as is economically and technologically feasible. Secondary MCLs address odor, taste and appearance of drinking water.
 - MCLG** Maximum contaminant level goal. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the USEPA.
 - MRDL** Maximum residual disinfectant level. The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
 - MRDLG** Maximum residual disinfectant level goal. The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.
 - NA** Not applicable.
 - Notification level (NL)** A health-based advisory level established by the State Board for contaminants in drinking water that lack MCLs.
 - Primary drinking water standard** These standards regulate contaminants that affect health by setting MCLs and MRDLs along with their monitoring, reporting and water treatment requirements.
 - PHG** Public health goal. The level of a contaminant in drinking water below which there is no known or expected risk to health. Public health goals are set by the California EPA.
 - TOC** Total organic carbon. A measure of organic content in the water.
 - Turbidity** A measure of the cloudiness of water. Turbidity is monitored because it is a good indication of the effectiveness of our filtration systems.
 - TT** Treatment technique. A required process intended to reduce the level of a contaminant in drinking water.
 - 90th percentile** A measure that indicates 90 percent of the samples had a lower result.
- UNITS**
- gpg** grains per gallon
 - NTU** nephelometric turbidity unit, a measure of the cloudiness of water
 - ppm** parts per million. One ppm is like 32 seconds in one year. (mg/L)
 - ppb** parts per billion. One ppb is like 3 seconds in 100 years. (µg/L)
 - ppt** parts per trillion. One ppt is like 3 seconds in 100,000 years. (ng/L)
 - TON** threshold odor number, a measure of odor in water
 - µS/cm** microsiemens per centimeter, a measure of electrical conductance

1	Regulated for public health <i>Primary MCL (Unit)</i>	Year sampled	State or federal goal <i>PHG, MCLG or MRDLG</i>	Highest amount allowed <i>MCL, MRDL or AL</i>	System average	Walnut Creek	Lafayette	Orinda	Sobrante	Upper San Leandro	San Pablo	Typical sources
Microbiological	Total Coliform	2015	0	5%	NA	1.4% was the highest percentage found in any month						Naturally present in the environment
	Turbidity (NTU)	2015	NA	1	0.03	0.02 – 0.09	0.01 – 0.08	0.01 – 0.08	0.02 – 0.2	0.03 – 0.10	0.02 – 0.06	Soil runoff
		2015	NA	95% ≤0.3	100%	100%	100%	100%	100%	100%		
Inorganic	Aluminum (ppb)	2015	600	1000	<50	<50	<50	<50	<50 – 121	<50 – 66	<50	Erosion of natural deposits; water treatment residue
	Copper (ppb)	2014	300	1300	90th percentile <50	0 out of 58 sites were above the regulatory action level						Corrosion of household plumbing; erosion of natural deposits
	Fluoride in source water ^a (ppm)	2015	1	2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Erosion of natural deposits; water additive
	Lead ^b (ppb)	2014	0.2	15	90th percentile <5	0 out of 58 sites were above the regulatory action level						Corrosion of household plumbing; erosion of natural deposits
	Nitrate as nitrogen (ppm)	2015	10	10	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4 – 0.5	<0.4	Runoff from fertilizer use; erosion of natural deposits
D/DBPs	Nitrate and nitrite as nitrogen (ppm)	2015	10	10	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4 – 0.5	<0.4	Runoff from fertilizer use; erosion of natural deposits
	Bromate (ppb)	2015	0.1	10	2 ^c	NA	NA	NA	<1 – 4.3	<1 – 4.6	NA	By-product of drinking water disinfection
	Chloramine as chlorine ^d (ppm)	2015	4	4	2 ^c	<0.05 – 3.1						Drinking water disinfectant added for treatment
	Control of DBP precursors (TOC)	2015	NA	TT	NA	NA	NA	NA	met req.	met req.	met req.	Various natural and man-made sources
	Haloacetic acids, 5 species (ppb)	2015	NA	60	37 ^e	18 – 40	19 – 36	10 – 37	14 – 49	8 – 29	NA	By-product of drinking water disinfection
	Trihalomethanes (ppb)	2015	NA	80	52 ^e	21 – 63	30 – 59	26 – 62	33 – 64	21 – 40	NA	By-product of drinking water disinfection

2	Regulated for drinking water aesthetics <i>Secondary MCL (Unit)</i>	Year sampled	State or federal goal <i>PHG or MCLG</i>	Highest amount allowed <i>MCL</i>	System average	Walnut Creek	Lafayette	Orinda	Sobrante	Upper San Leandro	San Pablo	Typical sources
	Aluminum (ppb)	2015	NA	200	<50	<50	<50	<50	<50 – 121	<50 – 66	<50	Erosion of natural deposits; water treatment residue
	Chloride (ppm)	2015	NA	250	11	5 – 8	6 – 7	6 – 7	15 – 21	15 – 18	14 – 15	Runoff/leaching from natural deposits
	Color (color units)	2015	NA	15	<1	1 – 3	<1	<1 – 1	1	1	1	Naturally-occurring organic materials
	Odor (TON)	2015	NA	3	2	<1 – 1	2	<1 – 2	2	2 – 4	<1 – 8	Naturally-occurring organic materials
	Specific conductance (µS/cm)	2015	NA	900	174	66 – 126	72	90 – 104	261	273	244	Substances that form ions when in water
	Sulfate (ppm)	2015	NA	250	15	1 – 3	1 – 2	1 – 12	19 – 30	24 – 44	20	Runoff/leaching from natural deposits
	Total dissolved solids (ppm)	2015	NA	500	115	34 – 87	24 – 63	38 – 83	130 – 240	150 – 350	150	Runoff/leaching from natural deposits
	Turbidity (NTU)	2015	NA	5	0.03	0.02 – 0.09	0.01 – 0.08	0.01 – 0.08	0.02 – 0.2	0.03 – 0.10	0.02 – 0.06	Soil runoff

3	Unregulated contaminants <i>No established MCL (Unit)</i>	Year sampled	State or federal goal <i>PHG or MCLG</i>	State notification level	System average	Walnut Creek	Lafayette	Orinda	Sobrante	Upper San Leandro	San Pablo ^g	Typical sources
UCMR3	Chlorate (ppb)	2013-2015	NA	800	174	91 – 220	84 – 210	68 – 160	100 – 290	84 – 480	NA	By-product of drinking water disinfection
	Chromium, hexavalent ^f (ppb)	2013-2015	0.02	NA	0.05	0.04 – 0.07	0.03 – 0.06	<0.03 – 0.06	0.03 – 0.09	<0.03 – 0.22	NA	Erosion of natural deposits; release of industrial chemicals
	Molybdenum (ppb)	2013-2015	NA	NA	<1	<1	<1	<1	<1 – 1	<1 – 1	NA	Erosion of natural deposits; release of industrial chemicals
	Strontium (ppb)	2013-2015	NA	NA	97	31 – 44	35 – 100	32 – 110	52 – 190	44 – 320	NA	Erosion of natural deposits; release of industrial chemicals
	Vanadium (ppb)	2013-2015	NA	50	0.7	0.3 – 0.4	0.2 – 0.4	0.2 – 0.4	0.4 – 1.9	0.3 – 2.4	NA	Erosion of natural deposits; release of industrial chemicals
Others ⁱ	Boron (ppb)	2015	NA	1000	<100	<100	<100	<100	<100	<100	104	Runoff/leaching from natural deposits
	Chlorate (ppb)	2015	NA	800	217	120 – 160	140	220 – 260	120 – 470	84 – 270	280 – 520	By-product of drinking water disinfection
	N-Nitrosodimethylamine ^h (NDMA) (ppt)	2015	3	10	2	1	2	<1 – 4	1 – 4	1 – 3	NA	By-product of drinking water disinfection



NOTES

- a)** See page 7 for additional information about fluoride in drinking water. **b)** See Page 7 for additional information about lead in drinking water. **c)** Highest running annual average. **d)** Chloramine residuals in the distribution system are measured as an equivalent quantity of chlorine. When the chloramine residual cannot be detected, the sample is further analyzed to ensure that microbiological water quality is in compliance with regulations. **e)** Highest locational running annual average. **f)** Hexavalent chromium has a California MCL of 10 ppb and all sample results are well below the MCL. **g)** San Pablo Water Treatment Plant is a standby plant and was not in operation during the required UCMR3 monitoring period. **h)** Sampling locations are chosen to represent worst case scenarios. **i)** Parameters with a Notification Level.

4 Other parameters of interest to customers (<i>Unit</i>)	Walnut Creek	Lafayette	Water treatment plants		Upper San Leandro	San Pablo
			Orinda	Sobrante		
Alkalinity, bicarbonate as CaCO ₃ (ppm)	20 – 35	17	19 – 25	74	86	77
Alkalinity, carbonate as CaCO ₃ (ppm)	3 – 14	6	8 – 10	5	<0.1	<0.1
Calcium (ppm)	5 – 9	5 – 6	5 – 10	16 – 22	18 – 34	16
Hardness as CaCO ₃ (gpg*)	1 – 2	1	1 – 2	4 – 5	4 – 8	4
Hardness as CaCO ₃ (ppm)	15 – 38	16 – 21	14 – 39	67 – 84	76 – 140	66 – 67
Magnesium (ppm)	1 – 4	1	1 – 2	6 – 7	7 – 14	6
pH (pH)	9.2 – 9.4	9.1 – 9.3	8.9 – 9.4	8.3 – 8.9	8.3 – 8.7	8.6 – 8.8
Potassium (ppm)	1	1	1	1 – 2	1 – 2	1
Silica (ppm)	8 – 13	8 – 9	7 – 9	6 – 13	9 – 15	12
Sodium (ppm)	6 – 13	6 – 8	6 – 12	20 – 27	21 – 33	24 – 25

* Grains per gallon (gpg) is a measure of water hardness. Knowing the amount can help improve the function of dishwashers, cooling equipment and other industrial processes. Refer to your appliance manufacturer's instruction manual for the optimum grains per gallon level.

WATER QUALITY REGULATIONS

In order to ensure that tap water is safe to drink, the USEPA and the State Board prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. California Department of Public Health establishes limits for contaminants in bottled water.

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water include:

Microbial contaminants, such as viruses, bacteria and protozoa, such as *Cryptosporidium*, that may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.

Inorganic contaminants, such as salts and metals, that can be naturally-occurring or result from urban storm water runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.

Pesticides and herbicides that may come from a variety of sources, such as agriculture, urban stormwater runoff and residential uses.

Organic chemical contaminants, including synthetic and volatile organic chemicals, that are by-products of industrial processes and petroleum production and can also come from gas stations, urban stormwater runoff, agricultural application and septic systems.

Radioactive contaminants that can be naturally occurring or be the result of oil and gas production and mining activities.

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that

water poses a health risk. More information about contaminants and potential health effects is available from the USEPA's Safe Drinking Water Hotline at 800-426-4791 or online at www.epa.gov/safewater. Contact your healthcare provider or visit the Centers for Disease Control and Prevention (CDC) website for guidelines on using tap water for health or medical purposes.

Cryptosporidium
Cryptosporidium is a microbial contaminant found in surface water throughout the United States. Although filtration is highly effective in removing *Cryptosporidium*, the most commonly used filtration methods cannot guarantee 100 percent removal.

Our monitoring indicates the presence of these organisms in one of our source waters. Current test methods cannot determine if the organisms are dead or are capable of causing disease. Ingestion of *Cryptosporidium* may cause abdominal infection with symptoms including nausea, diarrhea and abdominal cramps.

Cryptosporidium must be ingested to cause disease, and it may be spread through means other than drinking water. Most healthy individuals can overcome the disease within a few weeks. However, immuno-compromised people, infants and small children, and the elderly are at greater risk of developing life-threatening illness. We encourage these individuals to consult their physician regarding appropriate precautions to take to avoid infection.

Populations with low resistance
Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, and some elderly and some infants can be particularly at risk from infections.

These people should seek advice about drinking water from their health care providers. USEPA/CDC guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the USEPA Safe Drinking Water Hotline at 800-426-4791 or www.epa.gov/safewater.



Lead in drinking water
If present, elevated levels of lead can cause serious health problems. Pregnant women, infants and young children are typically more vulnerable to lead in drinking water than the general population.

Lead in drinking water is primarily from materials and components associated with lead in water distribution pipes and home plumbing. EBMUD replaced all known lead service pipes in its service area in the 1990s and maintains an aggressive corrosion control program to reduce lead leaching from its water mains. Still, you may have lead in your home plumbing. It is possible that lead levels at your home may be higher than at other homes in the community as a result of materials used in your home's plumbing.

EBMUD samples and tests drinking water in accordance with all state and federal drinking water requirements, and will provide a list of results upon request. If you are concerned about elevated lead levels in your home's water, you may wish to have your water tested. If your water has been sitting for several hours, you can minimize the potential for lead exposure by running your faucet for 30 seconds to 2 minutes before using water for drinking or cooking. Capture and reuse this water for other uses such as watering ornamental plants.

Information on lead in drinking water, testing methods and steps you can take to minimize exposure is available at ebmud.com/lead and from the USEPA Safe Drinking Water Hotline at 800-426-4791 or online at www.epa.gov/safewater/lead.

Fluoridation
EBMUD is required by state law to add fluoride to drinking water to help prevent dental decay in consumers. Current regulations require fluoride levels in the treated water be maintained between 0.6 to 1.2 ppm with an optimum dose of 0.7 ppm. Our monitoring showed that fluoride levels in the treated water distribution system averaged 0.78 ppm.

According to the American Dental Association and CDC, it is safe to use optimally fluoridated water for preparing infant formula. If an infant is primarily fed infant formula prepared with fluoridated water, there may be an increased chance for mild enamel fluorosis, but enamel fluorosis does not affect the health of the infant or the health of the infant's teeth. To lessen this chance, deionized, purified, distilled or demineralized bottled water can be used.

If you have additional questions about fluoride, contact your health provider. Additional information can be found at the State Board www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/Fluoridation.shtml or the CDC www.cdc.gov/fluoridation websites.

 **REPORT A WATER QUALITY CONCERN**

Do you have a question or concern about your water quality? Call 866-403-2683. EBMUD inspectors respond to calls within one business day regarding water which appears dirty, colored, or has foreign particles or unusual taste or odor.

This report contains important information about your drinking water. Translate it, or speak with someone who understands it. To request a copy of this report in Spanish or Chinese, please call 866-403-2683.

Este informe contiene información muy importante sobre su agua potable. Tradúzcalo, hable con alguien que lo entienda bien, o solicite un ejemplar de este informe en español llamando al 866-403-2683 o visitando www.ebmud.com/wqr-es.

這份報告包含有您飲用水的重要資訊。請翻譯該內容，或與了解內容的人討論。如需瀏覽中文版可上網站 www.ebmud.com/wqr-zh 或致電 866-403-2683 索取中文報告。

Ang ulat na ito ay naglalaman ng importanteng impormasyon tungkol sa inyong iniinom na tubig. Isalin ito, o makipag-usap sa isang taong nakakaintindi nito.

Bản báo cáo này có các thông tin quan trọng về nước uống của quý vị. Hãy chuyển ngữ tài liệu này, hoặc nói chuyện với người có thể hiểu được bản báo cáo này.

본 보고서에는 여러분의 식수에 대한 중요한 정보가 담겨져 있습니다. 번역 또는 지인을 통해 반드시 본 내용을 읽어보시기 바랍니다.

این گزارش حاوی اطلاعات مهمی در مورد آب آشامیدنی است. آن را ترجمه کنید، یا از کسی که مطالب آن را می فهمد سؤال کنید

この報告書には、あなたの飲料水に関する重要な情報が含まれています。和訳するか、理解できる人に相談してください。

В настоящем отчете содержится важная информация о питьевой воде. Переведите этот текст или покажите его тому, кто знает английский язык.

របាយការណ៍នេះមានព័ត៌មានសំខាន់ៗអំពីទឹកផឹក។ សូមរកគេឲ្យរួចប្រែជូនឬពិគ្រោះជាមួយនឹង អ្នកណាដែលយល់របាយការណ៍នេះ។

Este relatório contém informações importantes sobre sua água potável. Traduza o relatório ou fale com alguém que o compreenda.

يحتوي هذا التقرير على معلومات هامة حول مياه الشرب التي تتناولها. ترجم التقرير أو تحدث إلى شخص يستطيع فهمه.

इस रिपोर्ट में आपके पीने के पानी के बारे में महत्वपूर्ण जानकारी दी हुई है। इसका अनुवाद करें, या किसी ऐसे व्यक्ति से बात करें जो इसे समझता हो।

Ce rapport contient des informations importantes concernant votre eau potable. Faites-le traduire ou adressez-vous à quelqu'un qui est en mesure de le comprendre.

รายงานฉบับนี้มีข้อมูลสำคัญเกี่ยวกับน้ำดื่มของท่าน ขอให้แปลรายงานฉบับนี้หรือพูดคุยกับผู้ที่เข้าใจเนื้อหาในรายงานนี้



375 Eleventh Street
Oakland, CA 94607
1-866-40-EBMUD
www.ebmud.com

HOW TO CONTACT US

For more information about water quality or to report a water quality concern, call 866-403-2683 or visit www.ebmud.com/waterquality.

If you would like this report mailed to you, call 510-986-7555 or email custsvc@ebmud.com. View this report online at www.ebmud.com/wqr.

EBMUD encourages public participation in decisions affecting drinking water quality and other matters at its Board of Directors meeting held the second and fourth Tuesdays of each month at 1:15 pm, 375 Eleventh Street, 2nd Floor, Oakland.

Board of Directors

John A. Coleman • Andy Katz • Doug Linney • Lesa R. McIntosh
Frank Mellon • William B. Patterson • Marguerite Young

General Manager

Alexander R. Coate

FOR MORE WATER QUALITY INFORMATION

State Water Resources Control Board
Division of Drinking Water • 510-620-3474

U.S. Environmental Protection Agency
Safe Drinking Water Hotline • 800-426-4791

Alameda County Environmental Health • 510-567-6700

Contra Costa Environmental Health • 925-692-2537



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Educational Information

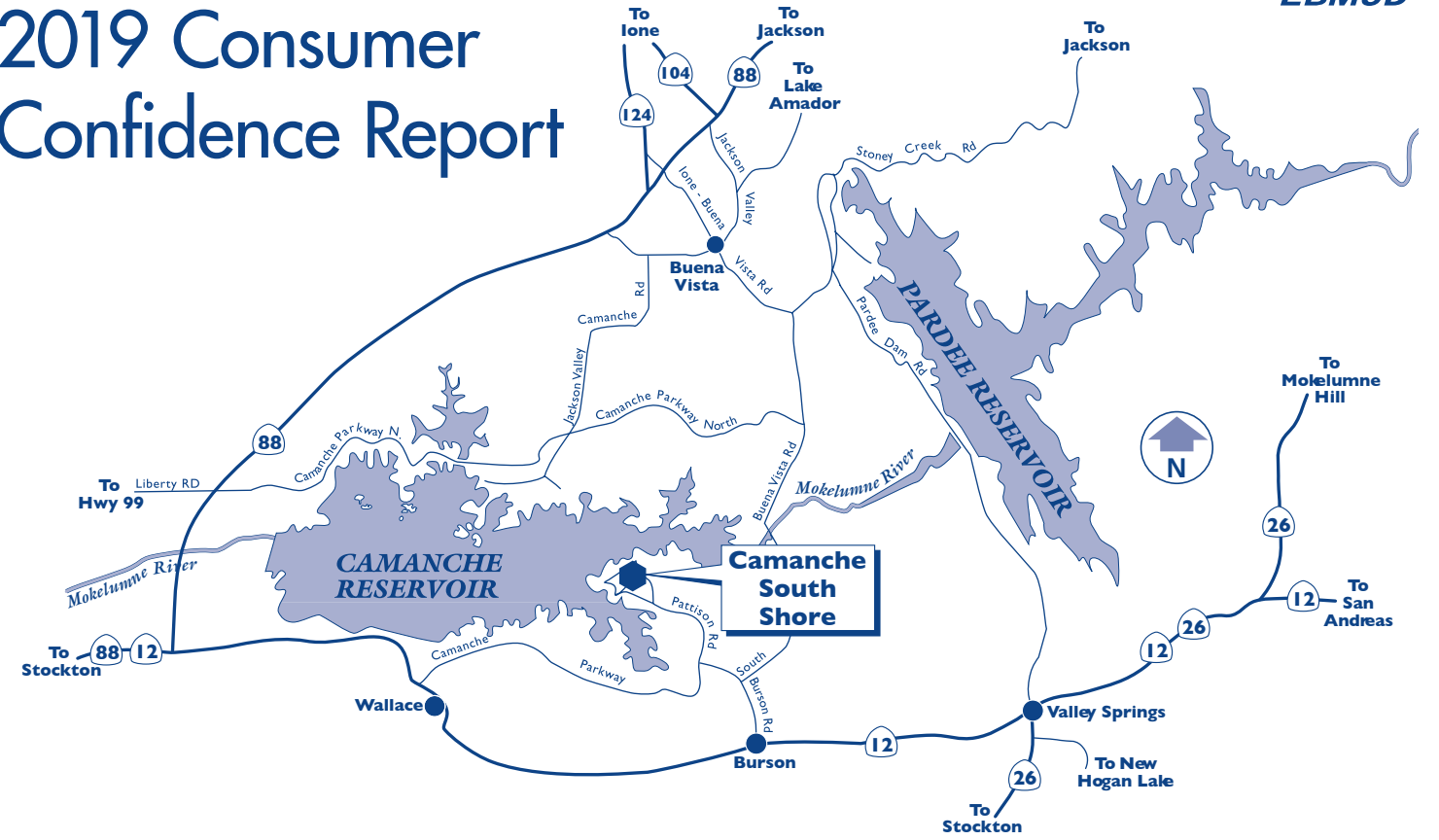
Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects is available online at www.epa.gov/ground-water-and-drinking-water.

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. USEPA/Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available online at www.cdc.gov/parasites/crypto/index.html.

Cryptosporidium is a microbial pathogen found in surface water throughout the U.S. Although filtration removes *Cryptosporidium*, the most commonly used filtration methods cannot guarantee 100 percent removal. Current test methods do not allow us to determine if the organisms are dead or if they are capable of causing disease. Ingestion of *Cryptosporidium* may cause cryptosporidiosis, an abdominal infection. Symptoms of infection include nausea, diarrhea, and abdominal cramps. Most healthy individuals can overcome the disease within a few weeks. However, immuno-compromised people, infants, small children, and the elderly are at greater risk of developing life threatening illness. We encourage immuno-compromised individuals to consult their doctor regarding appropriate precautions to take to avoid infection. *Cryptosporidium* must be ingested to cause disease, and it may be spread through means other than drinking water.

Camanche South Shore

2019 Consumer Confidence Report



Water System Information

This report includes information such as the source water, its water quality and comparisons to state and federal drinking water standards. For more information, please call the Pardee Water/Wastewater Supervisor at (209) 772-8368.

The Park Advisory Board meets in March, July and November at Pardee Center to discuss matters relating to water quality. For exact dates and times, please call (209) 772-8204. Public participation is encouraged.

Este informe contiene información muy importante sobre su agua potable. Tradúzcalo ó hable con alguien que lo entienda bien.

Water Source and Treatment

Camanche and Pardee Reservoirs are the water source for Camanche South Shore Recreation Area. The Recreation Area is served by Camanche South Shore Water Treatment Plant. Beginning in June 2018, a new ultrafiltration membrane treatment system followed by chlorine addition for disinfection was placed in service. The water treatment facility and distribution system are operated by state certified operators. The distribution system is served by two 240,000 gallon storage tanks.

This report describes the results from water sampling for potential contaminants and gives information on water related activities. The State Water Resources Control Board (State Water Board), Division of Drinking Water sets water quality requirements for the Camanche South Shore Recreation Area water system, in order to ensure that the water is safe to drink. Complying with regulations requires an extensive monitoring program

in both the source and treated waters. All water quality regulations were met in 2019.

In order to ensure that tap water is safe to drink, the U.S. Environmental Protection Agency (USEPA) and the State Water Board prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. California Department of Public Health (CDPH) and United States Food and Drug Administration regulations establish limits for contaminants in bottled water that provide the same protection for public health. Additional information on bottled water is available on the CDPH website at www.cdph.ca.gov/Programs/CEH/DFDCS/Pages/FDBPrograms/FoodSafetyProgram/Water.aspx.

Source Water Protection Activities

The State Water Board requires water utilities to determine the types of activities that can pollute their drinking water sources. EBMUD evaluated more than 100 activities that take place near these EBMUD reservoirs, and found that the sources are most vulnerable to the following activities: boating and marina gas stations, wastewater treatment and disposal facilities, historic gas stations, known contaminant plumes and historical mining. In 2019, no contaminants associated with these activities were detected in EBMUD's drinking water.

The detailed results of the source water assessment completed in 2002 can be reviewed at EBMUD's headquarters at Pardee Center, northeast of Valley Springs, or at the Stockton State Water Board office.

Camanche South Shore 2019 Water Quality Data

The tables list all the drinking water contaminants that we detected from January 1 through December 31, 2019, unless noted otherwise. The presence of these contaminants in the water does not necessarily indicate that the water poses a health risk.

Primary Contaminants

	MCL, AL or [MRDL]	PHG, (MCLG) or [MRDLG]	Average	Range	Sample Year	Typical Sources
Inorganic Contaminants						
Copper (ppb)	AL=1300	300	90th Percentile =73	No sites above AL out of 5 sites sampled	2019	Corrosion of household plumbing; erosion of natural deposits
Lead (ppb) *	AL=15	0.2	90th Percentile =2	No sites above AL out of 5 sites sampled	2019	Corrosion of household plumbing; erosion of natural deposits
Disinfection Byproducts, Disinfectant Residuals						
Chlorine residual as Cl ₂ (ppm)	[4]	[4]	0.9 ^a	0.5–1.2	2019	Drinking water disinfectant added for treatment
Haloacetic Acids, 5 species (ppb)	60	NA	44 ^b	36–49	2019	By-product of drinking water disinfection
Trihalomethanes (ppb)	80	NA	48 ^b	35–50	2019	By-product of drinking water disinfection

a) Highest Running Annual Average
b) Highest Locational Running Annual Average

Secondary Contaminants

	MCL	Average	Range	Sample Year	Typical Sources
Chloride (ppm)	250	3	3	2019	Runoff/leaching from natural deposits
Color (color units)	15	2	2	2019	Naturally-occurring organic matter
Odor–Threshold (TON)	3	<1	<1–2	2019	Naturally-occurring organic materials
Specific Conductance (µS/cm)	900	60	60	2019	Substances that form ions when in water
Sulfate (ppm)	250	1.6	1.6	2019	Runoff/leaching from natural deposits
Total Dissolved Solids (ppm)	500	53	53	2019	Runoff/leaching from natural deposits

Other Parameters

	Result
Alkalinity, total as CaCO ₃ (ppm)	17
Calcium (ppm)	4
Hardness, as CaCO ₃ (ppm)	15
Magnesium (ppm)	1

	Result
pH (pH units)	7.4
Potassium (ppm)	0.8
Sodium (ppm)	4

Treatment of Surface Water Sources

Treatment Technique	Ultrafiltration membrane treatment system
Turbidity Performance Standards	1. Be less than or equal to 0.3 NTU in 95% of measurements in a month 2. Not exceed 1.0 NTU at any time
Lowest monthly percentage of samples that met Turbidity Performance Standard No. 1	100%
Highest single turbidity measurement during the year	0.05 NTU
Number of violations of any surface water treatment requirements	0

Terms Used

AL = regulatory action level. The concentration which, if exceeded, triggers treatment or other requirements that a water system must follow.

MCL = Maximum Contaminant Level. The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs (or MCLGs) as is economically and technologically feasible.

MCLG = Maximum Contaminant Level Goal. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the U.S. Environmental Protection Agency.

MRDL = Maximum Residual Disinfectant Level. The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

MRDLG = Maximum Residual Disinfectant Level Goal. The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

NA = Not Applicable

NTU = Nephelometric Turbidity Units.

PDWS = Primary Drinking Water Standard. MCLs and MRDLs for contaminants that affect health along with their monitoring and reporting requirements, and water treatment requirements.

PHG = Public Health Goal. The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California Environmental Protection Agency.

ppb = parts per billion. One ppb is like 3 seconds in 100 years.

ppm = parts per million. One ppm is like 30 seconds in one year.

Secondary drinking water standard (SDWSs). MCLs for contaminants that affect taste, odor, or appearance of the drinking water. Contaminants with SDSWs do not affect the health at the MCL levels.

TON = Threshold Odor Number, a measurement of odors in water.

TT = Treatment Technique. A required process intended to reduce the level of a contaminant in drinking water.

Turbidity = A measure of cloudiness of the water. We monitor it because it is a good indicator of the effectiveness of our filtration system.

µS/cm = micro siemens per centimeter (measure of conductivity).

Contaminants in Drinking Water

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water include:

Microbial Contaminants, such as viruses and bacteria, that may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.

Inorganic Contaminants, such as salts and metals, that can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.

Private plumbing and fixtures may add lead or copper levels above the level delivered by EBMUD. Hot water systems can contain elevated levels of lead and copper so it is not advisable to drink from hot water faucets. For additional information see the Note about Lead on the bottom of this page.

Radioactive Contaminants, that can be naturally-occurring or be the result of oil and gas production and mining activities.

Pesticide and Herbicide Contaminants, that may come from a variety of sources, such as agriculture, urban stormwater and residential uses.

Organic Chemical Contaminants, including synthetic and volatile organic chemicals that are by-products of industrial processes and petroleum production, and can also come from gas stations, urban storm water runoff, agricultural application, and septic systems. The State Water Board waived monitoring requirements for synthetic organic chemicals, except for Atrazine and Simazine.

Secondary Contaminants affect aesthetic qualities such as taste, odor, or appearance. The clarity of the water can be measured by color, turbidity and aluminum content.

Other Parameters are water quality measurements which may be of interest to some consumers.

* Note about Lead

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with lead service lines and home plumbing. EBMUD is responsible for providing high quality drinking water and has replaced all known lead service lines in the EBMUD system, but cannot control the variety of materials used in existing home plumbing components.

When your water has been sitting for several hours, you can minimize the potential for lead exposure by running your faucet for 30 seconds to two minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods and steps you can take to minimize exposure is available online from the USEPA at www.epa.gov/lead.

The detailed results of the source water assessment completed in 2002 can be reviewed at the District's headquarters at Pardee Center, northeast of Valley Springs, or at the Stockton State Board office.

Camanche South Shore 2018 Water Quality Data

The tables list all the drinking water contaminants that we detected from January 1 through December 31, 2018, unless noted otherwise. The presence of these contaminants in the water does not necessarily indicate that the water poses a health risk. The State Board requires us to monitor certain contaminants less than once per year because the concentrations of these contaminants are not expected to vary significantly from year to year. Some of the data, though representative of the water quality, is more than one year old.

Primary Contaminants

	MCL, AL or [MRDL]	PHG, (MCLG) or [MRDLG]	Average	Range	Sample Year	Typical Sources
Inorganic Contaminants						
Copper (ppb)	AL=1300	300	90th Percentile =34	No sites above AL out of 6 sites sampled	2016	Corrosion of household plumbing; erosion of natural deposits
Lead (ppb) *	AL=15	0.2	90th Percentile =1	No sites above AL out of 6 sites sampled	2016	Corrosion of household plumbing; erosion of natural deposits
Disinfection Byproducts, Disinfectant Residuals						
Chlorine residual as Cl ₂ (ppm)	[4]	[4]	0.9 ^a	0.7–1.2	2018	Drinking water disinfectant added for treatment
Haloacetic Acids, 5 species (ppb)	60	NA	31 ^b	13–50	2018	By-product of drinking water disinfection
Trihalomethanes (ppb)	80	NA	43 ^b	27–57	2018	By-product of drinking water disinfection

a) Highest Running Annual Average
b) Highest Locational Running Annual Average

Secondary Contaminants

	MCL	Average	Range	Sample Year	Typical Sources
Chloride (ppm)	250	4	4	2018	Runoff/leaching from natural deposits
Color (color units)	15	3	3	2018	Naturally-occurring organic matter
Odor–Threshold (TON)	3	3	1–8 ^c	2018	Naturally-occurring organic materials
Specific Conductance (µS/cm)	900	40	40	2018	Substances that form ions when in water
Sulfate (ppm)	250	1.2	1.2	2018	Runoff/leaching from natural deposits
Total Dissolved Solids (ppm)	500	33	33	2018	Runoff/leaching from natural deposits

c) On 8/21/18, TON of 8 did not coincide with any odor complaints by consumers.

Other Parameters

	Result		Result
Alkalinity, total as CaCO ₃ (ppm)	15	pH (pH units)	7.4
Calcium (ppm)	3	Potassium (ppm)	0.6
Hardness, as CaCO ₃ (ppm)	13	Sodium (ppm)	4
Magnesium (ppm)	1		

Treatment of Surface Water Sources

Treatment Technique	Direct Filtration (dual media filtration with anthracite and sand). Anthracite was replaced with GAC on July 2016
Turbidity Performance Standards	1. Be less than or equal to 0.3 NTU in 95% of measurements in a month 2. Not exceed 1.0 NTU at any time
Lowest monthly percentage of samples that met Turbidity Performance Standard No. 1	100%
Highest single turbidity measurement during the year	0.09 NTU
Number of violations of any surface water treatment requirements	0

Terms Used

AL = regulatory action level. The concentration which, if exceeded, triggers treatment or other requirements that a water system must follow.

MCL = Maximum Contaminant Level. The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs (or MCLGs) as is economically and technologically feasible.

MCLG = Maximum Contaminant Level Goal. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the U.S. Environmental Protection Agency.

MRDL = Maximum Residual Disinfectant Level. The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

MRDLG = Maximum Residual Disinfectant Level Goal. The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

NA = Not Applicable

NTU = Nephelometric Turbidity Units.

PDWS = Primary Drinking Water Standard. MCLs and MRDLs for contaminants that affect health along with their monitoring and reporting requirements, and water treatment requirements.

PHG = Public Health Goal. The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California Environmental Protection Agency.

ppb = parts per billion. One ppb is like 3 seconds in 100 years.

ppm = parts per million. One ppm is like 30 seconds in one year.

Secondary drinking water standard (SDWSs). MCLs for contaminants that affect taste, odor, or appearance of the drinking water. Contaminants with SDSWs do not affect the health at the MCL levels.

TON = Threshold Odor Number, a measurement of odors in water.

TT = Treatment Technique. A required process intended to reduce the level of a contaminant in drinking water.

Turbidity = A measure of cloudiness of the water. We monitor it because it is a good indicator of the effectiveness of our filtration system.

µS/cm = micro siemens per centimeter (measure of conductivity).

Contaminants in Drinking Water

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water include:

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Secondary Contaminants affect aesthetic qualities such as taste, odor, or appearance. The clarity of the water can be measured by color, turbidity and aluminum content.

Other Parameters are water quality measurements which may be of interest to some consumers.

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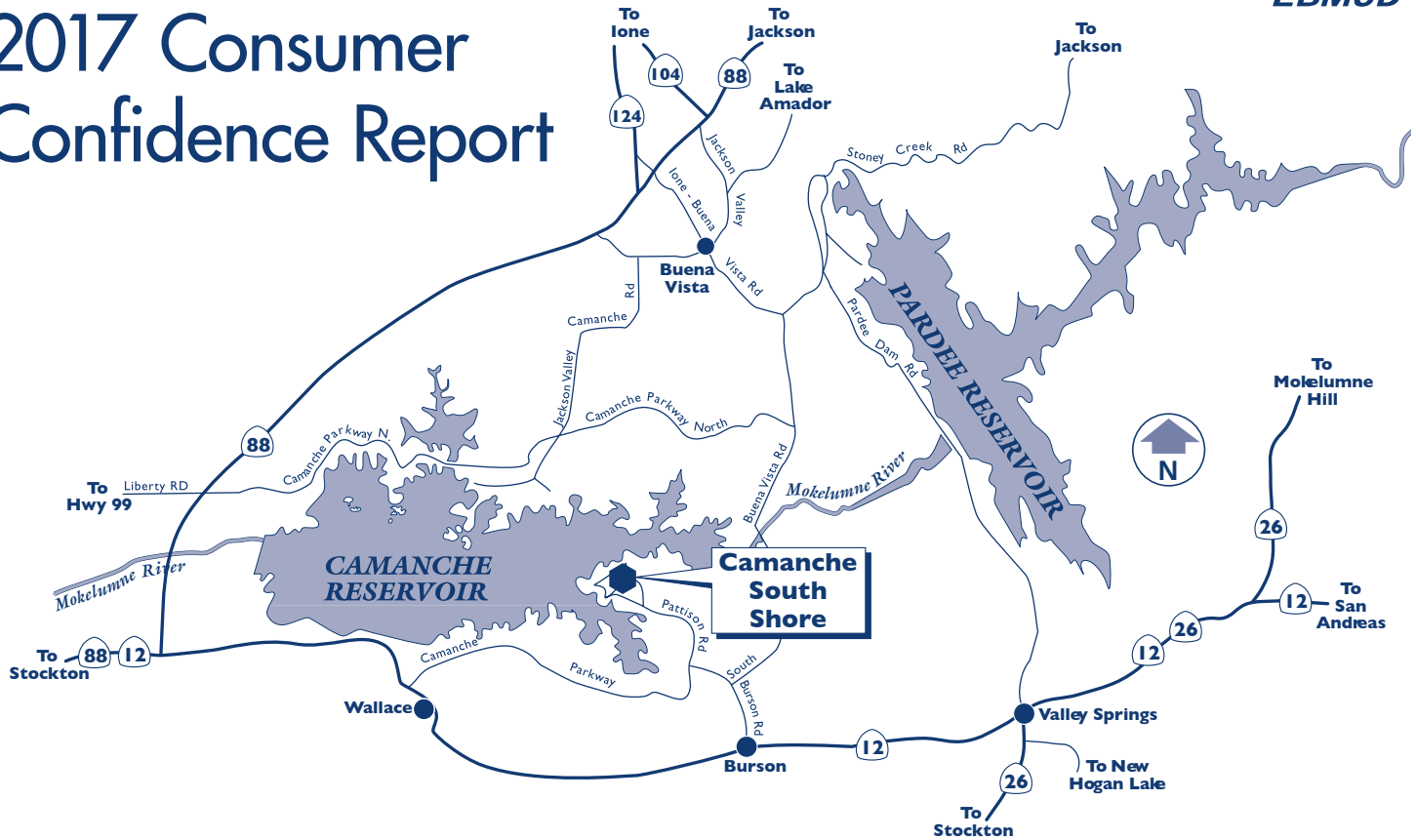
If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with lead service lines and home plumbing. EBMUD is responsible for providing high quality drinking water and has replaced all known lead service lines in the District, but cannot control the variety of materials used in existing home plumbing components. When your water has been sitting for

several hours, you can minimize the potential for lead exposure by running your faucet for 30 seconds to two minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested.

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Camanche South Shore

2017 Consumer Confidence Report



Water System Information

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Water Source and Treatment

Camanche and Pardee Reservoirs are the water source for Camanche South Shore Recreation Area. The Recreation Area is served by Camanche South Shore Water Treatment Plant. Treatment includes: coagulation, filtration and chlorination. The water treatment facility and distribution system are operated by state certified operators. The distribution system is served by two 240,000 gallon storage tanks.

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In order to ensure that tap water is safe to drink, the U.S. Environmental Protection Agency (USEPA) and the State Board prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. California Department of Public Health (CDPH) and United States Food and Drug Administration regulations establish limits for contaminants in bottled water that provide the same protection for public health. Additional information on bottled water is available on the CDPH website at www.cdph.ca.gov/Programs/CEH/DFDCS/Pages/FDBPrograms/FoodSafetyProgram/Water.aspx.

Source Water Protection Activities

The State Board requires water utilities to determine the types of activities that can pollute their drinking water sources. EBMUD evaluated more than 100 activities that take place near these District reservoirs, and found that the sources are most vulnerable to the following activities: boating and marina gas stations, wastewater treatment and disposal facilities, historic gas stations, known contaminant plumes and historical mining. In 2017, no contaminants associated with these activities were detected in EBMUD's drinking water.

The detailed results of the source water assessment completed in 2002 can be reviewed at the District's headquarters at Pardee Center, northeast of Valley Springs, or at the Stockton State Board office.

Camanche South Shore 2017 Water Quality Data

The tables list all the drinking water contaminants that we detected from January 1 through December 31, 2017, unless noted otherwise. The presence of these contaminants in the water does not necessarily indicate that the water poses a health risk. The State Board requires us to monitor certain contaminants less than once per year because the concentrations of these contaminants are not expected to vary significantly from year to year. Some of the data, though representative of the water quality, is more than one year old.

Primary Contaminants

	MCL, AL or [MRDL]	PHG, (MCLG) or [MRDLG]	Average	Range	Sample Year	Typical Sources
Inorganic Contaminants						
Copper (ppb)	AL=1300	300	90th Percentile =34	No sites above AL out of 6 sites sampled	2016	Corrosion of household plumbing; erosion of natural deposits
Lead (ppb) *	AL=15	0.2	90th Percentile =1	No sites above AL out of 6 sites sampled	2016	Corrosion of household plumbing; erosion of natural deposits
Disinfection Byproducts, Disinfectant Residuals						
Chlorine residual as Cl ₂ (ppm)	[4]	[4]	0.9 ^a	0.7–1.1	2017	Drinking water disinfectant added for treatment
Haloacetic Acids, 5 species (ppb)	60	NA	28 ^b	6–12	2017	By-product of drinking water disinfection
Trihalomethanes (ppb)	80	NA	30 ^b	8–21	2017	By-product of drinking water disinfection

a) Highest Running Annual Average

b) Highest Locational Running Annual Average

Secondary Contaminants

	MCL	Average	Range	Sample Year	Typical Sources
Chloride (ppm)	250	6	6	2017	Runoff/leaching from natural deposits
Color (color units)	15	3	3	2017	Naturally-occurring organic matter
Odor–Threshold (TON)	3	2	1–4 ^c	2017	Naturally-occurring organic materials
Specific Conductance (µS/cm)	900	60	60	2017	Substances that form ions when in water
Sulfate (ppm)	250	1.8	1.8	2017	Runoff/leaching from natural deposits
Total Dissolved Solids (ppm)	500	45	45	2017	Runoff/leaching from natural deposits

c) On 8/23/17, TON of 4 did not coincide with any odor complaints by consumers.

Other Parameters

	Result
Alkalinity, bicarbonate (ppm)	17
Calcium (ppm)	4
Hardness (ppm as CaCO ₃)	17

	Result
Magnesium (ppm)	1
pH (pH units)	7.5
Potassium (ppm)	0.8
Sodium (ppm)	5

Treatment of Surface Water Sources

Treatment Technique	Direct Filtration (dual media filtration with anthracite and sand). Anthracite was replaced with GAC on July 2016
Turbidity Performance Standards	1. Be less than or equal to 0.3 NTU in 95% of measurements in a month 2. Not exceed 1.0 NTU at any time
Lowest monthly percentage of samples that met Turbidity Performance Standard No. 1	100%
Highest single turbidity measurement during the year	0.10 NTU
Number of violations of any surface water treatment requirements	0

Terms Used

AL = regulatory action level. The concentration which, if exceeded, triggers treatment or other requirements that a water system must follow.

MCL = Maximum Contaminant Level. The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs (or MCLGs) as is economically and technologically feasible.

MCLG = Maximum Contaminant Level Goal. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the U.S. Environmental Protection Agency.

MRDL = Maximum Residual Disinfectant Level. The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

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NA = Not Applicable

NTU = Nephelometric Turbidity Units.

PDWS = Primary Drinking Water Standard. MCLs and MRDLs for contaminants that affect health along with their monitoring and reporting requirements, and water treatment requirements.

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Educational Information

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects is available online at www.epa.gov/ground-water-and-drinking-water.

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. USEPA/Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available online at www.cdc.gov/parasites/crypto/index.html.

Cryptosporidium is a microbial pathogen found in surface water throughout the U.S. Although filtration removes *Cryptosporidium*, the most commonly used filtration methods cannot guarantee 100 percent removal. Current test methods do not allow us to determine if the organisms are dead or if they are capable of causing disease. Ingestion of *Cryptosporidium* may cause cryptosporidiosis, an abdominal infection. Symptoms of infection include nausea, diarrhea, and abdominal cramps. Most healthy individuals can overcome the disease within a few weeks. However, immuno-compromised people, infants, small children, and the elderly are at greater risk of developing life threatening illness. We encourage immuno-compromised individuals to consult their doctor regarding appropriate precautions to take to avoid infection. *Cryptosporidium* must be ingested to cause disease, and it may be spread through means other than drinking water.

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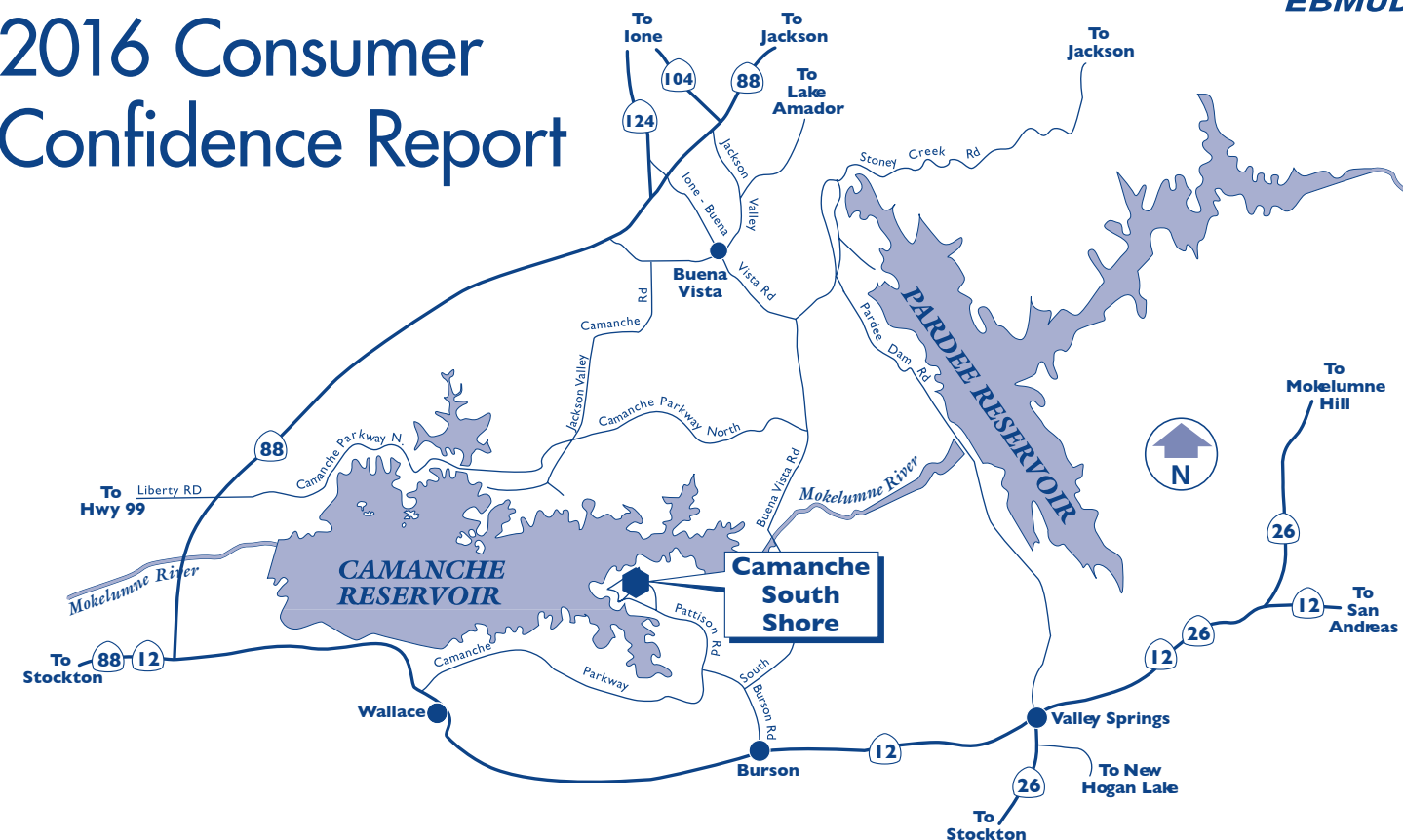
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Camanche South Shore

2016 Consumer Confidence Report



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Water Source and Treatment

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In order to ensure that tap water is safe to drink, the U.S. Environmental Protection Agency (USEPA) and the State Board prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. California Department of Public Health (CDPH) and United States Food and Drug Administration regulations establish limits for contaminants in bottled water that provide the same protection for public health. Additional information on bottled water is available on the CDPH website at <http://www.cdph.ca.gov/programs/Pages/fdbBVW.aspx>.

Source Water Protection Activities

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Camanche South Shore 2016 Water Quality Data

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Primary Contaminants

	MCL or [MRDL]	PHG (MCLG) or [MRDLG]	Average	Range	Sample Year	Violation	Typical Sources
Inorganic Contaminants							
Copper (ppb)	AL=1300	300	90th Percentile <50	No sites above AL out of 6 sites sampled	2016		Internal corrosion of household plumbing system; erosion of natural deposits; leaching from wood preservatives
Lead (ppb) *	AL=15	0.2	90th Percentile <5	No sites above AL out of 6 sites sampled	2016		Internal corrosion of household plumbing system; erosion of natural deposits
Disinfection Byproducts, Disinfectant Residuals							
Chlorine residual as Cl ₂ (ppm)	[4]	[4]	0.7 ^a	0.4–1.0	2016		Drinking water disinfectant added for treatment
Haloacetic Acids, 5 species (ppb)	60	NA	67 ^b	2–82	2016	Yes ^c	By-product of drinking water disinfection
Trihalomethanes (ppb)	80	NA	74 ^b	2–81	2016		By-product of drinking water disinfection

^a Highest Running Annual Average

^b Highest Locational Running Annual Average

^c Haloacetic Acids (HAAs) result exceeded MCL standard on April 14, 2016. The following quarter monitoring showed HAAs results to be in compliance with MCL standards on September 14, 2016. The District notified consumers of HAAs violation as required by the State Board and implemented corrective action by replacing anthracite filter media with Granular Activated Carbon (GAC). Some people who drink water containing HAAs in excess of the MCL over many years may have an increased risk of getting cancer.

Secondary Contaminants

	MCL	Average	Range	Sample Year	Violation	Typical Sources
Chloride (ppm)	250	6	3–8	2016		Runoff/leaching from natural deposits
Color (color units)	15	2	1–2	2016		Naturally-occurring organic matter
Odor–Threshold (TON)	3	5	1–8	2015	Yes ^d	Naturally-occurring organic materials
Specific Conductance (µS/cm)	900	61	42–80	2016		Substances that form ions when in water
Sulfate (ppm)	250	2	0–3	2016		Runoff/leaching from natural deposits
Total Dissolved Solids (ppm)	500	42	31–52	2016		Runoff/leaching from natural deposits

^d MCL exceedance for TON did not coincide with any odor complaints by consumers. TON values of 4, 8, 8, 4 and 4 were detected on 5/17, 7/26, 8/18, 8/18 and 11/25/2016, respectively.

Other Parameters

	Range
Alkalinity, bicarbonate (ppm)	16–23
Calcium (ppm)	5
Hardness (ppm as CaCO ₃)	16–20

	Range
Magnesium (ppm)	1–2
pH (pH units)	7.5–8.0
Potassium (ppm)	0.5–1
Sodium (ppm)	3–7

Treatment of Surface Water Sources

Treatment Technique	Direct Filtration (dual media filtration with anthracite and sand). Anthracite was replaced with GAC on July 2016
Turbidity Performance Standards	1. Be less than or equal to 0.3 NTU in 95% of measurements in a month 2. Not exceed 1.0 NTU at any time
Lowest monthly percentage of samples that met Turbidity Performance Standard No. 1	100%
Highest single turbidity measurement during the year	0.10 NTU
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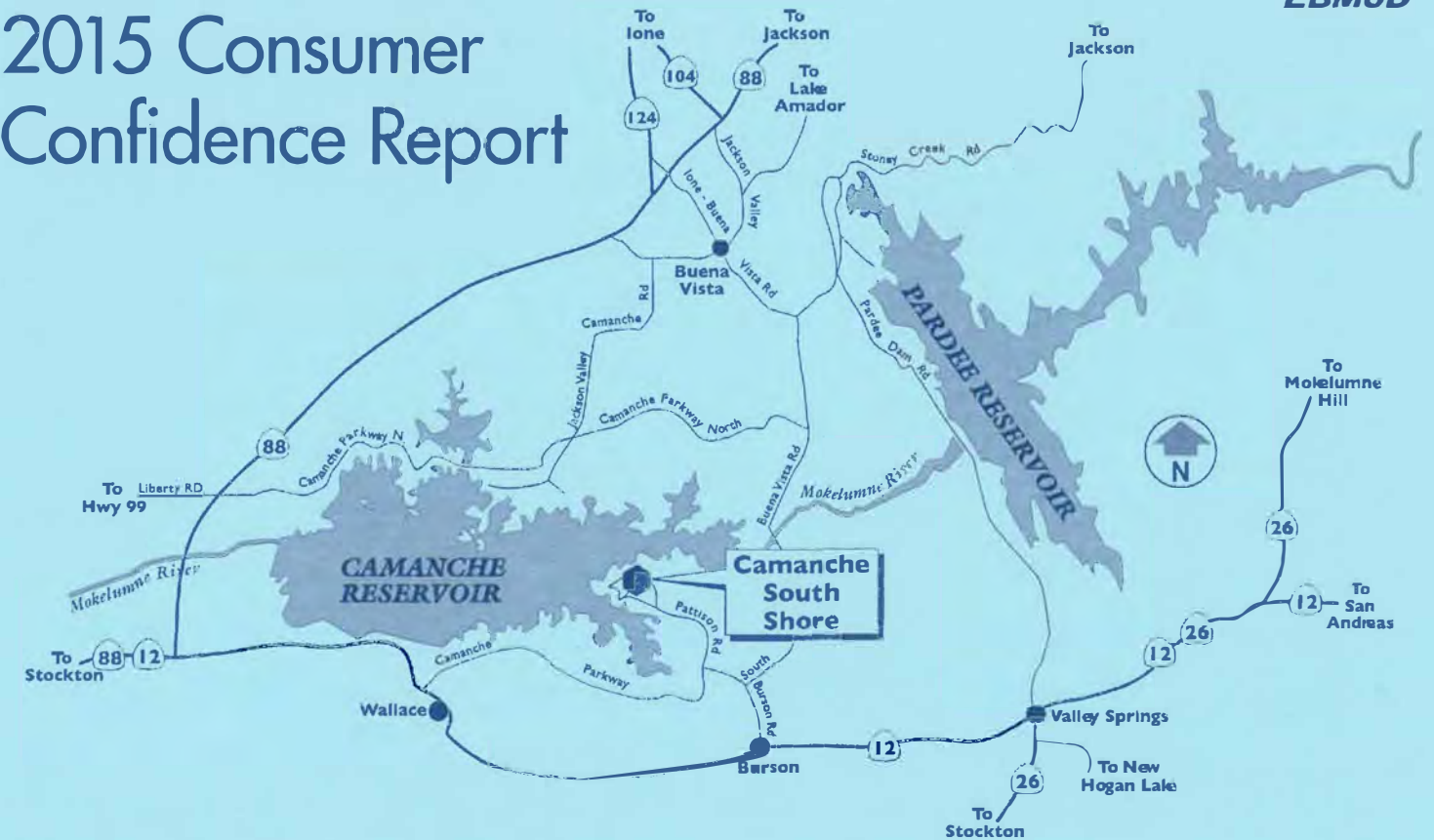
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Camanche South Shore

2015 Consumer Confidence Report



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KEEP SAVING

Latest drought information:
www.ebmud.com/drought

Camanche South Shore 2015 Water Quality Data

The tables list all the drinking water contaminants that we detected from January 1 through December 31, 2015, unless noted otherwise. The presence of these contaminants in the water does not necessarily indicate that the water poses a health risk. The State Board requires us to monitor certain contaminants less than once per year because the concentrations of these contaminants are not expected to vary significantly from year to year. Some of the data, though representative of the water quality, is more than one year old.

Primary Contaminants

	MCL or [MRDL]	PHG (MCLG) or [MRDLG]	Average	Range	Sample Year	Typical Sources
Inorganic Contaminants						
Copper (ppb)	AL=1300	300	90th Percentile <50	No sites above AL out of 5 sites sampled	2013	Internal corrosion of household plumbing system; erosion of natural deposits; leaching from wood preservatives
Lead (ppb)*	AL=15	0.2	90th Percentile <5	No sites above AL out of 5 sites sampled	2013	Internal corrosion of household plumbing system; erosion of natural deposits;
Disinfection Byproducts, Disinfectant Residuals						
Trihalomethanes (ppb)	80	NA	84††	71–98	2015	By-product of drinking water chlorination
Haloacetic Acids, 5 species (ppb)	60	NA	64††	62–65	2015	By-product of drinking water chlorination
Chlorine residual as Cl ₂ (ppm)	[4]	[4]	0.8†	0.5–0.9	2015	Drinking water disinfectant added for treatment

†Highest Running Annual Average

††Camanche South Shore initiated quarterly monitoring of Trihalomethanes and Haloacetic Acids 5 in 2015 to determine compliance with the Maximum Contaminant Levels and quarterly monitoring will be completed in April 2016.

Secondary Contaminants

	MCL	Violation	Average	Range	Sample Year	Typical Sources
Chloride (ppm)	250		11	11	2015	Runoff/leaching from natural deposits
Odor–Threshold (TON)	3	†††	5†††	2–8†††	2015	Naturally occurring organic materials
Specific Conductance (µS/cm)	900		100	100	2015	Substances that form ions when in water
Sulfate (ppm)	250		4	4	2015	Runoff/leaching from natural deposits
Total Dissolved Solids (ppm)	500		68	68	2015	Runoff/leaching from natural deposits

†††MCL exceedance for TON did not coincide with any odor complaints by consumers. TON values of 4 and 8 were detected on 8/18/2015 and 5/12/2015, respectively.

Other Parameters

	Average & Range		Average & Range
Alkalinity, bicarbonate (ppm)	22	Magnesium (ppm)	2
Calcium (ppm)	5	pH (pH units)	7.3
Hardness (ppm as CaCO ₃)	21	Potassium (ppm)	1
		Silica (ppm)	9–10
		Sodium (ppm)	9

Treatment of Surface Water Sources

Treatment Technique	Direct Filtration (dual media filtration with anthracite and sand)
Turbidity Performance Standards	1. Be less than or equal to 0.3 NTU in 95% of measurements in a month 2. Not exceed 1.0 NTU at any time
Lowest monthly percentage of samples that met Turbidity Performance Standard No. 1	100%
Highest single turbidity measurement during the year	0.15 NTU
Number of violations of any surface water treatment requirements	0

Terms Used

AL = regulatory action level. The concentration which, if exceeded, triggers treatment or other requirements that a water system must follow.

MCL = Maximum Contaminant Level. The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs (or MCLGs) as is economically and technologically feasible.

MCLG = Maximum Contaminant Level Goal. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the U.S. Environmental Protection Agency.

MRDL = Maximum Residual Disinfectant Level. The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

MRDLG = Maximum Residual Disinfectant Level Goal. The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

NA = Not Applicable

NTU = Nephelometric Turbidity Units.

PDWS = Primary Drinking Water Standard. MCLs and MRDLs for contaminants that affect health along with their monitoring and reporting requirements, and water treatment requirements.

PHG = Public Health Goal. The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California Environmental Protection Agency.

ppb = parts per billion.

ppm = parts per million.

Secondary drinking water standard. MCLs set to protect the odor, taste and appearance of drinking water.

TON = Threshold Odor Number, a measurement of odors in water.

TT = Treatment Technique. A required process intended to reduce the level of a contaminant in drinking water.

Turbidity = A measure of cloudiness of the water. See NTU.

µS/cm = micro siemens per centimeter (measure of conductivity).

Contaminants in Drinking Water

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water include:

Microbial Contaminants, such as viruses and bacteria, that may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.

Inorganic Contaminants, such as salts and metals, that can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming. The State Board waived the monitoring requirement for cyanide.

Private plumbing and fixtures may add lead or copper levels above the level delivered by the District. Hot water systems can contain elevated levels of lead and copper so it is not advisable to drink from hot water faucets. For additional information see the Note about Lead on the bottom of this page.

Radioactive Contaminants, that can be naturally-occurring or be the result of oil and gas production and mining activities.

Pesticide and Herbicide Contaminants, that may come from a variety of sources, such as agriculture, urban stormwater and residential uses.

Organic Chemical Contaminants, including synthetic and volatile organic chemicals that are by-products of industrial processes and petroleum production, and can also come from gas stations, urban storm water runoff, agricultural application, and septic systems. The State Board waived monitoring requirements for synthetic organic chemicals, except for Atrazine and Simazine.

Secondary Contaminants affect aesthetic qualities such as taste, odor, or appearance. The clarity of the water can be measured by color, turbidity and aluminum content. The State Board waived monitoring requirements for Thiobencarb.

Other Parameters are water quality measurements which may be of interest to some consumers.

* Note about Lead

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with lead service lines and home plumbing. FBMUD is responsible for providing high quality drinking water and has replaced all known lead service lines in the District, but cannot control the variety of materials used in existing home plumbing components. When your water has been sitting for

several hours, you can minimize the potential for lead exposure by running your faucet for 30 seconds to two minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods and steps you can take to minimize exposure is available from the USEPA Safe Drinking Water Hotline 800-426-4791 or at www.epa.gov/safewater/lead.

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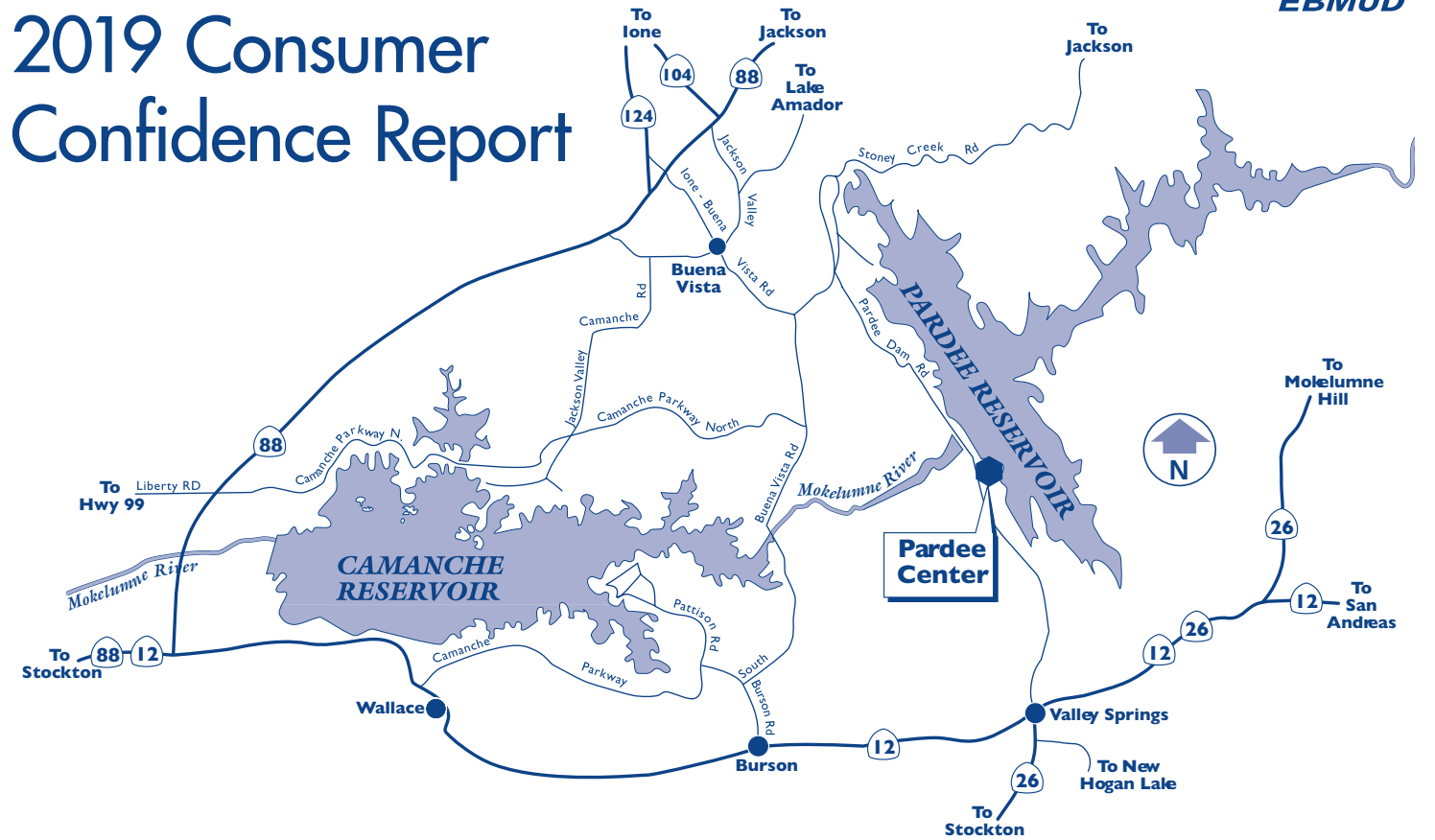
Educational Information

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects is available online at www.epa.gov/ground-water-and-drinking-water.

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. USEPA/Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available online at www.cdc.gov/parasites/cryptosporidium/index.html.

Cryptosporidium is a microbial pathogen found in surface water throughout the U.S. Although filtration removes *Cryptosporidium*, the most commonly used filtration methods cannot guarantee 100 percent removal. Pardee Center Water Treatment Plant (WTP) does remove *Cryptosporidium* and giardia as their sizes are larger (crypto 3-5 micron, giardia 7-14 micron) than the filtration membrane which is 0.001 micron. Current test methods do not allow us to determine if the organisms are dead or if they are capable of causing disease. Ingestion of *Cryptosporidium* may cause cryptosporidiosis, an abdominal infection. Symptoms of infection include nausea, diarrhea, and abdominal cramps. Most healthy individuals can overcome the disease within a few weeks. However, immuno-compromised people, infants, small children, and the elderly are at greater risk of developing life threatening illness. We encourage immuno-compromised individuals to consult their doctor regarding appropriate precautions to take to avoid infection. *Cryptosporidium* must be ingested to cause disease, and it may be spread through means other than drinking water.

Pardee Center 2019 Consumer Confidence Report



Water System Information

This report includes information such as the source water, its water quality and comparisons to state and federal drinking water standards. For more information, please call the Pardee Water/Wastewater Supervisor at (209) 772-8368.

The Park Advisory Board meets in March, July and November at Pardee Center to discuss matters relating to water quality. For exact dates and times, please call (209) 772-8204. Public participation is encouraged.

Este informe contiene información muy importante sobre su agua potable. Tradúzcalo ó hable con alguien que lo entienda bien.

Water Source and Treatment

Pardee Reservoir is the water source for Pardee Center. Pardee Center has a dual water distribution system. The non-potable system serves the fire hydrants, irrigation system, chemical buildings, and various other uses throughout Pardee Center. Pardee Center potable water system is served by a state-of-the-art nanofiltration membrane water treatment facility. Nanofiltration can remove particles as small as 0.001 microns. Water treatment also includes the addition of soda ash for corrosion control and chlorine for disinfection. The distribution system is served by a 13,900 gallon water storage tank. The water treatment facility and distribution system are operated by state certified operators.

This report describes the results from water sampling for potential contaminants and gives information on water related activities. The State Water Resources Control Board (State Water Board), Division of Drinking Water sets water quality require-

ments for the Pardee Center water system, in order to ensure that the water is safe to drink. Complying with regulations requires an extensive monitoring program in both the source and treated waters. All water quality regulations were met in 2019.

In order to ensure that tap water is safe to drink, the U.S. Environmental Protection Agency (USEPA) and the State Water Board prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. California Department of Public Health (CDPH) and United States Food and Drug Administration regulations establish limits for contaminants in bottled water that provide the same protection for public health. Additional information on bottled water is available on the CDPH website at www.cdph.ca.gov/Programs/CEH/DFDCS/Pages/FDBPrograms/FoodSafetyProgram/Water.aspx.

Source Water Protection Activities

The State Water Board requires water utilities to determine the types of activities that can pollute their drinking water sources. EBMUD evaluated more than 100 activities that take place near this EBMUD reservoir, and found that the source is most vulnerable to boating and marina gas stations. In 2019, no contaminants associated with these activities were detected in EBMUD's drinking water.

The detailed results of the source water assessment completed in 2002 can be reviewed at EBMUD's headquarters at Pardee Center, northeast of Valley Springs, or at the Stockton State Water Board office.

Pardee Center 2019 Water Quality Data

The tables list all the drinking water contaminants that we detected from January 1 through December 31, 2019, unless noted otherwise. The presence of these contaminants in the water does not necessarily indicate that the water poses a health risk. The State Water Board requires us to monitor certain contaminants less than once per year because the concentrations of these contaminants are not expected to vary significantly from year to year. Some of the data, though representative of the water quality, is more than one year old.

Primary Contaminants

	MCL, AL or [MRDL]	PHG, (MCLG) or [MRDLG]	Average	Range	Sample Year	Typical Sources
Inorganic Contaminants						
Copper (ppb)	AL=1300	300	90th Percentile =23	No sites above AL out of 5 sites sampled	2017	Corrosion of household plumbing system; erosion of natural deposits
Lead (ppb) *	AL=15	0.2	90th Percentile =0.8	No sites above AL out of 5 sites sampled	2017	Corrosion of household plumbing system; erosion of natural deposits
Disinfection Byproducts, Disinfectant Residuals						
Chlorine residual as Cl ₂ (ppm)	[4]	[4]	0.9 ^a	0.8–1.1	2019	Drinking water disinfectant added for treatment
Haloacetic Acids, 5 species (ppb)	60	NA	4	4	2019	By-product of drinking water chlorination
Trihalomethanes (ppb)	80	NA	6	6	2019	By-product of drinking water chlorination

a) Highest Running Annual Average

Secondary Contaminants

	MCL	Result	Sample Year	Typical Sources
Chloride (ppm)	250	2	2019	Runoff/leaching from natural deposits
Specific Conductance (µS/cm)	900	35	2019	Substances that form ions when in water
Total Dissolved Solids (ppm)	500	25	2019	Runoff/leaching from natural deposits

Other Parameters

	Result		Result
Alkalinity, total as CaCO ₃ (ppm)	15	pH (pH units)	8.5
Calcium (ppm)	1	Potassium (ppm)	0.3
Hardness, as CaCO ₃ (ppm)	6	Sodium (ppm)	6
Magnesium (ppm)	0.2		

Treatment of Surface Water Sources

Treatment Technique	Nanofiltration membrane treatment
Turbidity Performance Standards	1. Be less than or equal to 0.3 NTU in 95% of measurements in a month 2. Not exceed 1.0 NTU at any time
Lowest monthly percentage of samples that met Turbidity Performance Standard No. 1	100%
Highest single turbidity measurement during the year	0.05 NTU
Number of violations of any surface water treatment requirements	0

Terms Used

AL = regulatory action level. The concentration which, if exceeded, triggers treatment or other requirements that a water system must follow.

MCL = Maximum Contaminant Level. The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs (or MCLGs) as is economically and technologically feasible.

MCLG = Maximum Contaminant Level Goal. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the U.S. Environmental Protection Agency.

MRDL = Maximum Residual Disinfectant Level. The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

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NA = Not Applicable

NTU = Nephelometric Turbidity Units.

PDWS = Primary Drinking Water Standard. MCLs and MRDLs for contaminants that affect health along with their monitoring and reporting requirements, and water treatment requirements.

PHG = Public Health Goal. The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California Environmental Protection Agency.

ppb = parts per billion. One ppb is like 3 seconds in 100 years.

ppm = parts per million. One ppm is like 30 seconds in one year.

Secondary drinking water standard (SDWSs). MCLs for contaminants that affect taste, odor, or appearance of the drinking water. Contaminants with SDSWs do not affect the health at the MCL levels.

TT = Treatment Technique. A required process intended to reduce the level of a contaminant in drinking water.

Turbidity = A measure of cloudiness of the water. We monitor it because it is a good indicator of the effectiveness of our filtration system.

µS/cm = micro siemens per centimeter (measure of conductivity).

90th percentile = A measure that indicates 90 percent of the samples had a lower result.

Contaminants in Drinking Water

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

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Secondary Contaminants affect aesthetic qualities such as taste, odor, or appearance. The clarity of the water can be measured by color, turbidity and aluminum content. Regulations do not require monitoring for secondary contaminants for nontransient-noncommunity water systems such as Pardee Center.

Other Parameters are water quality measurements which may be of interest to some consumers.

* Note about Lead

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with lead service lines and home plumbing. EBMUD is responsible for providing high quality drinking water and has replaced all known lead service lines in the EBMUD system, but cannot control the variety of materials used in existing home plumbing components.

When your water has been sitting for several hours, you can minimize the potential for lead exposure by running your faucet for 30 seconds to two minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods and steps you can take to minimize exposure is available online from the USEPA at www.epa.gov/lead.

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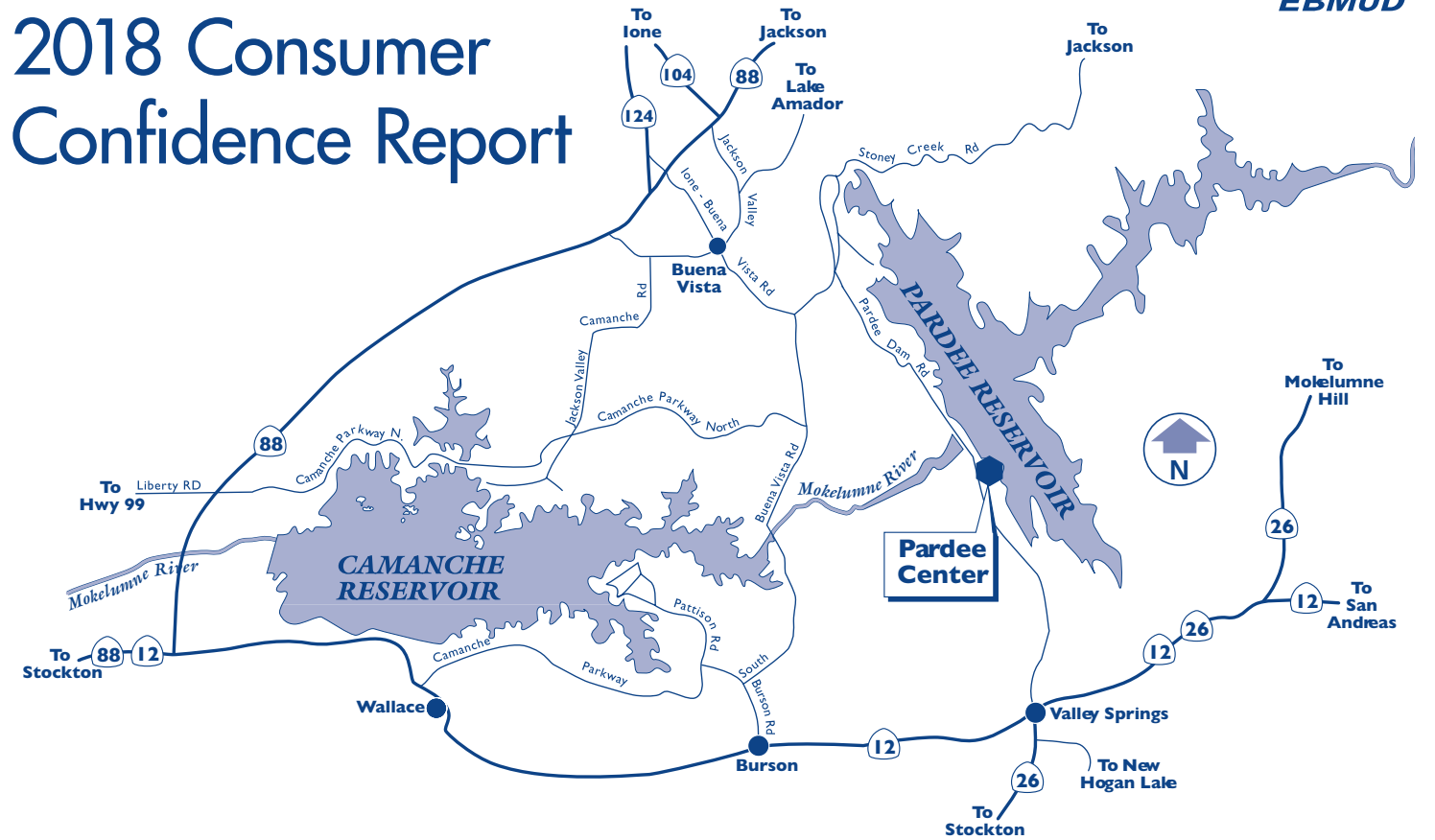
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Pardee Center 2018 Consumer Confidence Report



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This report describes the results from water sampling for potential contaminants and gives information on water related activities. The State Water Resources Control Board (State Board), Division of Drinking Water sets water quality requirements for the Pardee

Center water system, in order to ensure that the water is safe to drink. Complying with regulations requires an extensive monitoring program in both the source and treated waters. All water quality regulations were met in 2018.

In order to ensure that tap water is safe to drink, the U.S. Environmental Protection Agency (USEPA) and the State Board prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. California Department of Public Health (CDPH) and United States Food and Drug Administration regulations establish limits for contaminants in bottled water that provide the same protection for public health. Additional information on bottled water is available on the CDPH website at www.cdph.ca.gov/Programs/CEH/DFDCS/Pages/FDBPrograms/FoodSafetyProgram/Water.aspx.

Source Water Protection Activities

The State Board requires water utilities to determine the types of activities that can pollute their drinking water sources. EBMUD evaluated more than 100 activities that take place near this District reservoir, and found that the source is most vulnerable to boating and marina gas stations. In 2018, no contaminants associated with these activities were detected in EBMUD's drinking water.

The detailed results of the source water assessment completed in 2002 can be reviewed at the District's headquarters at Pardee Center, northeast of Valley Springs, or at the Stockton State Board office.

Pardee Center 2018 Water Quality Data

The tables list all the drinking water contaminants that we detected from January 1 through December 31, 2018, unless noted otherwise. The presence of these contaminants in the water does not necessarily indicate that the water poses a health risk. The State Board requires us to monitor certain contaminants less than once per year because the concentrations of these contaminants are not expected to vary significantly from year to year. Some of the data, though representative of the water quality, is more than one year old.

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Lead (ppb) *	AL=15	0.2	90th Percentile =0.3	No sites above AL out of 5 sites sampled	2017	Corrosion of household plumbing system; erosion of natural deposits
Disinfection Byproducts, Disinfectant Residuals						
Chlorine residual as Cl ₂ (ppm)	[4]	[4]	0.9 ^a	0.6–1.0	2018	Drinking water disinfectant added for treatment
Haloacetic Acids, 5 species (ppb)	60	NA	5	5	2018	By-product of drinking water chlorination
Trihalomethanes (ppb)	80	NA	12	12	2018	By-product of drinking water chlorination

a) Highest Running Annual Average

Secondary Contaminants

	MCL	Result	Sample Year	Typical Sources
Chloride (ppm)	250	2	2018	Runoff/leaching from natural deposits
Specific Conductance (µS/cm)	900	42	2018	Substances that form ions when in water
Total Dissolved Solids (ppm)	500	34	2018	Runoff/leaching from natural deposits

Other Parameters

	Result
Alkalinity, total as CaCO ₃ (ppm)	30
Calcium (ppm)	1
Hardness, as CaCO ₃ (ppm)	6
Magnesium (ppm)	0.3

	Result
pH (pH units)	8.7
Potassium (ppm)	0.4
Sodium (ppm)	8

Treatment of Surface Water Sources

Treatment Technique	Direct Filtration (dual media filtration with anthracite and sand)
Turbidity Performance Standards	1. Be less than or equal to 0.3 NTU in 95% of measurements in a month 2. Not exceed 1.0 NTU at any time
Lowest monthly percentage of samples that met Turbidity Performance Standard No. 1	100%
Highest single turbidity measurement during the year	0.05 NTU
Number of violations of any surface water treatment requirements	0

Terms Used

AL = regulatory action level. The concentration which, if exceeded, triggers treatment or other requirements that a water system must follow.

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ppb = parts per billion. One ppb is like 3 seconds in 100 years.

ppm = parts per million. One ppm is like 30 seconds in one year.

Secondary drinking water standard (SDWSs). MCLs for contaminants that affect taste, odor, or appearance of the drinking water. Contaminants with SDSWs do not affect the health at the MCL levels.

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Turbidity = A measure of cloudiness of the water. We monitor it because it is a good indicator of the effectiveness of our filtration system.

µS/cm = micro siemens per centimeter (measure of conductivity).

90th percentile = A measure that indicates 90 percent of the samples had a lower result.

* Note about Lead

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with lead service lines and home plumbing. EBMUD is responsible for providing high quality drinking water and has replaced all known lead service lines in the District, but cannot control the variety of materials used in existing home plumbing components. When your water has been sitting for

Contaminants in Drinking Water

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water include:

Microbial Contaminants, such as viruses and bacteria, that may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.

Inorganic Contaminants, such as salts and metals, that can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming. The State Board waived the monitoring requirement for cyanide.

Private plumbing and fixtures may add lead or copper levels above the level delivered by the District. Hot water systems can contain elevated levels of lead and copper so it is not advisable to drink from hot water faucets. For additional information see the Note about Lead on the bottom of this page.

Radioactive Contaminants, that can be naturally-occurring or be the result of oil and gas production and mining activities.

Pesticide and Herbicide Contaminants, that may come from a variety of sources, such as agriculture, urban stormwater and residential uses.

Organic Chemical Contaminants, including synthetic and volatile organic chemicals that are by-products of industrial processes and petroleum production, and can also come from gas stations, urban storm water runoff, agricultural application, and septic systems. The State Board has waived monitoring of synthetic organic chemicals.

Secondary Contaminants affect aesthetic qualities such as taste, odor, or appearance. The clarity of the water can be measured by color, turbidity and aluminum content. Regulations do not require monitoring for secondary contaminants for nontransient-noncommunity water systems such as Pardee Center.

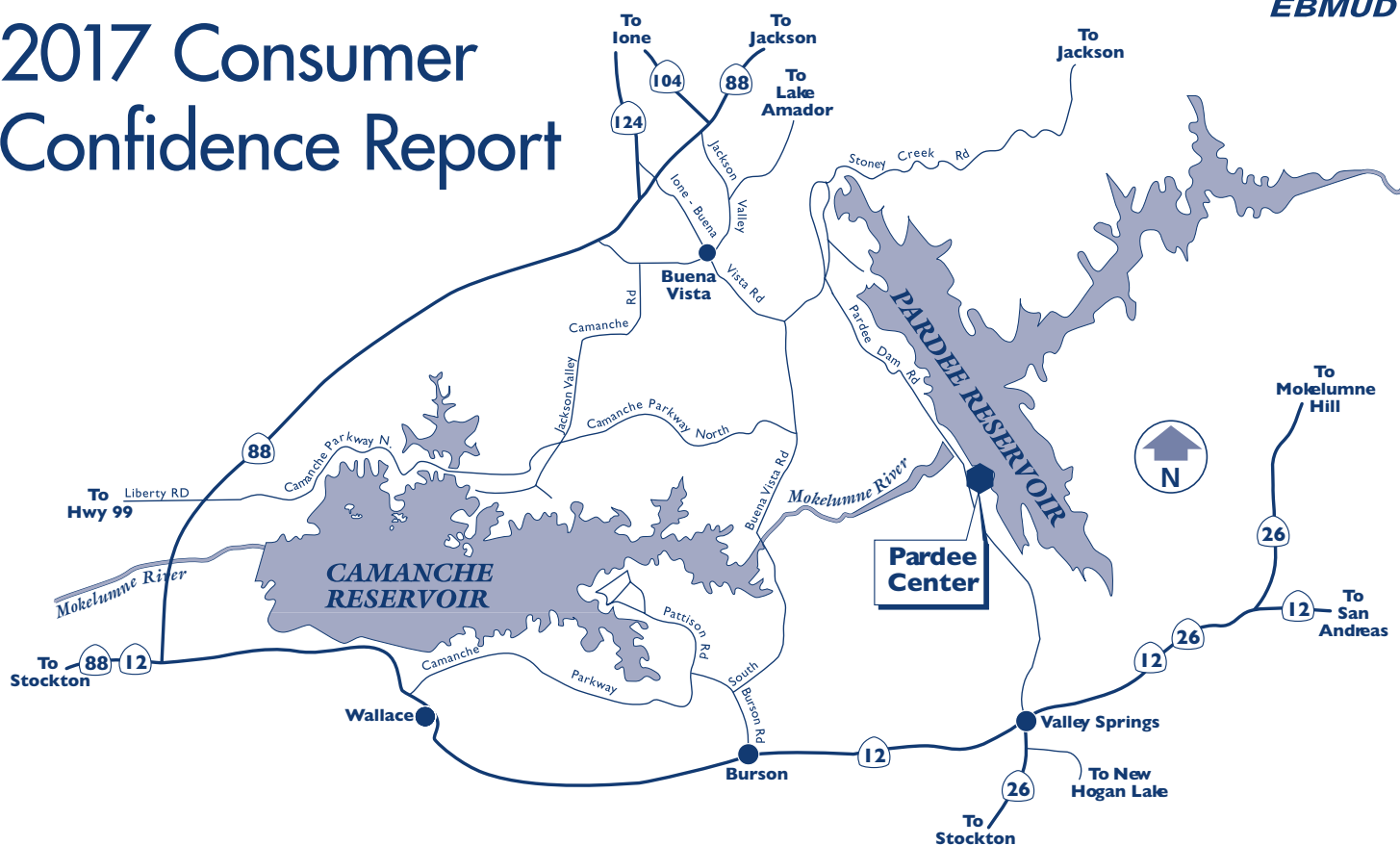
Other Parameters are water quality measurements which may be of interest to some consumers.

Unregulated Contaminant Monitoring helps U.S. Environmental Protection Agency and the State Water Resources Control Board to determine where certain contaminants occur and whether the contaminants need to be regulated. Pardee Center monitoring of Unregulated Contaminant Monitoring Regulation (UCMR3) 2015 showed no detection of these contaminants and results are available by request.

several hours, you can minimize the potential for lead exposure by running your faucet for 30 seconds to two minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested.

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Pardee Center 2017 Consumer Confidence Report



Water System Information

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Water Source and Treatment

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This report describes the results from water sampling for potential contaminants and gives information on water related activities. The State Water Resources Control Board (State Board), Division of Drinking Water sets water quality requirements for the Pardee

Center water system, in order to ensure that the water is safe to drink. Complying with regulations requires an extensive monitoring program in both the source and treated waters. All water quality regulations were met in 2017.

In order to ensure that tap water is safe to drink, the U.S. Environmental Protection Agency (USEPA) and the State Board prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. California Department of Public Health (CDPH) and United States Food and Drug Administration regulations establish limits for contaminants in bottled water that provide the same protection for public health. Additional information on bottled water is available on the CDPH website at www.cdph.ca.gov/Programs/CEH/DFDCS/Pages/FDBPrograms/FoodSafetyProgram/Water.aspx.

Source Water Protection Activities

The State Board requires water utilities to determine the types of activities that can pollute their drinking water sources. EBMUD evaluated more than 100 activities that take place near this District reservoir, and found that the source is most vulnerable to boating and marina gas stations. In 2017, no contaminants associated with these activities were detected in EBMUD's drinking water.

The detailed results of the source water assessment completed in 2002 can be reviewed at the District's headquarters at Pardee Center, northeast of Valley Springs, or at the Stockton State Board office.

Pardee Center 2017 Water Quality Data

The tables list all the drinking water contaminants that we detected from January 1 through December 31, 2017, unless noted otherwise. The presence of these contaminants in the water does not necessarily indicate that the water poses a health risk. The State Board requires us to monitor certain contaminants less than once per year because the concentrations of these contaminants are not expected to vary significantly from year to year. Some of the data, though representative of the water quality, is more than one year old.

Primary Contaminants

	MCL, AL or [MRDL]	PHG, (MCLG) or [MRDLG]	Average	Range	Sample Year	Typical Sources
Inorganic Contaminants						
Aluminum (ppb)	1000	600	56	56	2017	Erosion of natural deposits
Copper (ppb)	AL=1300	300	90th Percentile =21	No sites above AL out of 5 sites sampled	2017	Corrosion of household plumbing system; erosion of natural deposits
Lead (ppb) *	AL=15	0.2	90th Percentile =0.3	No sites above AL out of 5 sites sampled	2017	Corrosion of household plumbing system; erosion of natural deposits
Disinfection Byproducts, Disinfectant Residuals						
Chlorine residual as Cl ₂ (ppm)	[4]	[4]	0.9 ^a	0.7–1.0	2017	Drinking water disinfectant added for treatment
Haloacetic Acids, 5 species (ppb)	60	NA	5	5	2017	By-product of drinking water chlorination
Trihalomethanes (ppb)	80	NA	7	7	2017	By-product of drinking water chlorination

a) Highest Running Annual Average

Secondary Contaminants

	MCL	Result	Sample Year	Typical Sources
Chloride (ppm)	250	2	2017	Runoff/leaching from natural deposits
Specific Conductance (µS/cm)	900	33	2017	Substances that form ions when in water
Total Dissolved Solids (ppm)	500	26	2017	Runoff/leaching from natural deposits

Other Parameters

	Result		Result
Alkalinity, bicarbonate (ppm)	13	Magnesium (ppm)	0.3
Alkalinity, carbonate (ppm)	1	pH (pH units)	8.2
Calcium (ppm)	1	Potassium (ppm)	0.3
Hardness (ppm as CaCO ₃)	8	Sodium (ppm)	5

Treatment of Surface Water Sources

Treatment Technique	Direct Filtration (dual media filtration with anthracite and sand)
Turbidity Performance Standards	1. Be less than or equal to 0.3 NTU in 95% of measurements in a month 2. Not exceed 1.0 NTU at any time
Lowest monthly percentage of samples that met Turbidity Performance Standard No. 1	100%
Highest single turbidity measurement during the year	0.15 NTU
Number of violations of any surface water treatment requirements	0

Terms Used

AL = regulatory action level. The concentration which, if exceeded, triggers treatment or other requirements that a water system must follow.

MCL = Maximum Contaminant Level. The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs (or MCLGs) as is economically and technologically feasible.

MCLG = Maximum Contaminant Level Goal. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the U.S. Environmental Protection Agency.

MRDL = Maximum Residual Disinfectant Level. The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

MRDLG = Maximum Residual Disinfectant Level Goal. The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

NA = Not Applicable

NTU = Nephelometric Turbidity Units.

PDWS = Primary Drinking Water Standard. MCLs and MRDLs for contaminants that affect health along with their monitoring and reporting requirements, and water treatment requirements.

PHG = Public Health Goal. The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California Environmental Protection Agency.

ppb = parts per billion. One ppb is like 3 seconds in 100 years.

ppm = parts per million. One ppm is like 30 seconds in one year.

Secondary drinking water standard (SDWSs). MCLs for contaminants that affect taste, odor, or appearance of the drinking water. Contaminants with SDSWs do not affect the health at the MCL levels.

TT = Treatment Technique. A required process intended to reduce the level of a contaminant in drinking water.

Turbidity = A measure of cloudiness of the water. We monitor it because it is a good indicator of the effectiveness of our filtration system.

µS/cm = micro siemens per centimeter (measure of conductivity).

90th percentile = A measure that indicates 90 percent of the samples had a lower result.

Contaminants in Drinking Water

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water include:

Microbial Contaminants, such as viruses and bacteria, that may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.

Inorganic Contaminants, such as salts and metals, that can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming. The State Board waived the monitoring requirement for cyanide.

Private plumbing and fixtures may add lead or copper levels above the level delivered by the District. Hot water systems can contain elevated levels of lead and copper so it is not advisable to drink from hot water faucets. For additional information see the Note about Lead on the bottom of this page.

Radioactive Contaminants, that can be naturally-occurring or be the result of oil and gas production and mining activities.

Pesticide and Herbicide Contaminants, that may come from a variety of sources, such as agriculture, urban stormwater and residential uses.

Organic Chemical Contaminants, including synthetic and volatile organic chemicals that are by-products of industrial processes and petroleum production, and can also come from gas stations, urban storm water runoff, agricultural application, and septic systems. The State Board has waived monitoring of synthetic organic chemicals.

Secondary Contaminants affect aesthetic qualities such as taste, odor, or appearance. The clarity of the water can be measured by color, turbidity and aluminum content. Regulations do not require monitoring for secondary contaminants for nontransient-noncommunity water systems such as Pardee Center.

Other Parameters are water quality measurements which may be of interest to some consumers.

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* Note about Lead

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with lead service lines and home plumbing. EBMUD is responsible for providing high quality drinking water and has replaced all known lead service lines in the District, but cannot control the variety of materials used in existing home plumbing components. When your water has been sitting for

several hours, you can minimize the potential for lead exposure by running your faucet for 30 seconds to two minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested.

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Board of Directors

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Educational Information

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects is available online at www.epa.gov/ground-water-and-drinking-water.

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. USEPA/Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available online at www.cdc.gov/parasites/crypto/index.html.

Cryptosporidium is a microbial pathogen found in surface water throughout the U.S. Although filtration removes *Cryptosporidium*, the most commonly used filtration methods cannot guarantee 100 percent removal. Pardee Center Water Treatment Plant (WTP) does remove *Cryptosporidium* and giardia as their sizes are larger (crypto 3-5 micron, giardia 7-14 micron) than the filtration membrane which is 0.001 micron. Current test methods do not allow us to determine if the organisms are dead or if they are capable of causing disease. Ingestion of *Cryptosporidium* may cause cryptosporidiosis, an abdominal infection. Symptoms of infection include nausea, diarrhea, and abdominal cramps. Most healthy individuals can overcome the disease within a few weeks. However, immuno-compromised people, infants, small children, and the elderly are at greater risk of developing life threatening illness. We encourage immuno-compromised individuals to consult their doctor regarding appropriate precautions to take to avoid infection. *Cryptosporidium* must be ingested to cause disease, and it may be spread through means other than drinking water.

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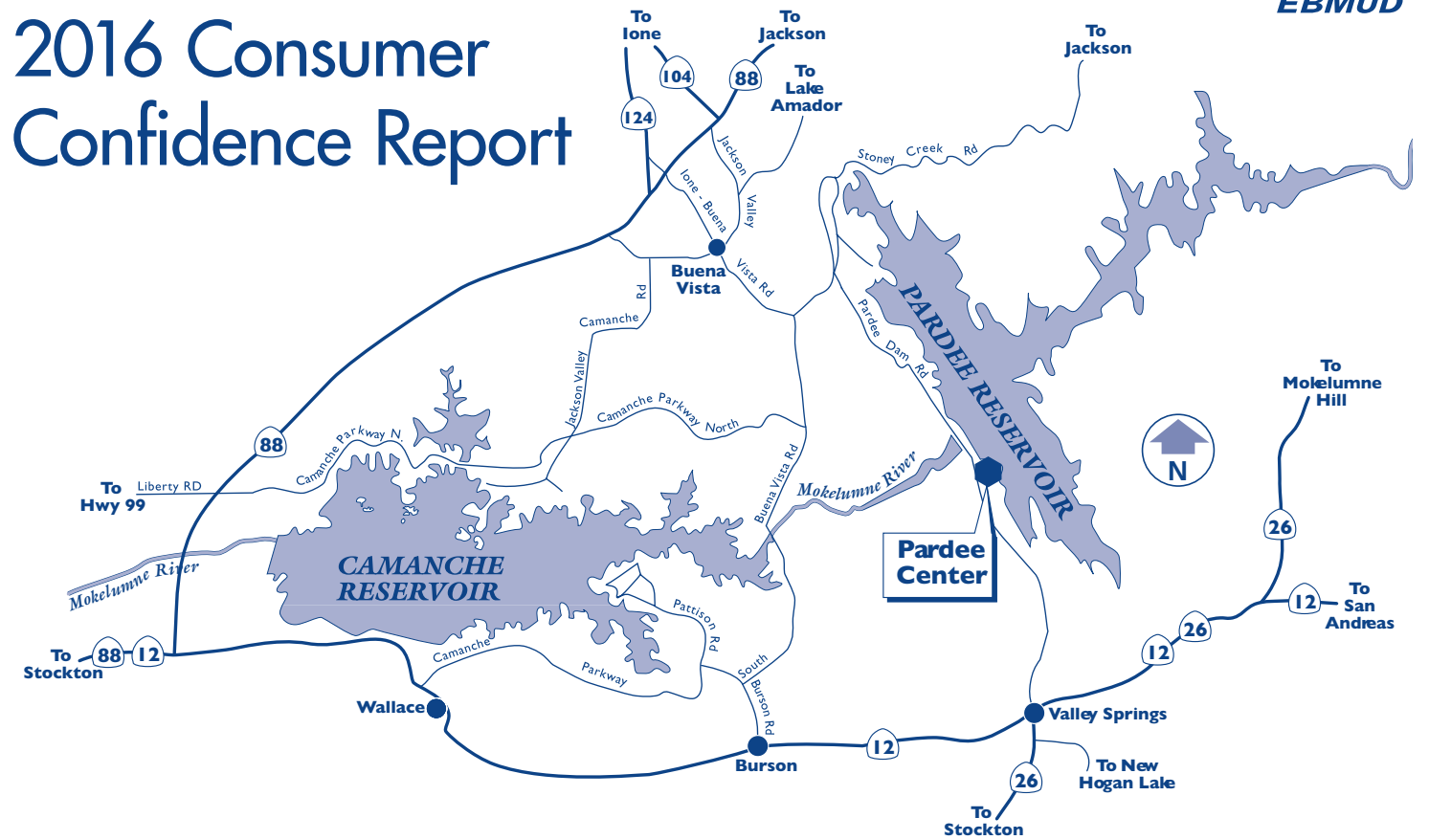
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Source Water Protection Activities

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Primary Contaminants

	MCL or [MRDL]	PHG (MCLG) or [MRDLG]	Average	Range	Sample Year	Typical Sources
Inorganic Contaminants						
Copper (ppb)	AL=1300	300	90th Percentile <50	No sites above AL out of 5 sites sampled	2014	Internal corrosion of household plumbing system; erosion of natural deposits; leaching from wood preservatives
Lead (ppb) *	AL=15	0.2	90th Percentile <5	No sites above AL out of 5 sites sampled	2014	Internal corrosion of household plumbing system; erosion of natural deposits;
Disinfection Byproducts, Disinfectant Residuals						
Chlorine residual as Cl ₂ (ppm)	[4]	[4]	0.8 ^a	0.5–1.1	2016	Drinking water disinfectant added for treatment
Haloacetic Acids, 5 species (ppb)	60	NA	10	10	2016	By-product of drinking water chlorination
Trihalomethanes (ppb)	80	NA	13	13	2016	By-product of drinking water chlorination

^a Highest Running Annual Average

Secondary Contaminants

	MCL	Average	Range	Sample Year	Typical Sources
Chloride (ppm)	250	2	2	2016	Runoff/leaching from natural deposits
Color (Color Unit)	15	2	2	2016	Naturally-occurring organic materials
Specific Conductance (µS/cm)	900	33	33	2016	Substances that form ions when in water
Total Dissolved Solids (ppm)	500	31	31	2016	Runoff/leaching from natural deposits

Other Parameters

	Average & Range		Average & Range
Alkalinity, bicarbonate (ppm)	13	Magnesium (ppm)	0.2
Calcium (ppm)	1	pH (pH units)	8.1
Hardness (ppm as CaCO ₃)	10	Potassium (ppm)	0.3
		Sodium (ppm)	6

Treatment of Surface Water Sources

Treatment Technique	Direct Filtration (dual media filtration with anthracite and sand)
Turbidity Performance Standards	1. Be less than or equal to 0.3 NTU in 95% of measurements in a month 2. Not exceed 1.0 NTU at any time
Lowest monthly percentage of samples that met Turbidity Performance Standard No. 1	100%
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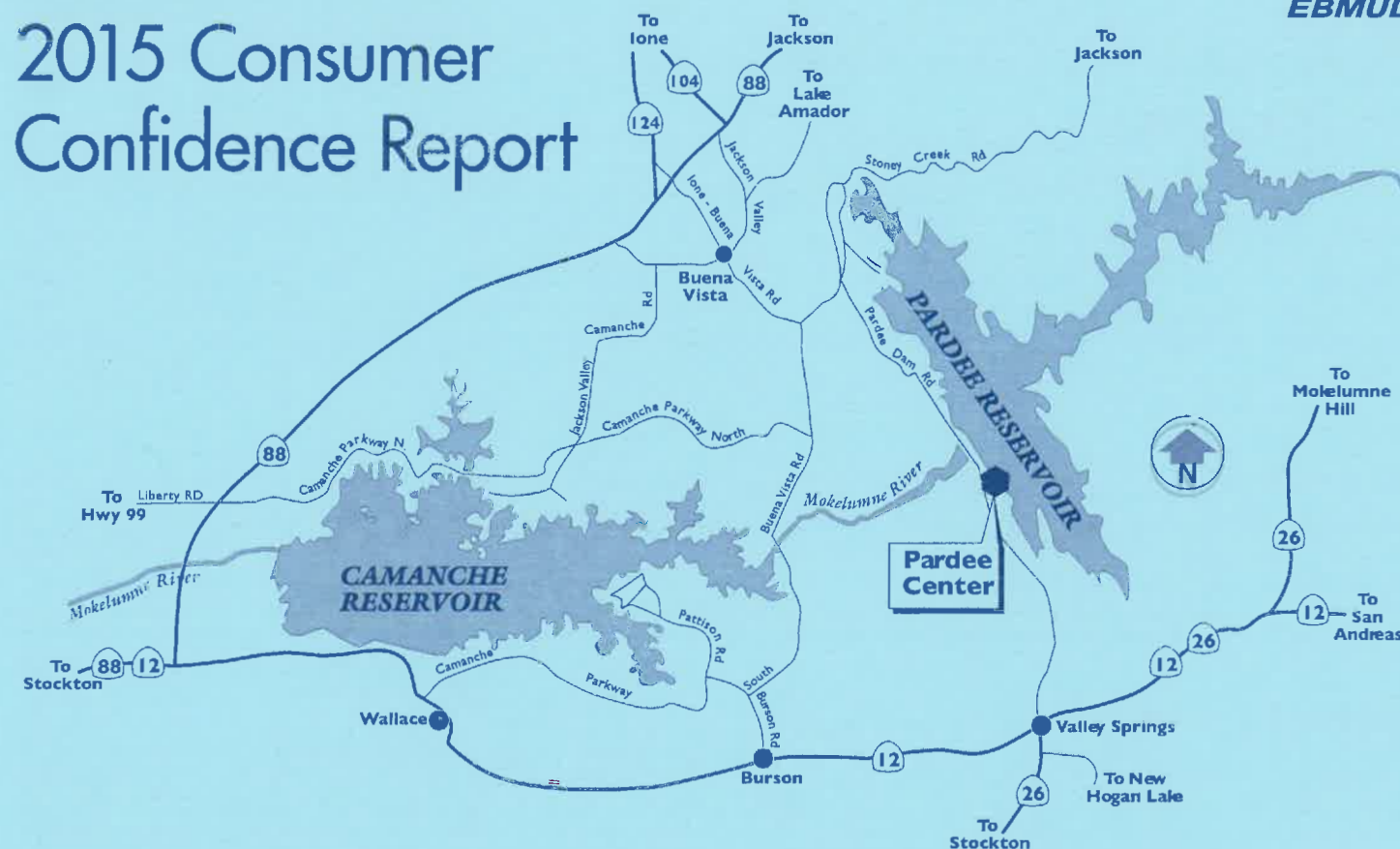
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KEEP SAVING

Latest drought information:
www.ebmud.com/drought

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	MCL or [MRDL]	PHG (MCLG) or [MRDLG]	Average	Range	Sample Year	Typical Sources
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Lead (ppb)*	AL=15	0.2	90th Percentile <5	No sites above AL out of 5 sites sampled	2014	Internal corrosion of household plumbing system; erosion of natural deposits;
Disinfection Byproducts, Disinfectant Residuals						
Trihalomethanes (ppb)	80	NA	13	13	2015	By-product of drinking water chlorination
Haloacetic Acids, 5 species (ppb)	60	NA	8	8	2015	By-product of drinking water chlorination
Chlorine residual as Cl ₂ (ppm)	[4]	[4]	0.8†	0.5–1.0	2015	Drinking water disinfectant added for treatment

†Highest Running Annual Average

Secondary Contaminants

	MCL	Violation	Average	Range	Sample Year	Typical Sources
Chloride (ppm)	250		4	4	2015	Runoff/leaching from natural deposits
Color (Color Unit)	15		13	13	2008	Naturally occurring organic materials
Odor–Threshold (TON)	3	††	3†††	1.1–3.5††	2008	Naturally occurring organic materials
Specific Conductance (µS/cm)	900		46	46	2015	Substances that form ions when in water
Total Dissolved Solids (ppm)	500		30	30	2015	Runoff/leaching from natural deposits

†† MCL exceedance for TON did not coincide with any odor complaints by consumers. TON value of 3.5 was detected on 4/22/2008.

††† Highest Running Annual Average (calculations include some 2007 data).

Other Parameters

	Average & Range		Average & Range
Alkalinity, bicarbonate (ppm)	34	Magnesium (ppm)	1
Calcium (ppm)	2	pH (pH units)	8.1
Hardness (ppm as CaCO ₃)	8	Potassium (ppm)	0.4
		Sodium (ppm)	7

Treatment of Surface Water Sources

Treatment Technique	Direct Filtration (dual media filtration with anthracite and sand)
Turbidity Performance Standards	1. Be less than or equal to 0.3 NTU in 95% of measurements in a month 2. Not exceed 1.0 NTU at any time
Lowest monthly percentage of samples that met Turbidity Performance Standard No. 1	100%
Highest single turbidity measurement during the year	0.05 NTU
Number of violations of any surface water treatment requirements	0

Terms Used

AL = regulatory action level. The concentration which, if exceeded, triggers treatment or other requirements that a water system must follow.

MCL = Maximum Contaminant Level. The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs (or MCLGs) as is economically and technologically feasible.

MCLG = Maximum Contaminant Level Goal. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the U.S. Environmental Protection Agency.

MRDL = Maximum Residual Disinfectant Level. The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

MRDLG = Maximum Residual Disinfectant Level Goal. The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

NA = Not Applicable

NTU = Nephelometric Turbidity Units.

PDWS = Primary Drinking Water Standard. MCLs and MRDLs for contaminants that affect health along with their monitoring and reporting requirements, and water treatment requirements.

PHG = Public Health Goal. The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California Environmental Protection Agency.

ppb = parts per billion.

ppm = parts per million.

Secondary drinking water standard. MCLs set to protect the odor, taste and appearance of drinking water.

TON = Threshold Odor Number, a measurement of odors in water.

TT = Treatment Technique. A required process intended to reduce the level of a contaminant in drinking water.

Turbidity = A measure of cloudiness of the water. See NTU.

µS/cm = micro siemens per centimeter (measure of conductivity).

Contaminants in Drinking Water

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water include:

Microbial Contaminants, such as viruses and bacteria, that may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.

Inorganic Contaminants, such as salts and metals, that can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming. The State Board waived the monitoring requirement for cyanide.

Private plumbing and fixtures may add lead or copper levels above the level delivered by the District. Hot water systems can contain elevated levels of lead and copper so it is not advisable to drink from hot water faucets. For additional information see the Note about Lead on the bottom of this page.

Radioactive Contaminants, that can be naturally-occurring or be the result of oil and gas production and mining activities.

Pesticide and Herbicide Contaminants, that may come from a variety of sources, such as agriculture, urban stormwater and residential uses.

Organic Chemical Contaminants, including synthetic and volatile organic chemicals that are by-products of industrial processes and petroleum production, and can also come from gas stations, urban storm water runoff, agricultural application, and septic systems. The State Board has waived monitoring of synthetic organic chemicals.

Secondary Contaminants affect aesthetic qualities such as taste, odor, or appearance. The clarity of the water can be measured by color, turbidity and aluminum content. Regulations do not require monitoring for secondary contaminants for nontransient-noncommunity water systems such as Pardee Center.

Other Parameters are water quality measurements which may be of interest to some consumers.

Unregulated Contaminant Monitoring helps U.S. Environmental Protection Agency and the State Water Resources Control Board to determine where certain contaminants occur and whether the contaminants need to be regulated. Pardee Center monitoring of Unregulated Contaminant Monitoring Regulation (UCMR3) 2015 showed no detection of these contaminants and results are available by request.

* Note about Lead

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with lead service lines and home plumbing. EBMUD is responsible for providing high quality drinking water and has replaced all known lead service lines in the District, but cannot control the variety of materials used in existing home plumbing components. When your water has been sitting for

several hours, you can minimize the potential for lead exposure by running your faucet for 30 seconds to two minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested.

Information on lead in drinking water, testing methods and steps you can take to minimize exposure is available from the USEPA *Safe Drinking Water Hotline* 800-426-4791 or at www.epa.gov/safewater/lead.

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Educational Information

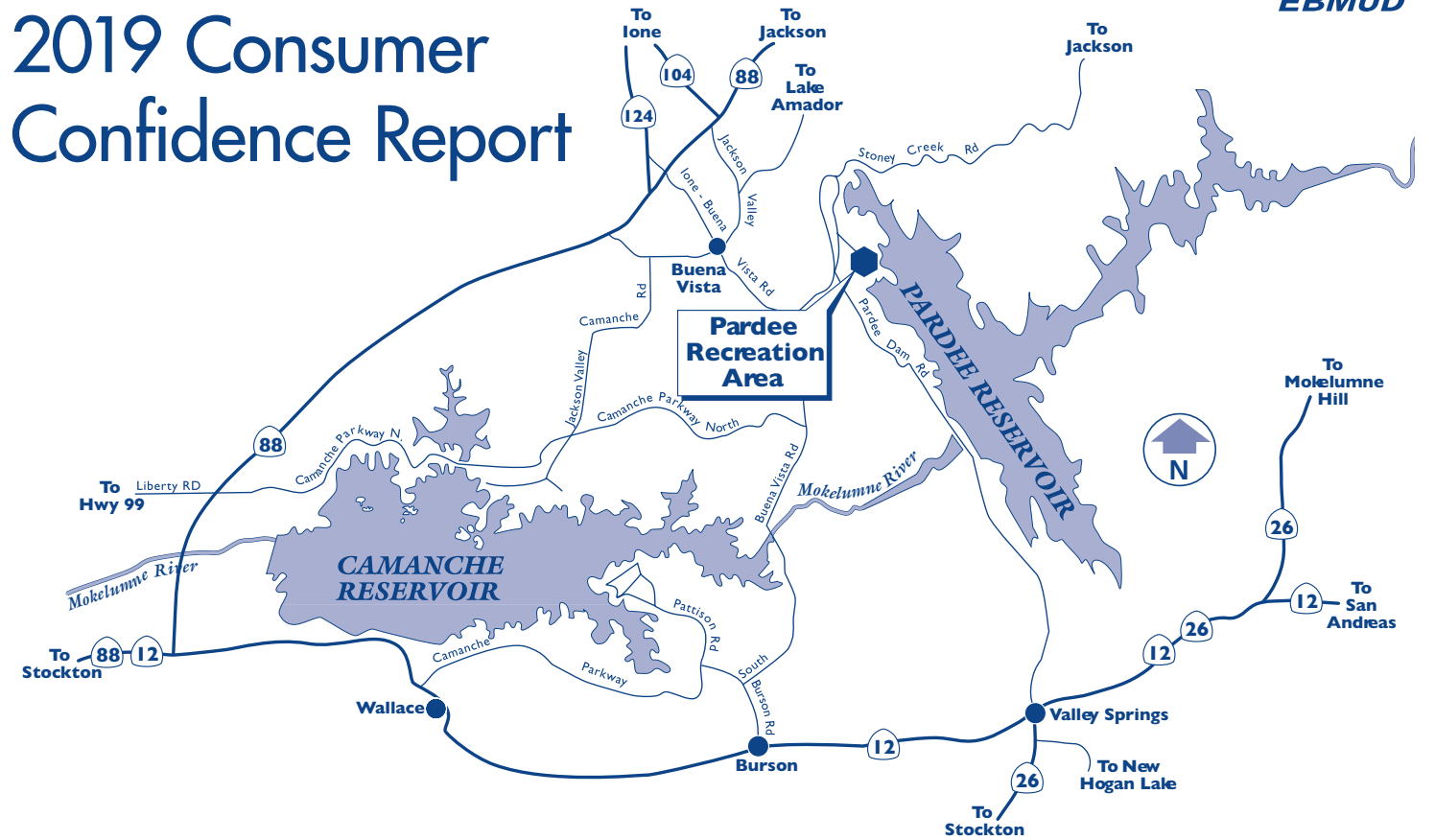
Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects is available online at www.epa.gov/ground-water-and-drinking-water.

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. USEPA/Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available online at www.cdc.gov/parasites/crypto/index.html.

Cryptosporidium is a microbial pathogen found in surface water throughout the U.S. Although filtration removes *Cryptosporidium*, the most commonly used filtration methods cannot guarantee 100 percent removal. Pardee Recreation Water Treatment Plant (WTP) does remove *Cryptosporidium* and giardia as their sizes are larger (crypto 3-5 micron, giardia 7-14 micron) than the filtration membrane which is 0.01 micron. Current test methods do not allow us to determine if the organisms are dead or if they are capable of causing disease. Ingestion of *Cryptosporidium* may cause cryptosporidiosis, an abdominal infection. Symptoms of infection include nausea, diarrhea, and abdominal cramps. Most healthy individuals can overcome the disease within a few weeks. However, immuno-compromised people, infants, small children, and the elderly are at greater risk of developing life threatening illness. We encourage immuno-compromised individuals to consult their doctor regarding appropriate precautions to take to avoid infection. *Cryptosporidium* must be ingested to cause disease, and it may be spread through means other than drinking water.

Pardee Recreation Area

2019 Consumer Confidence Report



Water System Information

This report includes information such as the source water, its water quality and comparisons to state and federal drinking water standards. For more information, please call the Pardee Water/Wastewater Supervisor at (209) 772-8368.

The Park Advisory Board meets in March, July and November at Pardee Center to discuss matters relating to water quality. For exact dates and times, please call (209) 772-8204. Public participation is encouraged.

Este informe contiene información muy importante sobre su agua potable. Tradúzcalo ó hable con alguien que lo entienda bien.

Water Source and Treatment

Pardee Reservoir is the water source for Pardee Recreation Area. The Recreation Area is served by a state-of-the-art ultrafiltration membrane water treatment facility with chlorine for disinfection. Ultrafiltration can remove particles as small as 0.01 microns. The distribution system is served by a 97,000 gallon water storage tank. The water treatment facility and distribution system are operated by state certified operators.

This report describes the results from water sampling for potential contaminants and gives information on water related activities. The State Water Resources Control Board (State Water Board), Division of Drinking Water sets water quality requirements for the Pardee Recreation Area water system, in order to ensure that the water is safe to drink. Complying with regulations

requires an extensive monitoring program in both the source and treated waters. All water quality regulations were met in 2019.

In order to ensure that tap water is safe to drink, the U.S. Environmental Protection Agency (USEPA) and the State Water Board prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. California Department of Public Health (CDPH) and United States Food and Drug Administration regulations establish limits for contaminants in bottled water that provide the same protection for public health. Additional information on bottled water is available on the CDPH website at www.cdph.ca.gov/Programs/CEH/DFDCS/Pages/FDBPrograms/FoodSafetyProgram/Water.aspx.

Source Water Protection Activities

The State Water Board requires water utilities to determine the types of activities that can pollute their drinking water sources. EBMUD evaluated more than 100 activities that take place near this EBMUD reservoir, and found that the source is most vulnerable to gasoline storage and dispensing at the recreation area marina and boating. In 2019, no contaminants associated with these activities were detected in EBMUD's drinking water.

The detailed results of the source water assessment completed in 2002 can be reviewed at EBMUD's headquarters at Pardee Center, northeast of Valley Springs, or at the Stockton State Water Board office.

Pardee Recreation Area 2019 Water Quality Data

The tables list all the drinking water contaminants that we detected from January 1 through December 31, 2019, unless noted otherwise. The presence of these contaminants in the water does not necessarily indicate that the water poses a health risk.

Primary Contaminants

	MCL, AL or [MRDL]	PHG, (MCLG) or [MRDLG]	Average	Range	Sample Year	Typical Sources
Inorganic Contaminants						
Copper (ppb)	AL=1300	300	90th Percentile =41	No sites above AL out of 5 sites sampled	2019	Corrosion of household plumbing; erosion of natural deposits
Lead (ppb) *	AL=15	0.2	90th Percentile =2.1	No sites above AL out of 5 sites sampled	2019	Corrosion of household plumbing; erosion of natural deposits
Disinfection Byproducts, Disinfectant Residuals						
Chlorine residual as Cl ₂ (ppm)	[4]	[4]	0.9 ^a	0.4–1.3	2019	Drinking water disinfectant added for treatment
Haloacetic Acids, 5 species (ppb)	60	NA	40	40	2019	By-product of drinking water disinfection
Trihalomethanes (ppb)	80	NA	52	52	2019	By-product of drinking water disinfection

a) Highest Running Annual Average

Secondary Contaminants

	MCL	Result	Sample Year	Typical Sources
Chloride (ppm)	250	4	2019	Runoff/leaching from natural deposits
Color (color units)	15	1	2019	Naturally occurring organic materials
Odor–Threshold (TON)	3	1	2019	Naturally-occurring organic materials
Specific Conductance (µS/cm)	900	49	2019	Substances that form ions when in water
Total Dissolved Solids (ppm)	500	36	2019	Runoff/leaching from natural deposits

Other Parameters

	Result		Result
Alkalinity, bicarbonate (ppm)	17	Magnesium (ppm)	0.6
Alkalinity, total as CaCO ₃ (ppm)	17	pH (pH units)	8.9
Calcium (ppm)	2	Potassium (ppm)	0.5
Hardness, as CaCO ₃ (ppm)	10	Sodium (ppm)	7

Treatment of Surface Water Sources

Treatment Technique	Ultrafiltration membrane treatment
Turbidity Performance Standards	1. Be less than or equal to 0.3 NTU in 95% of measurements in a month 2. Not exceed 1.0 NTU at any time
Lowest monthly percentage of samples that met Turbidity Performance Standard No. 1	100%
Highest single turbidity measurement during the year	0.05 NTU
Number of violations of any surface water treatment requirements	0

Terms Used

AL = regulatory action level. The concentration which, if exceeded, triggers treatment or other requirements that a water system must follow.

MCL = Maximum Contaminant Level. The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs (or MCLGs) as is economically and technologically feasible.

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MRDL = Maximum Residual Disinfectant Level. The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

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NA = Not Applicable

NTU = Nephelometric Turbidity Units.

PDWS = Primary Drinking Water Standard. MCLs and MRDLs for contaminants that affect health along with their monitoring and reporting requirements, and water treatment requirements.

PHG = Public Health Goal. The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California Environmental Protection Agency.

ppb = parts per billion. One ppb is like 3 seconds in 100 years.

ppm = parts per million. One ppm is like 30 seconds in one year.

Secondary drinking water standard (SDWSs). MCLs for contaminants that affect taste, odor, or appearance of the drinking water. Contaminants with SDSWs do not affect the health at the MCL levels.

TON = Threshold Odor Number, a measurement of odors in water.

TT = Treatment Technique. A required process intended to reduce the level of a contaminant in drinking water.

Turbidity = A measure of cloudiness of the water. We monitor it because it is a good indicator of the effectiveness of our filtration system.

µS/cm = micro siemens per centimeter (measure of conductivity).

90th percentile = A measure that indicates 90 percent of the samples had a lower result.

Contaminants in Drinking Water

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water include:

Microbial Contaminants, such as viruses and bacteria, that may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.

Inorganic Contaminants, such as salts and metals, that can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.

Private plumbing and fixtures may add lead or copper levels above the level delivered by EBMUD. Hot water systems can contain elevated levels of lead and copper so it is not advisable to drink from hot water faucets. For additional information see the Note about Lead on the bottom of this page.

Radioactive Contaminants, that can be naturally-occurring or be the result of oil and gas production and mining activities.

Pesticide and Herbicide Contaminants, that may come from a variety of sources, such as agriculture, urban stormwater and residential uses.

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Secondary Contaminants affect aesthetic qualities such as taste, odor, or appearance. The clarity of the water can be measured by color, turbidity and aluminum content.

Other Parameters are water quality measurements which may be of interest to some consumers.

* Note about Lead

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with lead service lines and home plumbing. EBMUD is responsible for providing high quality drinking water and has replaced all known lead service lines in the EBMUD system, but cannot control the variety of materials used in existing home plumbing components.

When your water has been sitting for several hours, you can minimize the potential for lead exposure by running your faucet for 30 seconds to two minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods and steps you can take to minimize exposure is available online from the USEPA at www.epa.gov/lead.

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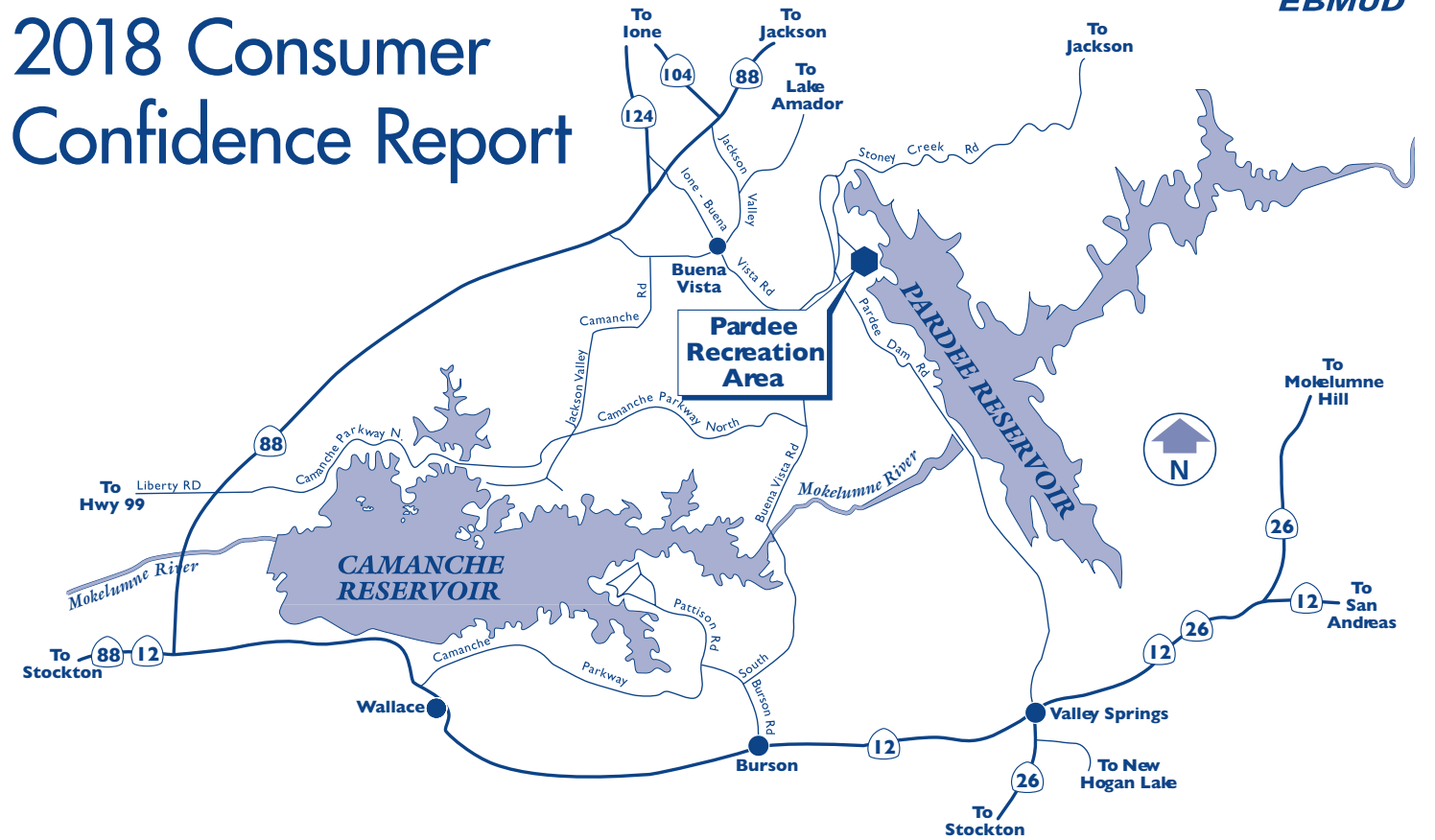
Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects is available online at www.epa.gov/ground-water-and-drinking-water.

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. USEPA/Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available online at www.cdc.gov/parasites/crypto/index.html.

Cryptosporidium is a microbial pathogen found in surface water throughout the U.S. Although filtration removes *Cryptosporidium*, the most commonly used filtration methods cannot guarantee 100 percent removal. Pardee Recreation Water Treatment Plant (WTP) does remove *Cryptosporidium* and giardia as their sizes are larger (crypto 3-5 micron, giardia 7-14 micron) than the filtration membrane which is 0.01 micron. Current test methods do not allow us to determine if the organisms are dead or if they are capable of causing disease. Ingestion of *Cryptosporidium* may cause cryptosporidiosis, an abdominal infection. Symptoms of infection include nausea, diarrhea, and abdominal cramps. Most healthy individuals can overcome the disease within a few weeks. However, immuno-compromised people, infants, small children, and the elderly are at greater risk of developing life threatening illness. We encourage immuno-compromised individuals to consult their doctor regarding appropriate precautions to take to avoid infection. *Cryptosporidium* must be ingested to cause disease, and it may be spread through means other than drinking water.

Pardee Recreation Area

2018 Consumer Confidence Report



Water System Information

This report includes information such as the source water, its water quality and comparisons to state and federal drinking water standards. For more information, please call the Pardee Water/Wastewater Supervisor at (209) 772-8368.

The Park Advisory Board meets in March, July and November at Pardee Center to discuss matters relating to water quality. For exact dates and times, please call (209) 772-8203. Public participation is encouraged.

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Water Source and Treatment

Pardee Reservoir is the water source for Pardee Recreation Area. The Recreation Area is served by a state-of-the-art ultrafiltration membrane water treatment facility with chlorine for disinfection. Ultrafiltration can remove particles as small as 0.01 microns. The distribution system is served by a 97,000 gallon water storage tank. The water treatment facility and distribution system are operated by state certified operators.

This report describes the results from water sampling for potential contaminants and gives information on water related activities. The State Water Resources Control Board (State Board), Division of Drinking Water sets water quality requirements for the Pardee Recreation Area water system, in order to ensure that the water is safe to drink. Complying with regulations requires an extensive monitoring program in both the source and treated waters. All water quality regulations were met in 2018.

In order to ensure that tap water is safe to drink, the U.S. Environmental Protection Agency (USEPA) and the State Board prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. California Department of Public Health (CDPH) and United States Food and Drug Administration regulations establish limits for contaminants in bottled water that provide the same protection for public health. Additional information on bottled water is available on the CDPH website at www.cdph.ca.gov/Programs/CEH/DFDCS/Pages/FDBPrograms/FoodSafetyProgram/Water.aspx.

Source Water Protection Activities

The State Board requires water utilities to determine the types of activities that can pollute their drinking water sources. EBMUD evaluated more than 100 activities that take place near this District reservoir, and found that the source is most vulnerable to gasoline storage and dispensing at the recreation area marina and boating. In 2018, no contaminants associated with these activities were detected in EBMUD's drinking water.

The detailed results of the source water assessment completed in 2002 can be reviewed at the District's headquarters at Pardee Center, northeast of Valley Springs, or at the Stockton State Board office.

Pardee Recreation Area 2018 Water Quality Data

The tables list all the drinking water contaminants that we detected from January 1 through December 31, 2018, unless noted otherwise. The presence of these contaminants in the water does not necessarily indicate that the water poses a health risk. The State Board requires us to monitor certain contaminants less than once per year because the concentrations of these contaminants are not expected to vary significantly from year to year. Some of the data, though representative of the water quality, is more than one year old.

Primary Contaminants

	MCL, AL or [MRDL]	PHG, (MCLG) or [MRDLG]	Average	Range	Sample Year	Typical Sources
Inorganic Contaminants						
Copper (ppb)	AL=1300	300	90th Percentile =115	No sites above AL out of 5 sites sampled	2018	Corrosion of household plumbing; erosion of natural deposits
Lead (ppb) *	AL=15	0.2	90th Percentile =1.6	No sites above AL out of 5 sites sampled	2018	Corrosion of household plumbing; erosion of natural deposits
Disinfection Byproducts, Disinfectant Residuals						
Chlorine residual as Cl ₂ (ppm)	[4]	[4]	0.9 ^a	0.6–1.2	2018	Drinking water disinfectant added for treatment
Haloacetic Acids, 5 species (ppb)	60	NA	54	54	2018	By-product of drinking water disinfection
Trihalomethanes (ppb)	80	NA	11	11	2018	By-product of drinking water disinfection

a) Highest Running Annual Average

Secondary Contaminants

	MCL	Result	Sample Year	Typical Sources
Chloride (ppm)	250	4	2018	Runoff/leaching from natural deposits
Color (color units)	15	3	2018	Naturally occurring organic materials
Specific Conductance (µS/cm)	900	61	2018	Substances that form ions when in water
Total Dissolved Solids (ppm)	500	47	2018	Runoff/leaching from natural deposits

Other Parameters

	Result
Alkalinity, bicarbonate (ppm)	24
Alkalinity, carbonate (ppm)	7
Alkalinity, total as CaCO ₃ (ppm)	31
Calcium (ppm)	3
Hardness, as CaCO ₃ (ppm)	12

	Result
Magnesium (ppm)	1
pH (pH units)	8.8
Potassium (ppm)	0.6
Sodium (ppm)	10

Treatment of Surface Water Sources

Treatment Technique	Ultrafiltration (membrane filtration)
Turbidity Performance Standards	1. Be less than or equal to 0.3 NTU in 95% of measurements in a month 2. Not exceed 1.0 NTU at any time
Lowest monthly percentage of samples that met Turbidity Performance Standard No. 1	100%
Highest single turbidity measurement during the year	0.1 NTU
Number of violations of any surface water treatment requirements	0

Terms Used

AL = regulatory action level. The concentration which, if exceeded, triggers treatment or other requirements that a water system must follow.

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ppb = parts per billion. One ppb is like 3 seconds in 100 years.

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Secondary drinking water standard (SDWSs). MCLs for contaminants that affect taste, odor, or appearance of the drinking water. Contaminants with SDSWs do not affect the health at the MCL levels.

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* Note about Lead

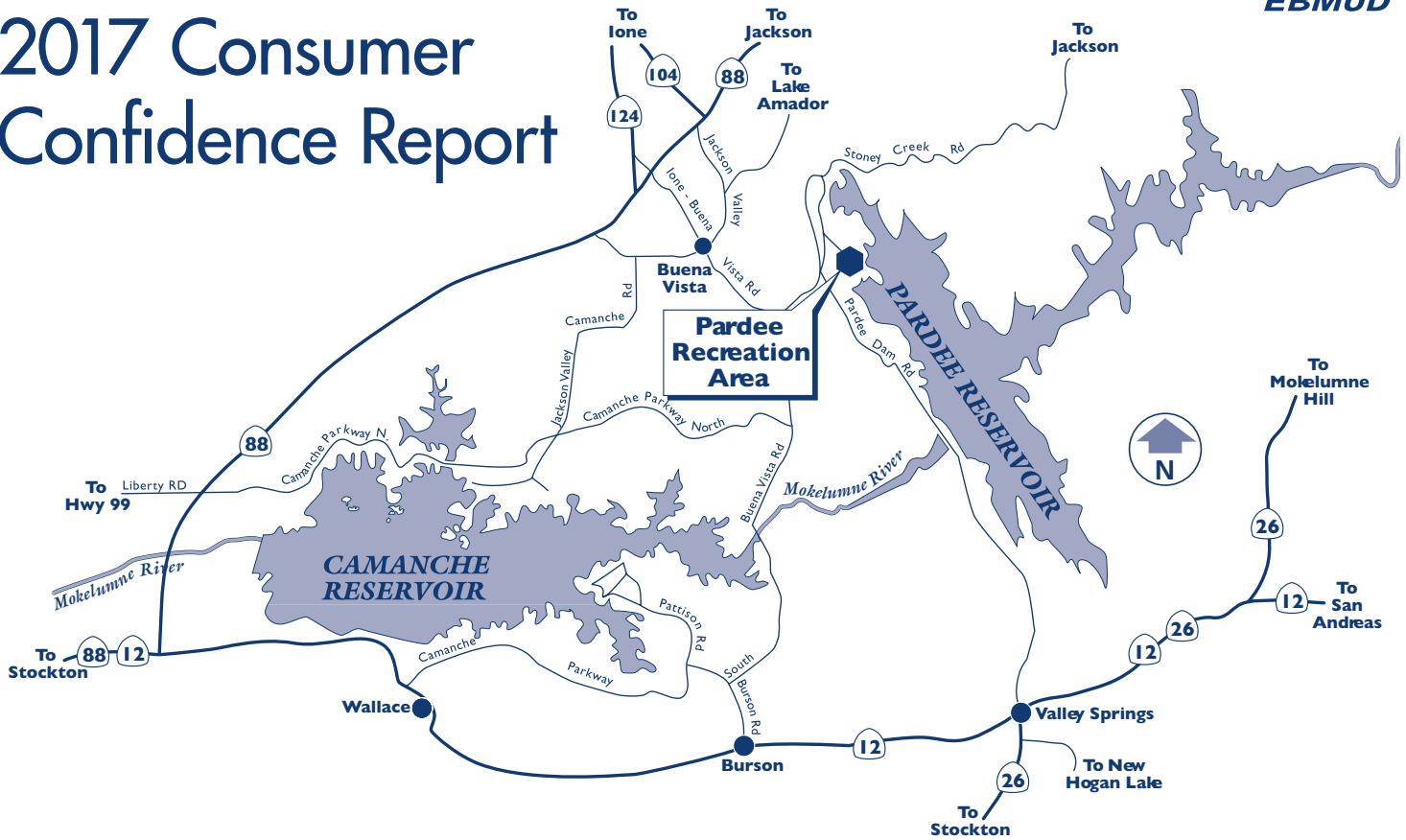
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Pardee Recreation Area

2017 Consumer Confidence Report



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The tables list all the drinking water contaminants that we detected from January 1 through December 31, 2017, unless noted otherwise. The presence of these contaminants in the water does not necessarily indicate that the water poses a health risk. The State Board requires us to monitor certain contaminants less than once per year because the concentrations of these contaminants are not expected to vary significantly from year to year. Some of the data, though representative of the water quality, is more than one year old.

Primary Contaminants

	Highest Number of Detections	MCL	MCLG	Typical Sources of Bacteria
Microbiological Contaminants				
Total Coliform Bacteria (state Total Coliform Rule)	one detected in November 2017	1 positive monthly sample	0	Naturally present in the environment
Total Coliform Bacteria (federal Revised Total Coliform Rule)	met requirement	TT	NA	Naturally present in the environment

	MCL, AL or [MRDL]	PHG, (MCLG) or [MRDLG]	Average	Range	Sample Year	Typical Sources
Inorganic Contaminants						
Copper (ppb)	AL=1300	300	90th Percentile =89	No sites above AL out of 10 sites sampled	2016	Corrosion of household plumbing system; erosion of natural deposits
Lead (ppb) *	AL=15	0.2	90th Percentile =6.9	No sites above AL out of 10 sites sampled	2016	Internal corrosion of household plumbing system; erosion of natural deposits
Disinfection Byproducts, Disinfection Residuals						
Chlorine residual as Cl ₂ (ppm)	[4]	[4]	0.9 ^a	0.5–1.5	2017	Drinking water disinfectant added for treatment
Haloacetic acids, 5 species (ppb)	60	NA	53	53	2017	By-product of drinking water disinfectant
Trihalomethanes	80	NA	78	78	2017	By-product of drinking water disinfectant

a) Highest Running Annual Average

Secondary Contaminants

	MCL	Result	Sample Year	Typical Sources
Chloride (ppm)	250	3.7	2017	Runoff/leaching from natural deposits
Color (color units)	15	1	2017	Naturally occurring organic materials
Specific Conductance (µS/cm)	900	52	2017	Substances that form ions when in water
Sulfate (ppm)	250	0.7	2017	Runoff/leaching from natural deposits
Total Dissolved Solids (ppm)	500	34	2017	Runoff/leaching from natural deposits

Other Parameters

	Result		Result
Alkalinity, bicarbonate (ppm)	16	Magnesium (ppm)	0.6
Alkalinity, carbonate (ppm)	1.8	pH (pH units)	8.6
Calcium (ppm)	2	Potassium (ppm)	0.4
Hardness (ppm as CaCO ₃)	10	Sodium (ppm)	7

Treatment of Surface Water Sources

Treatment Technique	Ultrafiltration (membrane filtration)
Turbidity Performance Standards	1. Be less than or equal to 0.3 NTU in 95% of measurements in a month 2. Not exceed 1.0 NTU at any time
Lowest monthly percentage of samples that met Turbidity Performance Standard No. 1	100%
Highest single turbidity measurement during the year	0.05 NTU
Number of violations of any surface water treatment requirements	0

Terms Used

AL = regulatory action level. The concentration which, if exceeded, triggers treatment or other requirements that a water system must follow.

MCL = Maximum Contaminant Level. The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs (or MCLGs) as is economically and technologically feasible.

MCLG = Maximum Contaminant Level Goal. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the U.S. Environmental Protection Agency.

MRDL = Maximum Residual Disinfectant Level. The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

MRDLG = Maximum Residual Disinfectant Level Goal. The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

NA = Not Applicable

NTU = Nephelometric Turbidity Units.

PDWS = Primary Drinking Water Standard. MCLs and MRDLs for contaminants that affect health along with their monitoring and reporting requirements, and water treatment requirements.

PHG = Public Health Goal. The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California Environmental Protection Agency.

ppb = parts per billion. One ppb is like 3 seconds in 100 years.

ppm = parts per million. One ppm is like 30 seconds in one year.

Secondary drinking water standard (SDWSs). MCLs for contaminants that affect taste, odor, or appearance of the drinking water. Contaminants with SDSWs do not affect the health at the MCL levels.

TT = Treatment Technique. A required process intended to reduce the level of a contaminant in drinking water.

Turbidity = A measure of cloudiness of the water. We monitor it because it is a good indicator of the effectiveness of our filtration system.

µS/cm = micro siemens per centimeter (measure of conductivity).

90th percentile = A measure that indicates 90 percent of the samples had a lower result.

Contaminants in Drinking Water

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water include:

Microbial Contaminants, such as viruses and bacteria, that may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.

Inorganic Contaminants, such as salts and metals, that can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.

Private plumbing and fixtures may add lead or copper levels above the level delivered by the District. Hot water systems can contain elevated levels of lead and copper so it is not advisable to drink from hot water faucets. For additional information see the Note about Lead on the bottom of this page.

Radioactive Contaminants, that can be naturally-occurring or be the result of oil and gas production and mining activities.

Pesticide and Herbicide Contaminants, that may come from a variety of sources, such as agriculture, urban stormwater and residential uses.

Organic Chemical Contaminants, including synthetic and volatile organic chemicals that are by-products of industrial processes and petroleum production, and can also come from gas stations, urban storm water runoff, agricultural application, and septic systems.

Secondary Contaminants affect aesthetic qualities such as taste, odor, or appearance. The clarity of the water can be measured by color, turbidity and aluminum content.

Other Parameters are water quality measurements which may be of interest to some consumers.

* Note about Lead

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with lead service lines and home plumbing. EBMUD is responsible for providing high quality drinking water and has replaced all known lead service lines in the District, but cannot control the variety of materials used in existing home plumbing components. When your water has been sitting for

several hours, you can minimize the potential for lead exposure by running your faucet for 30 seconds to two minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested.

Information on lead in drinking water, testing methods and steps you can take to minimize exposure is available online from the USEPA at www.epa.gov/lead.

Board of Directors

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Educational Information

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects is available online at www.epa.gov/ground-water-and-drinking-water.

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. USEPA/Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available online at www.cdc.gov/parasites/crypto/index.html.

Cryptosporidium is a microbial pathogen found in surface water throughout the U.S. Although filtration removes *Cryptosporidium*, the most commonly used filtration methods cannot guarantee 100 percent removal. Pardee Recreation Water Treatment Plant (WTP) does remove *Cryptosporidium* and giardia as their sizes are larger (crypto 3-5 micron, giardia 7-14 micron) than the filtration membrane which is 0.01 micron. Current test methods do not allow us to determine if the organisms are dead or if they are capable of causing disease. Ingestion of *Cryptosporidium* may cause cryptosporidiosis, an abdominal infection. Symptoms of infection include nausea, diarrhea, and abdominal cramps. Most healthy individuals can overcome the disease within a few weeks. However, immuno-compromised people, infants, small children, and the elderly are at greater risk of developing life threatening illness. We encourage immuno-compromised individuals to consult their doctor regarding appropriate precautions to take to avoid infection. *Cryptosporidium* must be ingested to cause disease, and it may be spread through means other than drinking water.

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Educational Information

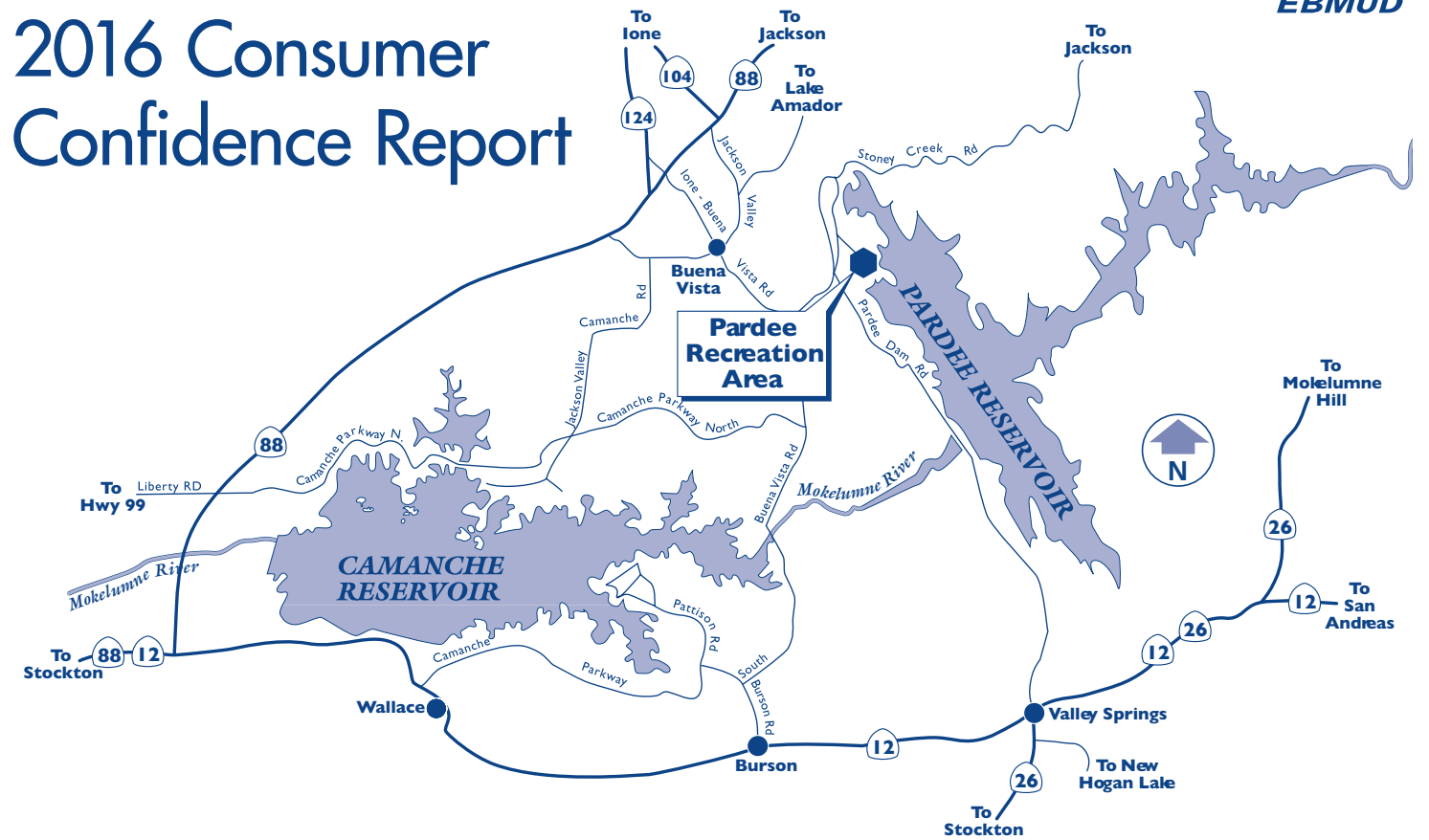
Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the USEPA's Safe Drinking Water Hotline (1-800-426-4791).

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. USEPA/Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline (1-800-426-4791).

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Pardee Recreation Area

2016 Consumer Confidence Report



Water System Information

This report includes information such as the source water, its water quality and comparisons to state and federal drinking water standards. For more information, please call the Pardee Water/Wastewater Supervisor at (209) 772-8368.

The Park Advisory Board meets in March, July and November at Pardee Center to discuss matters relating to water quality. For exact dates and times, please call (209) 772-8203. Public participation is encouraged.

Este informe contiene información muy importante sobre su agua potable. Tradúzcalo ó hable con alguien que lo entienda bien.

Water Source and Treatment

Pardee Reservoir is the water source for Pardee Recreation Area. The Recreation Area is served by a state-of-the-art ultrafiltration membrane water treatment facility with chlorine for disinfection. Ultrafiltration can remove particles as small as 0.01 microns. The distribution system is served by a 97,000 gallon water storage tank. The water treatment facility and distribution system are operated by state certified operators.

This report describes the results from water sampling for potential contaminants and gives information on water related activities. The State Water Resources Control Board (State Board), Division of Drinking Water sets water quality requirements for the Pardee Recreation Area water system, in order to ensure that the water is safe to drink. Complying with regulations requires an extensive monitoring program in both the source and treated waters. All water quality regulations were met in 2016.

In order to ensure that tap water is safe to drink, the U.S. Environmental Protection Agency (USEPA) and the State Board prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. California Department of Public Health (CDPH) and United States Food and Drug Administration regulations establish limits for contaminants in bottled water that provide the same protection for public health. Additional information on bottled water is available on the CDPH website at <http://www.cdph.ca.gov/programs/Pages/fdbBVW.aspx>.

Source Water Protection Activities

The State Board requires water utilities to determine the types of activities that can pollute their drinking water sources. EBMUD evaluated more than 100 activities that take place near this District reservoir, and found that the source is most vulnerable to gasoline storage and dispensing at the recreation area marina and boating. In 2016, no contaminants associated with these activities were detected in EBMUD's drinking water.

The detailed results of the source water assessment completed in 2002 can be reviewed at the District's headquarters at Pardee Center, northeast of Valley Springs, or at the Stockton State Board office.

Pardee Recreation Area 2016 Water Quality Data

The tables list all the drinking water contaminants that we detected from January 1 through December 31, 2016, unless noted otherwise. The presence of these contaminants in the water does not necessarily indicate that the water poses a health risk. The State Board requires us to monitor certain contaminants less than once per year because the concentrations of these contaminants are not expected to vary significantly from year to year. Some of the data, though representative of the water quality, is more than one year old.

Primary Contaminants

	MCL or [MRDL]	PHG (MCLG) or [MRDLG]	Average	Range	Sample Year	Typical Sources
Inorganic Contaminants						
Copper (ppb)	AL=1300	300	90th Percentile =89	No sites above AL out of 10 sites sampled	2016	Internal corrosion of household plumbing system; erosion of natural deposits; leaching from wood preservatives
Lead (ppb) *	AL=15	0.2	90th Percentile =6.9	No sites above AL out of 10 sites sampled	2016	Internal corrosion of household plumbing system; erosion of natural deposits
Disinfection Byproducts, Disinfection Residuals						
Chlorine residual as Cl ₂ (ppm)	[4]	[4]	0.8 ^a	0.2–1.0	2016	Drinking water disinfectant added for treatment
Haloacetic acids, 5 species (ppb)	60	NA	47	47	2016	By-product of drinking water disinfectant
Trihalomethanes	80	NA	60	60	2016	By-product of drinking water disinfectant

^a Highest Running Annual Average

Secondary Contaminants

	MCL	Average	Range	Sample Year	Typical Sources
Chloride (ppm)	250	6	5–8	2016	Runoff/leaching from natural deposits
Color (color units)	15	1	1	2016	Naturally occurring organic materials
Specific Conductance (µS/cm)	900	83	56–110	2016	Substances that form ions when in water
Sulfate (ppm)	250	2	1–2	2016	Runoff/leaching from natural deposits
Total Dissolved Solids (ppm)	500	40	39–40	2016	Runoff/leaching from natural deposits

Other Parameters

	Range
Alkalinity, bicarbonate (ppm)	20–22
Calcium (ppm)	4–5
Hardness (ppm as CaCO ₃)	14–20

	Range
Magnesium (ppm)	1–2
pH (pH units)	7.6–8.7
Potassium (ppm)	1
Sodium (ppm)	6–7

Treatment of Surface Water Sources

Treatment Technique	Ultrafiltration (membrane filtration)
Turbidity Performance Standards	1. Be less than or equal to 0.3 NTU in 95% of measurements in a month 2. Not exceed 1.0 NTU at any time
Lowest monthly percentage of samples that met Turbidity Performance Standard No. 1	100%
Highest single turbidity measurement during the year	0.05 NTU
Number of violations of any surface water treatment requirements	0

Terms Used

MCL = Maximum Contaminant Level. The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs (or MCLGs) as is economically and technologically feasible.

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NA = Not Applicable

NTU = Nephelometric Turbidity Units.

PDWS = Primary Drinking Water Standard. MCLs and MRDLs for contaminants that affect health along with their monitoring and reporting requirements, and water treatment requirements.

PHG = Public Health Goal. The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California Environmental Protection Agency.

ppb = parts per billion.

ppm = parts per million.

Secondary drinking water standard. MCLs set to protect the odor, taste and appearance of drinking water.

TT = Treatment Technique. A required process intended to reduce the level of a contaminant in drinking water.

Turbidity = A measure of cloudiness of the water. See NTU.

µS/cm = micro siemens per centimeter (measure of conductivity).

Contaminants in Drinking Water

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water include:

Microbial Contaminants, such as viruses and bacteria, that may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.

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Other Parameters are water quality measurements which may be of interest to some consumers.

* Note about Lead

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several hours, you can minimize the potential for lead exposure by running your faucet for 30 seconds to two minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested.

Information on lead in drinking water, testing methods and steps you can take to minimize exposure is available from the USEPA Safe Drinking Water Hotline 800-426-4791 or at www.epa.gov/safewater/lead.

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Educational Information

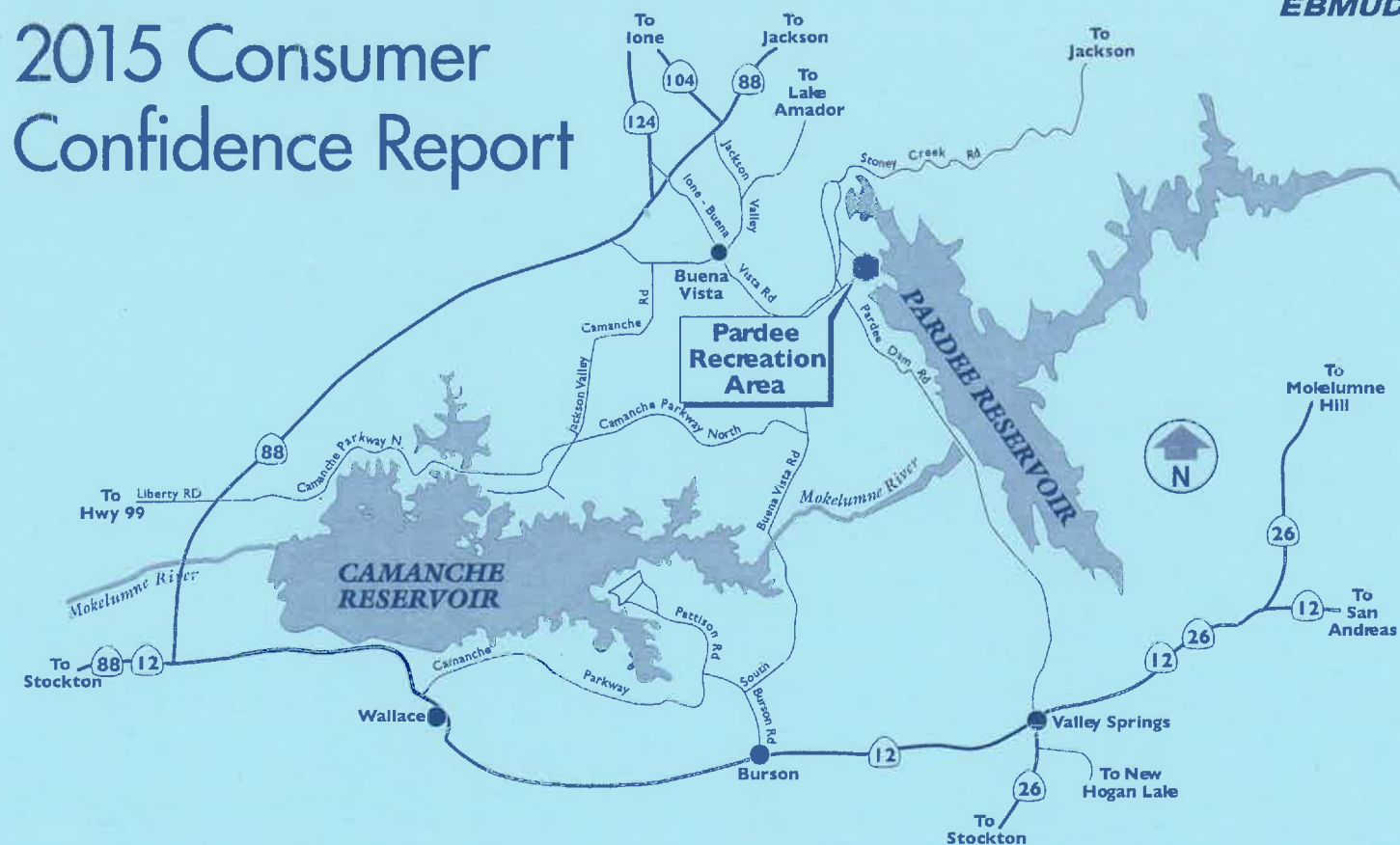
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Pardee Recreation Area

2015 Consumer Confidence Report



Water System Information

This report includes information such as the source water, its water quality and comparisons to state and federal drinking water standards. For more information, please call the Pardee Water/Wastewater Supervisor at (209) 772-8368.

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In order to ensure that tap water is safe to drink, the U.S. Environmental Protection Agency (USEPA) and the State Board prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. California Department of Public Health regulations establishes limits for contaminants in bottled water that provide the same protection for public health.

Source Water Protection Activities

The State Board requires water utilities to determine the types of activities that can pollute their drinking water sources. EBMUD evaluated more than 100 activities that take place near this District reservoir, and found that the source is most vulnerable to gasoline storage and dispensing at the recreation area marina and boating. In 2015, no contaminants associated with these activities were detected in EBMUD's drinking water.

The detailed results of the source water assessment completed in 2002 can be reviewed at the District's headquarters at Pardee Center, northeast of Valley Springs, or at the Stockton State Board office.

KEEP SAVING

Latest drought information:
www.ebmud.com/drought

Pardee Recreation Area 2015 Water Quality Data

The tables list all the drinking water contaminants that we detected from January 1 through December 31, 2015, unless noted otherwise. The presence of these contaminants in the water does not necessarily indicate that the water poses a health risk. The State Board requires us to monitor certain contaminants less than once per year because the concentrations of these contaminants are not expected to vary significantly from year to year. Some of the data, though representative of the water quality, is more than one year old.

Primary Contaminants

	MCL or [MRDL]	PHG (MCLG) or [MRDLG]	Average	Range	Sample Year	Typical Sources
Disinfection Byproducts, Disinfectant Residuals						
Chlorine residual as Cl ₂ (ppm)	[4]	[4]	0.8†	0.5–1.4	2015	Drinking water disinfectant added for treatment

†Highest Running Annual Average

Secondary Contaminants

	MCL	Violation	Average	Range	Sample Year	Typical Sources
Chloride (ppm)	250		5	5	2015	Runoff/leaching from natural deposits
Odor–Threshold (TON)	3		1.6	1.6	2009	Naturally occurring organic materials
Specific Conductance (µS/cm)	900		60	60	2015	Substances that form ions when in water
Sulfate (ppm)	250		1	1	2015	Runoff/leaching from natural deposits
Total Dissolved Solids (ppm)	500		33	33	2015	Runoff/leaching from natural deposits

Other Parameters

	Average & Range
Alkalinity, bicarbonate (ppm)	17
Calcium (ppm)	4
Hardness (ppm as CaCO ₃)	14

	Average & Range
Magnesium (ppm)	1
pH (pH units)	7.5
Potassium (ppm)	1
Sodium (ppm)	5

Treatment of Surface Water Sources

Treatment Technique	Ultrafiltration (membrane filtration)
Turbidity Performance Standards	1. Be less than or equal to 0.3 NTU in 95% of measurements in a month 2. Not exceed 1.0 NTU at any time
Lowest monthly percentage of samples that met Turbidity Performance Standard No. 1	100%
Highest single turbidity measurement during the year	0.05 NTU
Number of violations of any surface water treatment requirements	0

Terms Used

MCL = Maximum Contaminant Level. The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs (or MCLGs) as is economically and technologically feasible.

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MRDL = Maximum Residual Disinfectant Level. The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

MRDLG = Maximum Residual Disinfectant Level Goal. The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

NA = Not Applicable

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PDWS = Primary Drinking Water Standard. MCLs and MRDLs for contaminants that affect health along with their monitoring and reporting requirements, and water treatment requirements.

PHG = Public Health Goal. The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California Environmental Protection Agency.

ppb = parts per billion.

ppm = parts per million.

Secondary drinking water standard. MCLs set to protect the odor, taste and appearance of drinking water.

TON = Threshold Odor Number, a measurement of odors in water.

TT = Treatment Technique. A required process intended to reduce the level of a contaminant in drinking water.

Turbidity = A measure of cloudiness of the water. See NTU.

µS/cm = micro siemens per centimeter (measure of conductivity).

Contaminants in Drinking Water

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water include:

Microbial Contaminants, such as viruses and bacteria, that may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.

Inorganic Contaminants, such as salts and metals, that can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.

Private plumbing and fixtures may add lead or copper levels above the level delivered by the District. Hot water systems can contain elevated levels of lead and copper so it is not advisable to drink from hot water faucets. For additional information see the Note about Lead on the bottom of this page.

Radioactive Contaminants, that can be naturally-occurring or be the result of oil and gas production and mining activities.

Pesticide and Herbicide Contaminants, that may come from a variety of sources, such as agriculture, urban stormwater and residential uses.

Organic Chemical Contaminants, including synthetic and volatile organic chemicals that are by-products of industrial processes and petroleum production, and can also come from gas stations, urban storm water runoff, agricultural application, and septic systems.

Secondary Contaminants affect aesthetic qualities such as taste, odor, or appearance. The clarity of the water can be measured by color, turbidity and aluminum content. Regulations do not require monitoring for secondary contaminants for transient-noncommunity water systems such as Pardee Recreation Area.

Other Parameters are water quality measurements which may be of interest to some consumers.

* Note about Lead

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with lead service lines and home plumbing. EBMUD is responsible for providing high quality drinking water and has replaced all known lead service lines in the District, but cannot control the variety of materials used in existing home plumbing components. When your water has been sitting for

several hours, you can minimize the potential for lead exposure by running your faucet for 30 seconds to two minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods and steps you can take to minimize exposure is available from the USEPA Safe Drinking Water Hotline 800-426-4791 or at www.epa.gov/safewater/lead.

**Appendix 4-3. Penn Mine Bi-Annual Groundwater
Monitoring Report, 2016-2018 (72 pages)**

**2016 - 2018 BI-ANNUAL REPORT
LANDFILL GROUNDWATER MONITORING**

**Penn Mine Environmental Restoration
Project**

Prepared by



Tables, Figures, and 2018 Groundwater Data Updated: September 10, 2018 by
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1.0 INTRODUCTION

The East Bay Municipal Utility District (EBMUD or District) conducts groundwater monitoring and maintenance activities at the Penn Mine Landfill, located in Calaveras County, California, as shown on [Figure 1](#), in accordance with California Code of Regulations (CCR) Title 27 requirements for landfill monitoring and the *Penn Mine Landfill Post-Closure Operations and Maintenance Plan* dated December 1999 ([TRC 1999](#)). Previous monitoring data were reported in annual and biannual reports prepared in 2000, 2001, 2002, 2003, 2006, 2008, 2010, 2012, 2014, and 2016. This report summarizes and presents the results of groundwater monitoring and sampling performed at the Penn Mine Landfill for the period of August and September 2018. Groundwater wells LF-1, LF-2, and LF-4 were sampled on August 28 and 29, 2018. Well LF-3 had to be sampled during a second mobilization to the site on September 6, 2018 due to equipment technical issues encountered during the initial groundwater sampling mobilization.

2.0 FIELD PROCEDURES

The depth to groundwater from the four wells was measured using an electronic sounder. The depth to groundwater and top of casing elevation data were used to calculate the groundwater elevation for each well in reference to mean sea level (MSL). Groundwater elevation measurements from January 2000 to the present are presented in [Table 1](#). Groundwater elevations, as measured on August 28, 2018, are shown on [Figure 2](#).

Before groundwater sample collection, each well was purged and water quality readings (pH, temperature, electrical conductivity and turbidity) were recorded. Monitoring wells LF-1, LF-3, and LF-4 were purged dry using an electric powered submersible pump. LF-2 was purged of three well volumes worth of water. Purge volume calculations are shown on the attached groundwater sampling sheets. Groundwater samples were collected for laboratory analysis by lowering a bottom-fill, disposable bailer to just below the water level in each well. The groundwater samples were transferred from the disposable bailer into laboratory-supplied containers and transported to EBMUD's laboratory for analysis of water quality parameters under chain-of-custody documentation. Monitoring wells LF-1, LF-2, and LF-4 were purged on August 28 and 29, 2018, and well LF-3 was purged on September 6, 2018. LF-1, LF-2, and LF-4 were sampled on August 29, 2018, while LF-3 was sampled on September 6, 2018. The water sampling field survey forms and chain of custody records for the August and September 2018 sampling event are presented in [Appendix A](#).

3.0 SUMMARY OF RESULTS

The results of groundwater monitoring and analysis are discussed in the following sections and summarized in [Tables 1, 2A, and 2B](#). The locations of the four groundwater monitoring wells (LF-1 through LF-4) at the Penn Mine Landfill are shown on [Figure 2](#).

3.1 Groundwater Elevation and Flow Direction

Monitoring data collected on August 28, 2018 suggest that groundwater generally flows towards the southwest of the landfill ([Figure 2](#)). The groundwater levels and flow directions at the site are most likely influenced by geologic structural controls (e.g., fracture zone orientation) as well as the presence of the landfill materials (i.e., decreasing surface water infiltration directly underneath the landfill while

increasing infiltration at topographically downgradient locations, and physical obstruction of flow). In addition, differences in monitoring well completion depths and screened intervals may influence groundwater levels measured in the monitoring wells. Hydrographs of the measured groundwater elevations from the four landfill wells since December 2000 are presented on [Figure 3](#).

3.2 Groundwater Quality

Groundwater samples were collected from LF-1, LF-2 and LF-4 on August 29, 2018, and from LF-3 on September 6, 2018. All water samples were submitted to the EBMUD laboratory for analysis of water quality monitoring parameters under chain of custody documents prepared by the EBMUD laboratory. The results of historical field measurements and laboratory analysis for dissolved metals, cation/anion parameters, and general chemistry parameters are summarized in [Tables 2A and 2B](#). The laboratory report for the August and September 2018 sampling event is presented in Appendix B.

As described in the *Penn Mine Landfill Post-Closure Operations and Maintenance Plan*, the primary constituents of concern are copper, zinc, and total dissolved solids (TDS). The concentrations of these constituents over time (October 1999 to August and September 2018) are graphically shown on [Figures 4, 5, and 6](#) for copper, zinc, and TDS, respectively. The analytical results for the samples collected from the landfill monitoring wells are summarized below.

Copper

Dissolved copper was not detected above the reported laboratory detection limits in groundwater from three of the four monitoring wells during the 2018 sampling event, consistent with historic trends ([Figure 4](#)). Dissolved copper was detected in groundwater from monitoring well LF-1 at a concentration of 4.89 micrograms per liter (µg/L), slightly above the laboratory reporting limit of 4.06 µg/L. Even though the June 2014 and June 2016 samples showed dissolved copper as non-detected (ND), this location has yielded quantifiable concentrations of dissolved copper over the years at concentrations up to 25.8 µg/L. However, as LF-1 is located on the up-gradient side of the landfill with regards to groundwater flow, detected dissolved copper at this location likely represents background groundwater conditions.

Zinc

Dissolved zinc was detected in groundwater from all four landfill wells. The detected zinc concentrations range from 1.88 to 12.0 µg/L, with the highest concentration detected in LF-2. Zinc has been historically detected in groundwater from these wells. The recent detected zinc concentrations are within the range of concentrations previously detected from these wells and are significantly less than many previous detections at these same locations. Overall, dissolved zinc concentrations in all four wells have either been decreasing or stable since 2006 ([Figure 5](#)).

Total Dissolved Solids

The total dissolved solids (TDS) concentrations reported for the samples collected in 2018 ranged from 310 milligrams per liter (mg/L) in LF-3 to 770 mg/L in LF-2. These concentrations generally fall within the ranges of TDS observed during previous sampling events ([Figure 6](#)).

3.3 Leachate Quality and Quantity

Based on the concentration of cadmium in the leachate samples collected in 2000, landfill leachate was classified as a Resource Conservation and Recovery Act (RCRA) hazardous waste for off-site disposal. The most recent leachate sample collected in January 2016 indicated that the leachate is still characterized as hazardous waste. Leachate pumping and removal is conducted every 60 to 90 days from the site. All leachate removed from the site to date has been transported and disposed of hazardous waste.

EBMUD has retained a contractor to remove and manage the leachate to comply with Title 27 of CCR, which specifically requires that the hydraulic head on the landfill liner shall be no more than 1 foot at any given time. The contractor measures the water depth in the landfill sump prior to and after pumping. The removal frequency is stepped up or down in accordance with the leachate production rate.

Between January 2001 and June 2018, approximately 709,406 gallons of leachate were removed from the sump using a vacuum truck and transported to an offsite disposal facility, corresponding to an average of approximately 41,729 gallons of leachate extracted and disposed of per year. The quantity of leachate extracted through June 2018 is summarized in [Table 3](#)¹. [Figure 7](#) graphically depicts the incremental and cumulative volume of leachate extracted from January 2001 to June 2018.

[Figure 8](#) shows the extraction frequency was higher earlier on in the life of the landfill and during the springs of 2005 and 2006². Based on data from 2001 to the present, the off-haul rate has decreased from a monthly rate of 10,487 gallons in calendar year 2001 to 1,167 gallons in the first half of 2018. While it used to take less than one week to collect and remove 2,000 gallons, so far in 2018, it is taking 7.4 weeks. [Figure 9](#) compares the amount of leachate removed to local rainfall in terms of water years (WYs). The decreasing rate of leachate removal is apparent here as well. However, the figure also illustrates a general correlation between leachate production and rainfall, suggesting surface water intrusion into the landfill.

At the time of landfill closure, there was estimated to be 1.5 to 2 million gallons of leachate contained within the landfill, based on the residual moisture of the mine waste at the beginning of the removal operation. At a rate of 2,000 gallons every week, the shortest estimated time for complete removal was in excess of 14 years. In actuality, the removal rate has decreased significantly over the years, even if the total available leachate requiring removal likely has increased since landfill closure as a result of rain water intrusion. With repairs and modifications performed to date, leachate production has fallen to approximately 269 gallons per week in June 2018. EBMUD, therefore, expects to continue removing leachate from the landfill into the foreseeable future, albeit at a much reduced rate.

¹ For 2001, only the total monthly leachate quantities are available, without specific amounts for the individual off-haul events.

² Details for the individual off-haul events in 2001 are not available. However, it is reasonable to assume that the frequency of pump-out was high given that the monthly totals were even more than those in 2002.

4.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of monitoring and site inspections performed from 2000 through 2018, there is no evidence of release of landfill leachate to groundwater.

From 2004 to 2018, groundwater sampling has been performed bi-annually. In August and September 2018, water samples were collected and analyzed for the same water quality parameters as during previous sampling events. The analytical data collected to date provide the baseline conditions for both groundwater level and water quality, which indicate that the closed landfill is functioning as designed, with no significant changes observed during this event.

EBMUD will continue to perform bi-annual groundwater sampling and analysis at the site. The groundwater monitoring results will be submitted to the State Water Resources Control Board (SWRCB) in bi-annual reports. The next monitoring report is scheduled to be submitted in September of 2020.

5.0 REFERENCES

California Department of Water Resources. 2018. *California Data Exchange Center – Public Precipitation Monitoring Database* (<https://cdec.water.ca.gov/reportapp/javareports?name=PRECIPMON>).

CH2M HILL. 2000. *Technical Memorandum. Penn Mine Leachate Removal and Treatment Alternatives*. August 3.

TRC. 1999. *Penn Mine Landfill Post-Closure Operations and Maintenance Plan, prepared for East Bay Municipal Utility District and the Central Valley Regional Water Quality Control District*. December.

TRC. 1999. *Penn Mine Landfill As-Built, Sheets 1 through 19*. August

Table 1. Groundwater Elevation Data Summary, Penn Mine Landfill, January 2000 through August 2018

Top of Casing Elevation (MSL)	LF-1		LF-2		LF-3		LF-4	
	407.45		363.87		354.28		377.21	
Date	Depth to Groundwater (feet)	Groundwater Elevation (MSL)	Depth to Groundwater (feet)	Groundwater Elevation (MSL)	Depth to Groundwater (feet)	Groundwater Elevation (MSL)	Depth to Groundwater (feet)	Groundwater Elevation (MSL)
1/21/2000	66.56	340.89	37.74	326.13	27.62	326.66	56.21	321.00
2/24/2000	67.00	340.45	30.50	333.37	14.60	339.68	53.95	323.26
3/17/2000	67.15	340.30	31.22	332.65	15.05	339.23	52.92	324.29
4/24/2000	70.05	337.40	31.30	332.57	15.45	338.83	61.25	315.96
5/31/2000	67.50	339.95	31.90	331.97	16.27	338.01	53.45	323.76
6/23/2000	67.75	339.70	33.80	330.07	17.15	337.13	53.35	323.86
7/19/2000	69.52	337.93	37.34	326.53	18.02	336.26	55.05	322.16
8/24/2000	68.57	338.88	38.66	325.21	25.92	328.36	53.95	323.26
9/18/2000	68.82	338.63	39.78	324.09	26.82	327.46	54.10	323.11
10/20/2000	69.20	338.25	40.61	323.26	28.78	325.50	59.31	317.90
11/20/2000	69.00	338.45	36.10	327.77	19.70	334.58	56.00	321.21
12/19/2000	70.12	337.33	35.90	327.97	19.72	334.56	54.90	322.31
1/22/2001	70.70	336.75	31.15	332.72	19.60	334.68	55.20	322.01
2/26/2001	70.60	336.85	30.80	333.07	14.86	339.42	54.40	322.81
3/22/2001	70.80	336.65	30.91	332.96	15.14	339.14	53.38	323.83
4/16/2001	70.65	336.80	31.22	332.65	15.98	338.30	53.35	323.86
5/14/2001	70.72	336.73	32.67	331.20	17.00	337.28	53.63	323.58
6/18/2001	71.10	336.35	35.93	327.94	20.80	333.48	53.64	323.57
7/16/2001	71.15	336.30	38.31	325.56	25.58	328.70	53.83	323.38
8/22/2001	71.58	335.87	40.44	323.43	27.45	326.83	54.20	323.01
9/21/2001	71.82	335.63	41.20	322.67	28.20	326.08	54.45	322.76
10/22/2001	72.57	334.88	41.92	321.95	29.10	325.18	55.17	322.04
11/21/2001	72.57	334.88	42.21	321.66	27.32	326.96	55.27	321.94
12/20/2001	72.80	334.65	35.80	328.07	24.90	329.38	55.37	321.84
1/14/2002	72.98	334.47	31.35	332.52	15.30	338.98	54.39	322.82
2/21/2002	73.00	334.45	30.70	333.17	15.21	339.07	54.60	322.61
3/15/2002	72.40	335.05	30.32	333.55	14.20	340.08	53.35	323.86
4/19/2002	71.05	336.40	30.90	332.97	15.98	338.30	52.80	324.41
5/13/2002	70.85	336.60	31.70	332.17	17.00	337.28	52.83	324.38
6/13/2002	71.17	336.28	34.09	329.78	19.56	334.72	52.80	324.41
7/22/2002	75.57	331.88	37.75	326.12	26.08	328.20	62.00	315.21
8/22/2002	72.13	335.32	39.62	324.25	27.41	326.87	53.70	323.51

Table 1. Groundwater Elevation Data Summary, Penn Mine Landfill, January 2000 through August 2018 (continued)

Top of Casing Elevation (MSL)	LF-1		LF-2		LF-3		LF-4	
	407.45		363.87		354.28		377.21	
Date	Depth to Groundwater (feet)	Groundwater Elevation (MSL)	Depth to Groundwater (feet)	Groundwater Elevation (MSL)	Depth to Groundwater (feet)	Groundwater Elevation (MSL)	Depth to Groundwater (feet)	Groundwater Elevation (MSL)
9/26/2002	72.20	335.25	41.00	322.87	28.60	325.68	53.70	323.51
10/28/2002	72.58	334.87	NM	NC	NM	NC	NM	NC
11/22/2002	72.85	334.60	41.95	321.92	29.25	325.03	54.55	322.66
12/23/2002	71.80	335.65	37.81	326.06	23.00	331.28	54.40	322.81
1/23/2003	73.30	334.15	32.75	331.12	18.12	336.16	54.80	322.41
2/25/2003	73.50	333.95	32.12	331.75	17.90	336.38	55.20	322.01
3/24/2003	73.65	333.80	32.12	331.75	18.86	335.42	55.00	322.21
4/17/2003	73.72	333.73	31.65	332.22	19.62	334.66	54.92	322.29
5/16/2003	74.50	332.95	31.82	332.05	19.80	334.48	55.00	322.21
6/30/2003	74.10	333.35	35.90	327.97	26.25	328.03	55.42	321.79
7/24/2003	80.15	327.30	38.35	325.52	27.30	326.98	64.20	313.01
8/22/2003	74.20	333.25	40.36	323.51	28.30	325.98	55.92	321.29
9/18/2003	74.20	333.25	41.39	322.48	29.08	325.20	55.78	321.43
10/16/2003	75.30	332.15	42.90	320.97	30.40	323.88	55.35	321.86
11/25/2003	74.52	332.93	42.84	321.03	30.97	323.31	56.35	320.86
12/23/2003	74.40	333.05	37.60	326.27	22.90	331.38	56.40	320.81
1/26/2004	74.85	332.60	32.00	331.87	17.30	336.98	55.30	321.91
2/24/2004	74.70	332.75	30.85	333.02	15.88	338.40	54.55	322.66
3/22/2004	73.34	334.11	29.64	334.23	15.95	338.33	53.20	324.01
4/15/2004	72.40	335.05	30.12	333.75	17.50	336.78	53.35	323.86
5/21/2004	72.00	335.45	33.60	330.27	19.20	335.08	53.10	324.11
6/24/2004	71.70	335.75	36.16	327.71	25.70	328.58	53.27	323.94
7/29/2004	71.80	335.65	39.10	324.77	27.30	326.98	53.40	323.81
8/12/2004	71.90	335.55	39.80	324.07	27.83	326.45	53.50	323.71
9/28/2004	72.35	335.10	41.70	322.17	29.18	325.10	54.05	323.16
10/29/2004	72.50	334.95	41.94	321.93	27.77	326.51	54.32	322.89
11/19/2004	72.60	334.85	39.72	324.15	23.20	331.08	54.60	322.61
12/29/2004	72.85	334.60	35.80	328.07	29.50	324.78	54.70	322.51
1/26/2005	73.02	334.43	30.00	333.87	15.87	338.41	53.00	324.21
2/23/2005	71.58	335.87	28.65	335.22	14.00	340.28	51.55	325.66
3/18/2005	69.95	337.50	28.90	334.97	14.90	339.38	50.30	326.91
4/29/2005	67.60	339.85	29.70	334.17	15.85	338.43	48.80	328.41

Table 1. Groundwater Elevation Data Summary, Penn Mine Landfill, January 2000 through August 2018 (continued)

Top of Casing Elevation (MSL)	LF-1		LF-2		LF-3		LF-4	
	407.45		363.87		354.28		377.21	
Date	Depth to Groundwater (feet)	Groundwater Elevation (MSL)	Depth to Groundwater (feet)	Groundwater Elevation (MSL)	Depth to Groundwater (feet)	Groundwater Elevation (MSL)	Depth to Groundwater (feet)	Groundwater Elevation (MSL)
5/31/2005	67.00	340.45	31.20	332.67	17.60	336.68	49.60	327.61
6/23/2005	66.65	340.80	32.20	331.67	19.20	335.08	49.90	327.31
7/22/2005	66.90	340.55	34.65	329.22	24.70	329.58	50.35	326.86
8/18/2005	66.75	340.70	34.40	329.47	26.60	327.68	50.50	326.71
9/19/2005	67.00	340.45	36.00	327.87	27.50	326.78	51.00	326.21
10/28/2005	68.00	339.45	39.60	324.27	27.50	326.78	52.00	325.21
11/7/2005	68.10	339.35	39.90	323.97	28.80	325.48	52.10	325.11
12/4/2005	68.70	338.75	39.95	323.92	28.40	325.88	52.60	324.61
1/26/2006	68.72	338.73	27.40	336.47	14.41	339.87	50.68	326.53
2/16/2006	67.40	340.05	29.60	334.27	16.70	337.58	49.66	327.55
3/13/2006	66.18	341.27	28.50	335.37	14.05	340.23	49.24	327.97
4/14/2006	63.79	343.66	24.88	338.99	12.50	341.78	46.05	331.16
5/4/2006	67.00	340.45	31.20	332.67	17.60	336.68	49.60	327.61
5/15/2006	61.55	345.90	29.20	334.67	15.41	338.87	43.20	334.01
6/22/2006	60.50	346.95	29.42	334.45	17.45	336.83	45.63	331.58
7/25/2006	60.73	346.72	34.80	329.07	20.83	333.45	46.92	330.29
8/14/2006	60.73	346.72	34.80	329.07	20.83	333.45	46.92	330.29
9/21/2006	61.58	345.87	37.82	326.05	26.90	327.38	48.27	328.94
10/23/2006	62.32	345.13	38.80	325.07	27.78	326.50	49.10	328.11
11/21/2006	62.81	344.64	39.12	324.75	28.35	325.93	49.70	327.51
12/18/2006	62.92	344.53	39.40	324.47	27.42	326.86	50.14	327.07
1/16/2007	63.90	343.55	35.50	328.37	22.30	331.98	50.70	326.51
2/6/2007	64.50	342.95	35.30	328.57	22.80	331.48	51.10	326.11
3/7/2007	64.80	342.65	29.90	333.97	16.60	337.68	50.80	326.41
4/3/2007	64.40	343.05	30.90	332.97	17.90	336.38	50.20	327.01
6/13/2007	63.90	343.55	34.90	328.97	20.50	333.78	50.60	326.61
7/18/2007	64.30	343.15	37.90	325.97	26.40	327.88	50.90	326.31
8/18/2007	64.50	342.95	39.10	324.77	27.40	326.88	51.20	326.01
9/5/2007	64.80	342.65	40.20	323.67	28.30	325.98	51.40	325.81
10/18/2007	65.60	341.85	41.20	322.67	29.50	324.78	52.30	324.91
12/5/2007	66.20	341.25	41.50	322.37	30.00	324.28	53.00	324.21
1/2/2008	66.60	340.85	39.50	324.37	23.90	330.38	53.30	323.91

Table 1. Groundwater Elevation Data Summary, Penn Mine Landfill, January 2000 through August 2018 (continued)

Top of Casing Elevation (MSL)	LF-1		LF-2		LF-3		LF-4	
	407.45		363.87		354.28		377.21	
Date	Depth to Groundwater (feet)	Groundwater Elevation (MSL)	Depth to Groundwater (feet)	Groundwater Elevation (MSL)	Depth to Groundwater (feet)	Groundwater Elevation (MSL)	Depth to Groundwater (feet)	Groundwater Elevation (MSL)
2/7/2008	66.90	340.55	29.90	333.97	15.70	338.58	52.00	325.21
3/5/2008	66.60	340.85	30.20	333.67	16.30	337.98	51.00	326.21
4/3/2008	65.70	341.75	31.00	332.87	17.70	336.58	50.90	326.31
5/5/2008	65.00	342.45	32.60	331.27	18.80	335.48	50.80	326.41
5/14/2008	64.95	342.50	33.18	330.69	19.51	334.77	50.91	326.30
6/4/2008	64.90	342.55	34.70	329.17	22.80	331.48	51.10	326.11
7/2/2008	65.10	342.35	37.20	326.67	26.50	327.78	51.40	325.81
8/6/2008	65.50	341.95	39.70	324.17	28.00	326.28	51.90	325.31
9/3/2008	65.80	341.65	40.70	323.17	28.70	325.58	52.20	325.01
10/3/2008	66.30	341.15	41.40	322.47	29.50	324.78	52.80	324.41
11/18/2008	67.10	340.35	42.10	321.77	30.20	324.08	53.60	323.61
12/4/2008	67.40	340.05	42.10	321.77	30.60	323.68	53.90	323.31
1/7/2009	67.80	339.65	42.00	321.87	27.30	326.98	54.20	323.01
2/3/2009	68.20	339.25	37.60	326.27	23.10	331.18	54.40	322.81
3/2/2009	68.50	338.95	33.10	330.77	16.60	337.68	53.50	323.71
4/23/2009	68.30	339.15	31.90	331.97	17.90	336.38	51.90	325.31
6/3/2009	68.20	339.25	34.30	329.57	20.00	334.28	52.00	325.21
7/22/2009	68.40	339.05	38.60	325.27	27.10	327.18	52.30	324.91
9/2/2009	68.60	338.85	41.00	322.87	28.70	325.58	52.70	324.51
10/7/2009	68.90	338.55	42.00	321.87	29.60	324.68	53.10	324.11
11/10/2009	69.30	338.15	42.50	321.37	30.10	324.18	53.60	323.61
12/2/2009	69.50	337.95	42.70	321.17	30.50	323.78	53.90	323.31
1/13/2010	69.90	337.55	41.40	322.47	26.90	327.38	54.40	322.81
3/3/2010	70.00	337.45	30.50	333.37	15.10	339.18	52.90	324.31
4/15/2010	70.00	337.45	30.80	333.07	16.30	337.98	52.50	324.71
5/5/2010	69.60	337.85	31.00	332.87	16.00	338.28	50.80	326.41
6/1/2010	68.70	338.75	31.50	332.37	17.40	336.88	50.20	327.01
6/15/2010	68.45	339.00	32.60	331.27	18.00	336.28	50.32	326.89
7/6/2010	68.10	339.35	34.70	329.17	19.50	334.78	50.50	326.71
8/3/2010	68.00	339.45	37.30	326.57	25.30	328.98	50.80	326.41
9/1/2010	67.90	339.55	39.30	324.57	27.20	327.08	51.10	326.11
11/2/2010	68.50	338.95	41.20	322.67	28.20	326.08	52.10	325.11

Table 1. Groundwater Elevation Data Summary, Penn Mine Landfill, January 2000 through August 2018 (continued)

Top of Casing Elevation (MSL)	LF-1		LF-2		LF-3		LF-4	
	407.45		363.87		354.28		377.21	
Date	Depth to Groundwater (feet)	Groundwater Elevation (MSL)	Depth to Groundwater (feet)	Groundwater Elevation (MSL)	Depth to Groundwater (feet)	Groundwater Elevation (MSL)	Depth to Groundwater (feet)	Groundwater Elevation (MSL)
2/2/2011	68.50	338.95	29.40	334.47	15.50	338.78	48.60	328.61
5/1/2011	62.10	345.35	29.90	333.97	16.00	338.28	43.30	333.91
8/3/2011	61.60	345.85	35.50	328.37	25.40	328.88	47.60	329.61
11/3/2011	64.30	343.15	40.70	323.17	29.20	325.08	50.80	326.41
2/1/2012	64.90	342.55	38.20	325.67	26.40	327.88	51.50	325.71
5/3/2012	65.90	341.55	30.70	333.17	16.80	337.48	50.60	326.61
5/17/2012	65.86	341.59	31.33	332.54	17.53	336.75	50.25	326.96
8/1/2012	65.90	341.55	38.20	325.67	24.60	329.68	50.80	326.41
11/11/2012	66.50	340.95	41.70	322.17	29.50	324.78	52.00	325.21
2/5/2013	68.30	339.15	32.40	331.47	18.70	335.58	52.30	324.91
5/2/2013	66.90	340.55	57.30	306.57	24.80	329.48	51.40	325.81
8/14/2013	67.50	339.95	41.00	322.87	29.30	324.98	52.70	324.51
11/7/2013	68.20	339.25	42.90	320.97	31.00	323.28	53.90	323.31
2/6/2014	69.60	337.85	43.50	320.37	32.30	321.98	55.10	322.11
5/6/2014	70.20	337.25	34.50	329.37	20.30	333.98	55.40	321.81
8/6/2014	71.60	335.85	42.90	320.97	30.00	324.28	57.20	320.01
11/5/2014	71.20	336.25	56.90	306.97	31.40	322.88	43.60	333.61
5/1/2015	71.60	335.85	33.20	330.67	19.20	335.08	53.20	324.01
8/4/2015	71.50	335.95	41.00	322.87	29.00	325.28	54.00	323.21
11/18/2015	72.70	334.75	44.60	319.27	30.50	323.78	56.30	320.91
2/9/2016	72.30	335.15	30.60	333.27	15.00	339.28	55.40	321.81
5/3/2016	66.10	341.35	30.40	333.47	15.40	338.88	49.40	327.81
7/20/2016	64.29	343.16	36.00	327.87	23.85	330.43	50.72	326.49
8/1/2016	66.70	340.75	37.00	326.87	25.50	328.78	62.60	314.61
8/28/2018	58.37	349.08	39.69	324.18	27.29	326.99	49.51	327.70

Note:

MSL = feet above mean sea level

NC = not calculated

NM = not measured

Table 2A. Groundwater, Subdrain, and Leachate Laboratory Analysis Summary - Penn Mine Landfill

WELL ID	Sample Date	Sample Type	Depth to Water (feet)	FIELD PARAMETER READINGS				GENERAL CHEMISTRY PARAMETERS			LAB.
				Temp. (°C)	pH	E.C. (umhos/cm)	Turbidity (NTU)	TSS (mg/L)	TDS (mg/L)	Alkalinity (mg/L)	
LF-1	10/14/1999	P	64.2	22.8	7.65	803	--	--	443	297	APPL
	10/20/1999	P	67.97	19.7	6.94	709	29.6	U 4	400	310	MCC/GEO
	10/20/1999	S	--	--	--	--	--	2.6	420	290	EBMUD
	1/21/2000	P	66.56	25	7.72	633	5.2	3.5	440	290	EBMUD
	4/21/2000	P	67.02	19	7.5	650	3.3	47	460	320	EBMUD
	7/20/2000	P	69.52	21.4	7.13	708	12.2	3	450	310	EBMUD
	10/19/2000	P	69.82	21.9	7.41	661	5.23	1.4	440	330	EBMUD
	10/19/2000	R	--	--	--	--	--	U 1.2	440	320	EBMUD
	1/18/2001	P	72.12	17.3	7.53	663	12.6	U 1.5	450	300	EBMUD
	4/17/2001	P	70.75	19	7.09	644	0.6	1.7	450	320	EBMUD
	7/26/2001	P	71.71	19.7	7.6	741	3	4.3	430	300	EBMUD
	10/17/2001	P	72.21	19.6	7.6	658	3	3	450	310	EBMUD
	1/31/2002	P	--	21	7.6	750	1	10	450	300	EBMUD
	1/31/2002	R	--	--	--	--	--	11	440	300	EBMUD
	7/18/2002	P	--	21	7.1	720	6	U 1.5	460	320	EBMUD
	1/31/2003	P	--	19	7.3	730	--	4.7	470	330	EBMUD
	7/18/2003	P	74.20	21	7.7	720	1	11	470	340	EBMUD
	2/24/2004	P	74.70	19	6.36	589	4	2.4	140	120	EBMUD
	8/24/2004	P	--	19.4	7.31	277	--	6	340	190	EBMUD
	5/4/2006	P	69.19	20.1	7.45	230	2	U 6.2	140	110	EBMUD
	5/14/2008	P	64.95	18.1	7.11	718	4	5.7	320	230	EBMUD
	6/15/2010	P	68.45	18.9	7.14	668	3	U 2.5	330	240	EBMUD
	5/17/2012	P	65.86	22.4	7.58	860	8.31	16	480	340	EBMUD
	6/9/2014	P	69.94	20.14	7.33	833	11.7	96	470	340	EBMUD
	7/20/2016	P	131.4	20.5	7.99	795	5.5	4.8	480	350	EBMUD
	8/29/2018	P	58.37	20.2	7.08	986	8.4	480	580	340	EBMUD
LF-2	10/14/1999	P	38.68	24.9	7.25	630	--	--	365	253	APPL
	10/20/1999	P	40.68	20.3	6.65	547	59.6	U 4	310	260	MCC/GEO
	10/20/1999	S	--	--	--	--	--	4.4	310	230	EBMUD
	1/21/2000	P	37.74	24.8	7.39	479	12.1	2.7	380	230	EBMUD
	4/21/2000	P	31.14	19	5.9	480	1.7	15	370	250	EBMUD
	7/20/2000	P	37.34	21.7	6.71	542	7.6	U 3.0	380	260	EBMUD
	10/19/2000	P	41.04	21.4	7.16	593	14.53	1.2	380	270	EBMUD
	1/18/2001	P	33.43	17.9	7.34	588	3.04	U 6.0	420	260	EBMUD
	1/18/2001	R	--	--	--	--	--	U 2.0	390	260	EBMUD
	4/17/2001	P	31.31	19.3	6.66	554	0.7	U 1.5	380	260	EBMUD
	7/26/2001	P	39.39	19.8	6.8	627	8	U 2.0	380	260	EBMUD
	10/17/2001	P	42.02	19.8	7.17	678	3	15	400	280	EBMUD
	10/17/2001	R	--	--	--	--	--	26	400	270	EBMUD
	1/31/2002	P	--	20	6.8	640	2	U 1.2	440	270	EBMUD
	7/18/2002	P	--	21	6.4	690	7	U 1.5	490	280	EBMUD
	7/18/2002	R	--	--	--	--	--	1.5	490	280	EBMUD
	1/30/2003	P	--	20	6.6	710	--	U 2.0	460	280	EBMUD
	7/18/2003	P	41.39	21	6.9	660	1	2.7	470	290	EBMUD

Table 2A. Groundwater, Subdrain, and Leachate Laboratory Analysis Summary - Penn Mine Landfill (continued)

WELL ID	Sample Date	Sample Type	Depth to Water (feet)	FIELD PARAMETER READINGS				GENERAL CHEMISTRY PARAMETERS			LAB.
				Temp. (°C)	pH	E.C. (umhos/cm)	Turbidity (NTU)	TSS (mg/L)	TDS (mg/L)	Alkalinity (mg/L)	
LF-2	2/24/2004	P	30.85	19.7	8.02	709	4	U 1.2	450	320	EBMUD
	8/24/2004	P	--	20.1	7.16	437	--	6.3	590	370	EBMUD
	5/4/2006	R	28.06	20.3	6.78	687	4	U 10	490	300	EBMUD
	5/14/2008	P	33.18	18.8	6.37	1013	6	3	710	370	EBMUD
	6/15/2010	P	32.6	19.4	6.33	999	12	U 1.7	690	360	EBMUD
	5/17/2012	P	31.33	20.5	6.47	1053	0.67	1.4	690	360	EBMUD
	6/9/2014	P	37.43	19.79	6.38	1113	0.86	< 1.2	720	420	EBMUD
	7/20/2016	P	36.00	20.03	6.83	907	5.9	23	670	350	EBMUD
LF-3	8/29/2018	P	39.69	20.2	9.06	1062	0.2	220	770	340	EBMUD
	10/14/1999	P	27.13	24.9	7.75	712	--	--	421	159	EBMUD
	10/20/1999	P	29.05	19.1	7.11	592	49.2	6	310	170	MCC/GEO
	10/20/1999	S	--	--	--	--	--	2.4	390	150	EBMUD
	1/21/2000	P	27.62	25.1	7.77	549	27.62	10	440	150	EBMUD
	4/21/2000	P	15.5	19	7.3	550	2.2	7.2	440	390	EBMUD
	7/20/2000	P	21.02	19.2	7.1	760	16.1	4	460	160	EBMUD
	10/19/2000	P	28.22	21.4	7	643	0.7	U 1.2	450	170	EBMUD
	1/18/2001	P	22.42	18.3	6.2	168	6.9	U 3.0	110	52	EBMUD
	4/17/2001	P	16.16	19.1	7.06	254	1.3	U 1.5	180	80	EBMUD
	7/26/2001	P	26.7	20.2	6.05	291	7	3	140	81	EBMUD
	10/17/2001	P	28.95	19.8	7.25	198	1	6	150	83	EBMUD
	1/31/2002	P	--	20	7.7	520	2	6.5	210	80	EBMUD
	7/18/2002	P	--	20	6.7	580	10	3.2	430	150	EBMUD
	1/30/2003	P	--	20	6.9	190	--	5.5	170	74	EBMUD
	7/18/2003	P	29.08	20	7.2	450	1	3.7	350	150	EBMUD
	2/24/2004	P	15.88	19.7	7.93	524	6	2.4	370	150	EBMUD
	8/24/2004	P	--	19.7	7.13	233	--	18	300	130	EBMUD
	5/4/2006	R	14.50	19.9	7.02	99	30	U 10	84	56	EBMUD
	5/14/2008	P	19.51	17.8	6.97	348	6	2.5	220	140	EBMUD
	6/15/2010	P	18.00	17.9	6.94	355	5	U 2.5	220	120	EBMUD
	5/17/2012	P	17.53	21.5	7.69	474	6.99	15	270	160	EBMUD
	6/9/2014	P	23.12	20.16	7.48	435	9.1	11	270	170	EBMUD
	7/20/2016	P	86.2	20.79	7.98	476	-1.5	3.2	290	150	EBMUD
	9/6/2018	P	27.29	20.2	7.61	466.9	9.8	19	310	170	EBMUD
LF-4	10/14/1999	P	55.55	23.8	7.79	801	--	--	486	172	APPL
	10/20/1999	P	73.73	19.1	7.22	718	47.1	10	480	340	MCC/GEO
	10/20/1999	R	--	--	--	--	--	13	440	340	MCC/GEO
	10/20/1999	S	--	--	--	--	--	5.6	500	220	EBMUD
	10/20/1999	S, R	--	--	--	--	--	13	490	320	EBMUD
	1/21/2000	P	56.21	25.6	7.69	704	74.2	190	530	360	EBMUD
	1/21/2000	R	--	--	--	--	--	200	510	360	EBMUD
	4/21/2000	P	57.02	19	6.9	710	42	350	520	370	EBMUD
	4/21/2000	R	--	--	--	--	--	700	550	410	EBMUD
	7/20/2000	P	55.05	19.9	6.83	856	7.1	14	540	420	EBMUD
	7/20/2000	R	--	--	--	--	--	36	540	420	EBMUD

Table 2A. Groundwater, Subdrain, and Leachate Laboratory Analysis Summary - Penn Mine Landfill (continued)

WELL ID	Sample Date	Sample Type	Depth to Water (feet)	FIELD PARAMETER READINGS				GENERAL CHEMISTRY PARAMETERS			LAB.
				Temp. (°C)	pH	E.C. (umhos/cm)	Turbidity (NTU)	TSS (mg/L)	TDS (mg/L)	Alkalinity (mg/L)	
LF-4	10/19/2000	P	55	20.7	7.41	755	8.5	14	530	420	EBMUD
	1/18/2001	P	55.25	17.3	6.9	821	30.2	210	540	410	EBMUD
	4/17/2001	P	53.5	18.6	7.19	778	0.9	120	540	420	EBMUD
	4/17/2001	R	--	--	--	--	--	210	530	420	EBMUD
	7/26/2001	P	54.32	19.7	6.79	902	140	230	530	410	EBMUD
	7/26/2001	R	--	--	--	--	--	9	530	410	EBMUD
	10/17/2001	P	54.94	19.7	7.08	930	6	130	550	410	EBMUD
	1/31/2002	P	--	21	7.5	840	1	9.3	550	380	EBMUD
	7/18/2002	P	--	20	7	820	12	44	550	380	EBMUD
	1/30/2003	P	--	20	7.1	810	--	33	540	380	EBMUD
	7/18/2003	P	55.78	20	7.3	820	6	36	540	400	EBMUD
	2/24/2004	P	54.55	19.3	7.9	850	31	30	550	440	EBMUD
	8/24/2004	P	--	19.8	7.74	435	--	110	530	450	EBMUD
	5/4/2006	P	41.68	20.5	7.23	1290	17	240	750	650	EBMUD
	5/14/2008	P	50.91	18	6.98	871	120	340	580	460	EBMUD
	6/15/2010	P	50.32	17.8	6.91	822	42	U 2	570	470	EBMUD
	5/17/2012	P	50.25	22.4	7.23	1013	7.41	24	590	500	EBMUD
	6/9/2014	P	55.22	20.31	7.08	926	29.4	66	570	460	EBMUD
	7/20/2016	P	150.0	24.57	7.53	1091	9.8	8.8	660	560	EBMUD
	8/29/2018	P	49.51	20.9	2.58	1062	7.7	9.0	630	470	EBMUD
Subdrain	9/23/1998	P	--	--	--	787	--	--	515	289	APPL
	2/4/1999	P	--	--	7.9	722	--	--	--	--	APPL
	4/28/1999	P	--	--	7.5	467	--	--	--	--	APPL
	7/19/1999	P	--	--	7.8	849	--	--	--	--	APPL
	3/1/2000	P	--	16	7.08	691	8.4	U 1.2	450	280	EBMUD
	2006 - 2018	X	--	--	--	--	--	--	--	--	--
Leachate	8/24/1999	P	--	--	--	--	--	--	--	--	APPL
	3/30/2000	P	--	--	3.28	--	--	--	--	--	MCC
	6/5/2000	P	--	--	3.6	--	--	--	--	--	MCC
	10/25/2000	P	--	--	3.7	--	--	--	--	--	Chromalab
	10/25/2000	P	--	--	3.8	--	--	--	--	--	Chromalab
	10/25/2000	P	--	--	3.7	--	--	--	--	--	Chromalab

Note:

µg/L micrograms per liter

mg/L milligrams per liter

-- Not analyzed/available/applicable

MCC McCampbell Analytical

GEO GeoAnalytical Laboratories

EBMUD District Laboratory

APPL Agriculture & Priority Pollutants Laboratories

B Analyte detected in method blank

P Primary sample

R Replicate sample

S Split sample

U Not detected

X Insufficient water present for sample collection during bi-annual sampling from 2006 - 2018.

Table 2B. Groundwater, Subdrain, and Leachate Laboratory Analysis Summary - Penn Mine Landfill

WELL ID	Sample Date	Sample Type	Depth to Water (feet)	DISSOLVED METALS							TOTAL METALS						LAB
				Al (µg/L)	Cd (µg/L)	Cu (µg/L)	Hg (µg/L)	Ni (µg/L)	Pb (µg/L)	Zn (µg/L)	Sulfate (mg/L)	Na (µg/L)	K (µg/L)	Mg (µg/L)	Ca (µg/L)	Chloride (mg/L)	
LF-1	10/14/1999	P	64.2	U 100	U 5	U 5	U 0.2	U 5	U 3	U 50	21.3	48400	5100	44300	40200	45.3	APPL
	10/20/1999	P	67.97	300	U 5	U 5	U 0.8	U 50	U 5	U 50	24	40000	5400	44000	37000	40	MCC/GEO
	10/20/1999	S	--	19.9	0.578	U 2.08	U 0.02	U 5.2	22.4	12.1	23	B 52000	5830	B 49800	B 41400	46	EBMUD
	1/21/2000	P	66.56	U 10.4	U 0.832	5.9	U 0.02	U 5.2	U 9.36	10.8	25	52200	6210	B 50400	40000	41	EBMUD
	4/21/2000	P	67.02	23.8	U 0.728	6.27	U 0.02	2.38	11.2	B 4.18	31	69800	6640	44700	33900	42	EBMUD
	7/20/2000	P	69.52	43	U 0.728	6.55	U 0.02	21.9	U 3.0	24	27	61100	6380	B 47300	41100	43	EBMUD
	10/19/2000	P	69.82	26.3	U 0.728	9.26	U 0.02	12.5	11.7	5.99	32	63300	6180	43600	35100	42	EBMUD
	10/19/2000	R	--	26.3	U 0.728	7.24	U 0.02	10.9	8.72	5.38	32	63600	6270	45100	35100	43	EBMUD
	1/18/2001	P	72.12	B 29.7	U 0.728	7.97	U 0.02	6.17	12	278	400	47000	6730	36500	33800	420	EBMUD
	4/17/2001	P	70.75	29.4	U 0.728	7.61	U 0.02	B 14.6	6.31	81.8	350	B 69000	6430	B 44800	35100	250	EBMUD
	7/26/2001	P	71.71	U 9.0	U 0.728	8.73	U 0.02	7.92	U 0.3	117	31	66700	6400	41100	34400	34	EBMUD
	10/17/2001	P	72.21	18.2	U 0.728	8.41	U 0.02	5.92	U 0.3	91.3	32	69600	6650	B 40800	B 33900	34	EBMUD
	1/31/2002	P	--	26.9	U 0.728	10.4	U 0.02	U 2.08	U 0.9	57.8	28	77000	7270	41900	31400	26	EBMUD
	1/31/2002	R	--	31	U 0.728	10.1	U 0.02	U 2.08	U 0.90	55.7	30	79500	7170	39900	31900	26	EBMUD
	7/18/2002	P	--	15	--	9.3	U 0.02	--	U 0.90	46.6	76	75000	6780	44700	31900	69	EBMUD
	1/30/2003	P	--	U 10.4	--	9.53	U 0.02	--	U 0.90	9.60	30	77500	6340	43100	32100	29	EBMUD
	7/18/2003	P	74.20	U 10.4	--	U 6.24	U 0.02	--	U 0.90	2.95	32	76500	6650	45000	B 35400	29	EBMUD
	2/24/2004	P	74.70	U 10.4	--	U 6.24	U 0.02	--	U 0.90	164	5.8	40500	7950	21700	33700	3.6	EBMUD
	2/24/2004	R	--	79.7	--	9.85	--	--	--	278	--	21600	8880	7980	31000	--	EBMUD
	8/24/2004	P	--	U 8.32	--	14.7	U 0.02	--	U 0.8	111	24	54700	7570	28500	B 33500	19	EBMUD
	8/24/2004	R	--	152	--	25.8	--	--	--	196	--	51600	7630	24900	33200	--	EBMUD
	5/4/2006	P	69.19	48	--	9.42	U 0.02	--	3.4	260	32	8900	11000	3300	29000	29	EBMUD
	5/4/2006	R	--	U 14	--	U 8.32	--	--	--	230	32	8000	10000	3000	28000	29	EBMUD
	5/14/2008	P	64.95	U 22	--	13	U 0.02	--	--	160	15	48000	8800	22000	33000	23	EBMUD
	6/15/2010	P	68.45	U 17	--	16.6	U 0.02	--	--	91	19	48000	9200	25000	33000	23	EBMUD
	5/17/2012	P	65.86	15.2	--	U 7.31	U 0.02	--	--	U 6.27	44	71200	5590	41300	32500	40	EBMUD
	6/9/2014	P	69.94	U 11.4	--	U 6.24	U 0.04	--	--	U 4.16	54	66700	6380	48600	41500	34	EBMUD
	7/21/2016	P	64.29	U 7.28	--	U 5.20	--	--	--	U 0.520	36	55500	6390	44000	B 40000	33	EBMUD
	8/29/2018	P	58.37	U 14.0	--	4.89	--	--	--	1.88	52	47900	5390	50500	43000	18	EBMUD
LF-2	10/14/1999	P	38.68	U 100	U 5	U 5	U 0.2	U 5	U 3	U 50	34.5	20200	1300	27300	61200	13.2	APPL
	10/20/1999	P	40.68	500	U 5	U 5	U 0.8	U 50	U 5	U 50	33	21000	1600	29000	61000	13	MCC/GEO
	10/20/1999	S	--	U 10.4	U 0.4	U 2.08	U 0.02	U 5.2	9.43	6.12	35	B 22900	1870	B 30500	B 61900	15	EBMUD
	1/21/2000	P	37.74	U 10.4	U 0.832	3.04	B 0.04	U 5.2	10.9	U 50	35	20300	2010	B 32400	63600	12	EBMUD
	4/21/2000	P	31.14	26.8	U 0.728	U 3.12	0.02	U 2.08	8.96	U 50	35	18700	763	30600	61500	15	EBMUD
	7/20/2000	P	37.34	55.2	U 0.728	U 3.12	U 0.02	2.89	18.1	U 50	28	19000	1110	B 29800	72700	14	EBMUD
	10/19/2000	P	41.04	34.7	U 0.728	U 3.12	U 0.02	U 2.08	6.5	U 50	37	18900	1360	29300	65900	33	EBMUD
	1/18/2001	P	33.43	B 38.4	U 0.728	U 3.12	U 0.02	U 2.08	11.8	78.1	400	17200	4390	29800	65800	550	EBMUD
	1/18/2001	R	--	B 37.2	U 0.728	U 3.12	U 0.02	U 2.08	14.8	80	300	17100	4670	28700	64400	220	EBMUD
	4/17/2001	P	31.31	31.4	U 0.728	U 3.12	0.02	B 5.65	U 5.20	5.52	510	B 18000	682	B 30000	65900	320	EBMUD
	7/26/2001	P	39.39	64.7	U 0.728	U 3.12	U 0.02	U 2.08	U 0.30	5.8	34	19800	1120	31100	70100	15	EBMUD
	10/17/2001	P	42.02	41.4	U 0.728	U 3.12	U 0.02	U 2.08	U 0.30	8.98	33	20400	1580	B 32300	B 72800	15	EBMUD
	10/17/2001	R	--	33	U 0.728	U 3.12	U 0.02	3.76	U 0.30	6.41	34	20400	1400	B 32600	B 72000	15	EBMUD
	1/31/2002	P	--	45.6	U 0.728	U 3.12	U 0.02	U 2.08	U 0.90	3.1	41	21700	633	35100	77800	16	EBMUD
	7/18/2002	P	--	8.96	--	U 3.12	U 0.02	--	U 0.90	10.7	60	22600	583	42700	85300	54	EBMUD

Table 2B. Groundwater, Subdrain, and Leachate Laboratory Analysis Summary - Penn Mine Landfill

WELL ID	Sample Date	Sample Type	Depth to Water (feet)	DISSOLVED METALS							TOTAL METALS						LAB
				Al (µg/L)	Cd (µg/L)	Cu (µg/L)	Hg (µg/L)	Ni (µg/L)	Pb (µg/L)	Zn (µg/L)	Sulfate (mg/L)	Na (µg/L)	K (µg/L)	Mg (µg/L)	Ca (µg/L)	Chloride (mg/L)	
LF-2	7/18/2002	R	--	U 6.24	--	U 3.12	U 0.02	--	U 0.90	18.2	55	22100	606	42500	84500	20	EBMUD
	1/30/2003	P	--	1740	--	U 6.24	U 0.02	--	U 0.90	6.34	47	21300	733	39100	85500	24	EBMUD
	7/18/2003	P	41.39	15.1	--	U 6.24	U 0.02	--	U 0.90	3.33	51	20800	603	38900	B 84900	280	EBMUD
	2/24/2004	P	30.85	U 10.4	--	U 6.24	U 0.02	--	U 0.90	3.51	49	21100	701	40500	86500	23	EBMUD
	2/24/2004	R	--	28.5	--	4.4	--	--	--	B 17	--	20800	652	38500	B 79700	--	EBMUD
	8/24/2004	P	--	U 8.32	--	4.35	U 0.02	--	U 0.8	17.3	53	23400	1590	45400	B 99500	26	EBMUD
	8/24/2004	R	--	98.2	--	10.4	--	--	--	31.8	--	25100	1880	46900	101000	--	EBMUD
	5/4/2006	P	28.06	U 14	--	U 8.32	U 0.02	--	0.21	190	54	21000	2000	39000	99000	20	EBMUD
	5/4/2006	R	--	17	--	U 8.32	--	--	--	190	--	18000	2200	35000	91000	--	EBMUD
	5/14/2008	P	33.18	U 22	--	U 3.3	U 0.02	--	--	8.5	110	27000	1100	58000	130000	26	EBMUD
	6/15/2010	P	32.6	U 17	--	U 4.18	U 0.02	--	--	U 4.2	99	25000	680	53000	130000	19	EBMUD
	5/17/2012	P	31.33	U 12.5	--	U 7.31	U 0.02	--	--	U 6.27	130	24300	511	51200	109000	17	EBMUD
	6/9/2014	P	37.43	U 11.4	--	U 6.24	U 0.04	--	--	4.32	92	29100	930	63100	134000	22	EBMUD
	7/20/2016	P	36.0	U 7.28	--	U 5.20	--	--	--	10.4	100	25100	1150	B 47700	B 108000	15	EBMUD
	8/29/2018	P	39.7	U 14.0	--	U 4.06	--	--	--	12.0	100	23000	896	49100	104000	16	EBMUD
LF-3	10/14/1999	P	27.13	U 100	U 5	U 5	U 0.2	U 5	U 3	U 50	135	37600	2600	34400	41100	9.8	EBMUD
	10/20/1999	P	29.05	290	U 5	U 5	U 0.8	U 50	U 5	U 50	120	37000	3100	31000	36000	13	MCC/GEO
	10/20/1999	S	--	24.7	1.03	2.24	U0.02	U 5.2	U 0.3	13.9	130	B 47500	3710	B 36100	39200	11	EBMUD
	1/21/2000	P	27.62	11.1	U 0.832	3.04	B 0.04	5.83	U 9.36	25.2	130	47000	5190	B 38900	39700	11	EBMUD
	4/21/2000	P	15.5	30.7	U 0.728	U 3.12	0.02	U 2.08	10.6	B 22.4	130	43800	3320	33500	41400	12	EBMUD
	7/20/2000	P	21.02	71.6	U 0.728	U 3.12	U 0.02	5.27	19.6	19.6	160	46000	7960	B 38000	49200	11	EBMUD
	10/19/2000	P	28.22	27.7	U 0.728	U 3.12	U 0.02	U 2.08	U 5.2	5.23	170	45200	3780	36100	46200	9.6	EBMUD
	1/18/2001	P	22.42	B 18.8	2.46	8.32	U 0.02	9.03	U 5.2	307	400	5100	2490	4960	12600	640	EBMUD
	4/17/2001	P	16.16	17.8	6.52	6.34	0.02	B 7.04	U 5.2	380	450	B 13300	2970	B 12500	20900	280	EBMUD
	7/26/2001	P	26.7	10.6	13.4	7.64	U 0.02	4.36	U 0.30	438	18	7800	3440	10800	19400	2.1	EBMUD
	10/17/2001	P	28.95	12.2	5.86	9.07	U 0.02	3.75	U 0.30	395	19	8310	3540	B 10800	B 19600	2.1	EBMUD
	1/31/2002	P	--	24	U 0.728	U 3.12	U 0.02	U 2.08	U 0.90	51.7	45	14300	4470	17000	24400	6.9	EBMUD
	7/18/2002	P	--	14	--	U 3.12	U 0.02	--	U 0.90	9.17	140	43900	3620	35600	45000	10	EBMUD
	1/30/2003	P	--	2310	--	10.4	0.069	--	U 0.90	71.1	9.8	5960	6890	9420	17200	2	EBMUD
	7/18/2003	P	29.08	13	--	U 6.24	U 0.02	--	U 0.90	7.97	100	38300	3100	26700	B 40600	12	EBMUD
	2/24/2004	P	15.88	10.4	--	U 6.24	U 0.02	--	U 0.90	1.04	140	35600	3010	30100	38000	6.4	EBMUD
	2/24/2004	R	--	92	--	U 4.4	--	--	--	B 21.6	--	35900	3210	B 28700	B 35600	--	EBMUD
	8/24/2004	P	--	U 8.32	--	7.01	U 0.02	--	U 0.8	56.8	100	28400	3500	25200	B 31800	4.4	EBMUD
	8/24/2004	R	--	390	--	11.1	--	--	--	99.4	--	28800	3480	25400	31100	--	EBMUD
	5/4/2006	P	14.50	48	--	U 8.32	U 0.02	--	0.24	140	98	1200	2700	4800	13000	16	EBMUD
	5/4/2006	R	--	16	--	U 8.32	--	--	--	99	98	1100	2700	4900	12000	16	EBMUD
	5/14/2008	P	19.51	U 22	--	U 3.3	U 0.02	--	--	40	31	20000	2800	17000	29000	2.5	EBMUD
	6/15/2010	P	18	U 17	--	4.78	U 0.02	--	--	52	40	21000	2500	19000	26000	3.3	EBMUD
	5/17/2012	P	17.53	U 12.5	--	U 7.31	U 0.02	--	--	U 6.27	58	34000	2730	19400	28600	4	EBMUD
	6/9/2014	P	23.12	U 11.4	--	U 6.24	U 0.04	--	--	U 4.16	56	34700	2740	19800	32200	4.5	EBMUD
	7/21/2016	P	23.85	U 7.28	--	U 5.20	--	--	--	0.614	64	29100	1920	B 22300	B 27600	3.4	EBMUD
	9/6/2018	P	27.5	U 14.0	--	U 4.06	--	--	--	4.26	64	31900	2300	20800	32400	4.2	EBMUD

Table 2B. Groundwater, Subdrain, and Leachate Laboratory Analysis Summary - Penn Mine Landfill

WELL ID	Sample Date	Sample Type	Depth to Water (feet)	DISSOLVED METALS							TOTAL METALS						LAB
				Al (µg/L)	Cd (µg/L)	Cu (µg/L)	Hg (µg/L)	Ni (µg/L)	Pb (µg/L)	Zn (µg/L)	Sulfate (mg/L)	Na (µg/L)	K (µg/L)	Mg (µg/L)	Ca (µg/L)	Chloride (mg/L)	
LF-4	10/14/1999	P	55.55	122	U 5	U 5	U 0.2	U 5	U 3	U 50	27.4	127000	7100	17000	23900	26.8	APPL
	10/20/1999	P	73.73	170	U 5	U 5	U 0.8	U 50	U 5	U 50	29	110000	7000	19000	22000	29	MCC/GEO
	10/20/1999	R	--	180	U 5	U 5	U 0.8	U 50	U 5	U 50	28	110000	6900	20000	24000	28	MCC/GEO
	10/20/1999	S	--	U 10.4	U 0.832	U 2.08	U 0.02	U 5.2	0.5	9.48	27	B 128000	7450	B 21600	U 0.104	28	EBMUD
	10/20/1999	S, R	--	14.8	1.01	3.98	U 0.02	U 5.2	U 0.3	8.92	36	B 128000	7550	B 21100	U 0.104	29	EBMUD
	1/21/2000	P	56.21	U 10.4	U 0.832	U 2.08	U 0.02	5.38	U 9.36	3.06	19	141000	8140	B 29500	26600	36	EBMUD
	1/21/2000	R	--	U 10.4	U 0.832	3.76	--	U 5.2	U 9.36	3.41	18	142000	8330	B 29600	26800	38	EBMUD
	4/21/2000	P	57.02	13.9	U 0.728	U 3.12	U 0.02	U 2.08	U 5.20	B 7.57	17	131000	6560	28100	27300	35	EBMUD
	4/21/2000	R	--	15	U 0.728	U 3.12	U 0.02	3.05	U 5.20	U 2.08	15	132000	6300	29700	27700	32	EBMUD
	7/20/2000	P	55.05	35.8	U 0.728	U 3.12	U 0.02	3.35	12.3	7.74	16	138000	10400	30000	31700	32	EBMUD
	7/20/2000	R	--	36.4	U 0.728	U 3.12	--	3.18	15.9	6.34	16	139000	7050	B 30900	32600	32	EBMUD
	10/19/2000	P	55	18.2	U 0.728	U 3.12	U 0.02	U 2.08	7.98	U 2.08	18	128000	6440	27600	27300	34	EBMUD
	1/18/2001	P	55.25	B 22.1	U 0.728	U 3.12	U 0.02	U 2.08	8.37	24.5	760	111000	6430	28100	28800	570	EBMUD
	4/17/2001	P	53.5	17.1	U 0.728	U 3.12	0.02	B 8.26	U 5.20	3.32	260	B 132000	6140	B 29700	29600	290	EBMUD
	4/17/2001	R	--	16.6	U 0.728	U 3.12	0.02	B 7.41	U 5.20	4.74	260	B 134000	6220	B 30300	30000	170	EBMUD
	7/26/2001	P	54.32	35.5	U 0.728	U 3.12	U 0.02	4.25	0.5	6.93	18	132000	6000	29800	31200	31	EBMUD
	7/26/2001	R	--	35.5	0.978	U 3.12	U 0.02	2.68	U 0.30	7.2	17	134000	6100	29900	31100	30	EBMUD
	10/17/2001	P	54.94	15.4	U 0.728	U 3.12	U 0.02	2.26	U 0.30	22.6	17	139000	6440	B 29400	B 31200	30	EBMUD
	1/31/2002	P	--	25.5	U 0.728	U 3.12	U 0.02	U 2.08	U 0.90	U 2.08	17	147000	7010	29100	32800	36	EBMUD
	7/18/2002	P	--	U 6.24	--	U 3.12	U 0.02	--	U 0.90	43.9	17	138000	6480	28600	30200	2.5	EBMUD
	1/30/2003	P	--	U 10.4	--	U 6.24	U 0.02	--	U 0.90	5.15	17	136000	6410	26800	31300	37	EBMUD
	7/18/2003	P	55.78	19.4	--	U 6.24	U 0.02	--	U 0.90	21.2	23	135000	6680	30000	B 33600	37	EBMUD
	2/24/2004	P	54.55	U 10.4	--	U 6.24	U 0.02	--	1.1	9.18	19	13300	6190	30200	32400	30	EBMUD
	2/24/2004	R	--	1340	--	U 4.4	--	--	--	--	--	13700	6600	B 30200	B 31300	--	EBMUD
	8/24/2004	P	--	8.62	--	6.52	U 0.02	--	U 0.8	5.4	16	133000	6040	30400	B 31200	25	EBMUD
	8/24/2004	R	--	4120	--	12.4	--	--	--	22.5	--	135000	6470	33500	32500	--	EBMUD
	5/4/2006	P	41.68	1400	--	10.3	U 0.02	--	0.20	49	23	160000	7400	55000	50000	37	EBMUD
	5/4/2006	R	--	15	--	U 8.32	--	--	--	9.7	23	160000	7000	55000	49000	37	EBMUD
	5/4/2006	QC	--	2900	--	U 8.32	--	--	--	52	28	160000	7700	58000	52000	35	EBMUD
	5/4/2006	QCR	--	15	--	U 8.32	U 0.02	--	0.26	8.7	28	160000	7200	58000	50000	35	EBMUD
	5/14/2008	P	50.91	U 22	--	U 3.3	U 0.02	--	--	46	14	150000	6700	39000	35000	27	EBMUD
	6/15/2010	P	50.32	U 17	--	U 4.18	U 0.02	--	--	U 4.2	15	140000	6400	34000	33000	29	EBMUD
	5/17/2012	P	50.25	U 12.5	--	U 7.31	U 0.02	--	--	U 6.27	18	156000	7300	33700	38100	32	EBMUD
	6/9/2014	P	55.22	U 11.4	--	U 6.24	U 0.04	--	--	U 4.16	16	143000	7120	30200	38100	30	EBMUD
	7/20/2016	P	50.72	U 7.28	--	U 5.20	--	--	--	U 0.520	19	139000	8340	B 36400	B 40000	30	EBMUD
	8/29/2018	P	45.5	U 14.0	--	U 4.06	--	--	--	3.44	18	134000	6710	29300	32500	32	EBMUD
Subdrain	9/23/1998	P	--	U 50	U 0.25	4.3	U 0.20	1.3	U 1.5	U 25	22	37000	5900	5100	46000	42	APPL
	2/4/1999	P	--	--	--	13.8	--	--	--	U 50	--	--	--	--	--	--	APPL
	4/28/1999	P	--	--	--	72.7	--	--	--	123	--	--	--	--	--	--	APPL
	7/19/1999	P	--	--	--	11.2	--	--	--	U 50	--	--	--	--	--	--	APPL
	3/1/2000	P	--	59.4	U 0.728	6.87	U 0.02	U 2.08	16.8	27.3	68	40300	1980	48300	44900	9.5	EBMUD
	5/4/2006	--	X	--	--	--	--	--	--	--	--	--	--	--	--	--	
	5/14/2008	--	X	--	--	--	--	--	--	--	--	--	--	--	--	--	
	6/15/2010	--	X	--	--	--	--	--	--	--	--	--	--	--	--	--	
	5/17/2012	--	X	--	--	--	--	--	--	--	--	--	--	--	--	--	
	6/9/2014	--	X	--	--	--	--	--	--	--	--	--	--	--	--	--	

Table 2B. Groundwater, Subdrain, and Leachate Laboratory Analysis Summary - Penn Mine Landfill

WELL ID	Sample Date	Sample Type	Depth to Water (feet)	DISSOLVED METALS							TOTAL METALS						LAB
				Al (µg/L)	Cd (µg/L)	Cu (µg/L)	Hg (µg/L)	Ni (µg/L)	Pb (µg/L)	Zn (µg/L)	Sulfate (mg/L)	Na (µg/L)	K (µg/L)	Mg (µg/L)	Ca (µg/L)	Chloride (mg/L)	
Leachate	8/24/1999	P	--	--	10900	283000	--	2910	116	1630000	--	--	--	--	--	--	APPL
	3/30/2000	P	--	--	10000	120000	U 0.8	2800	75	1900000	--	--	--	--	--	--	MCC
	6/5/2000	P	--	--	11000	57000	1	2900	86	80000	--	--	--	--	--	--	MCC
	10/25/2000	P	--	--	6800	260000	0.64	2400	99	1900000	--	--	--	--	--	--	Chromalab
	10/25/2000	P	--	--	11000	280000	2.8	3800	170	2000000	--	--	--	--	--	--	Chromalab
	10/25/2000	P	--	--	11000	260000	2.8	4000	U 500	1900000	--	--	--	--	--	--	Chromalab
	1/21/2016*	P	--	B 881000	3270	42700	0.33	4310	U 110	1940000							EBMUD

Note:

µg/L micrograms per liter

mg/L milligrams per liter

-- Not analyzed/available/applicable

MCC McCampbell Analytical

GEO GeoAnalytical Laboratories

EBMUD District Laboratory

APPL Agriculture & Priority Pollutants Laboratories

B Analyte detected in method blank

P Primary sample

R Lab Replicate sample

S Split sample

U Analyte not detected at or above the listed analytical reporting limit

QC Field duplicate

QCR Lab replicate of Field duplicate

X Insufficient water present for sample collection

* Result from unfiltered lab method

Table 3. Leachate Removal - January 2001 to June 2018 - Penn Mine Landfill

Date	Volume Hauled (Gallons)	Cumulative Volume Hauled (Gallons)	Annual Volume Hauled (Gallons)
1/1/2001	26,363	26,363	--
2/1/2001	16,317	42,680	--
3/1/2001	11,782	54,462	--
4/1/2001	8,732	63,194	--
5/1/2001	10,317	73,511	--
6/1/2001	7,844	81,355	--
7/1/2001	7,406	88,761	--
8/1/2001	8,725	97,486	--
9/1/2001	6,837	104,323	--
10/1/2001	6,599	110,922	--
11/1/2001	8,020	118,942	--
12/1/2001	6,901	125,843	125,843
1/3/2002	2,398	128,241	--
1/10/2002	3,957	132,198	--
1/17/2002	2,321	134,519	--
1/25/2002	2,204	136,723	--
1/31/2002	1,484	138,207	--
2/7/2002	1,847	140,054	--
2/14/2002	1,808	141,862	--
2/21/2002	2,098	143,960	--
2/28/2002	1,981	145,941	--
3/7/2002	1,784	147,725	--
3/14/2002	1,727	149,452	--
3/21/2002	1,736	151,188	--
3/28/2002	1,652	152,840	--
4/4/2002	1,573	154,413	--
4/11/2002	1,482	155,895	--
4/18/2002	1,468	157,363	--
4/25/2002	1,360	158,723	--
5/2/2002	1,400	160,123	--
5/9/2002	1,496	161,619	--
5/16/2002	1,400	163,019	--
5/23/2002	1,353	164,372	--
5/30/2002	1,343	165,715	--
6/13/2002	2,628	168,343	--
6/27/2002	2,588	170,931	--
7/11/2002	2,547	173,478	--
7/25/2002	2,537	176,015	--
8/8/2002	2,456	178,471	--
8/22/2002	2,470	180,941	--
9/5/2002	2,427	183,368	--
9/19/2002	2,410	185,778	--
10/7/2002	2,513	188,291	--
10/24/2002	2,489	190,780	--
11/7/2002	2,827	193,607	--
11/22/2002	2,871	196,478	--
12/5/2002	2,134	198,612	--
12/19/2002	2,271	200,883	75,040
1/6/2003	2,218	203,101	--
1/16/2003	2,271	205,372	--
1/30/2003	2,596	207,968	--
2/13/2003	2,578	210,546	--
2/27/2003	2,592	213,138	--
3/13/2003	2,206	215,344	--

Table 3. Leachate Removal - January 2001 to June 2018 - Penn Mine Landfill (continued)

Date	Volume Hauled (Gallons)	Cumulative Volume Hauled (Gallons)	Annual Volume Hauled (Gallons)
3/27/2003	2,088	217,432	--
4/14/2003	2,297	219,729	--
4/24/2003	1,513	221,242	--
5/8/2003	1,987	223,229	--
5/22/2003	1,923	225,152	--
6/5/2003	1,914	227,066	--
6/26/2003	2,124	229,190	--
7/10/2003	2,437	231,627	--
7/24/2003	1,850	233,477	--
8/14/2003	2,090	235,567	--
8/28/2003	2,267	237,834	--
9/18/2003	2,225	240,059	--
10/2/2003	2,264	242,323	--
10/23/2003	2,307	244,630	--
11/13/2003	2,133	246,763	--
11/24/2003	2,460	249,223	--
12/15/2003	2,199	251,422	--
12/29/2003	2,284	253,706	52,823
1/15/2004	2,293	255,999	--
1/22/2004	2,344	258,343	--
1/29/2004	2,248	260,591	--
2/10/2004	2,154	262,745	--
3/1/2004	2,244	264,989	--
3/4/2004	5,818	270,807	--
3/18/2004	3,154	273,961	--
4/1/2004	2,154	276,115	--
4/15/2004	1,803	277,918	--
4/29/2004	1,799	279,717	--
5/13/2004	1,683	281,400	--
5/27/2004	1,630	283,030	--
6/10/2004	1,641	284,671	--
6/24/2004	1,641	286,313	--
7/8/2004	1,628	287,941	--
7/29/2004	2,281	290,221	--
8/12/2004	1,567	291,788	--
9/2/2004	2,230	294,018	--
9/23/2004	2,283	296,301	--
10/7/2004	1,594	297,895	--
10/25/2004	2,094	299,989	--
11/15/2004	2,226	302,215	--
12/2/2004	1,848	304,063	--
12/20/2004	2,026	306,089	52,383
1/6/2005	2,336	308,425	--
1/20/2005	2,393	310,818	--
1/24/2005	2,276	313,094	--
1/27/2005	2,269	315,363	--
2/7/2005	2,281	317,644	--
2/10/2005	2,600	320,244	--
2/17/2005	1,843	322,087	--
2/28/2005	2,125	324,212	--
3/10/2005	2,142	326,354	--
3/24/2005	2,212	328,566	--
4/7/2005	2,083	330,649	--
4/14/2005	4,481	335,130	--

Table 3. Leachate Removal - January 2001 to June 2018 - Penn Mine Landfill (continued)

Date	Volume Hauled (Gallons)	Cumulative Volume Hauled (Gallons)	Annual Volume Hauled (Gallons)
5/2/2005	2,117	337,247	--
5/12/2005	1,465	338,712	--
5/26/2005	1,509	340,221	--
6/13/2005	1,836	342,057	--
6/30/2005	1,711	343,768	--
7/18/2005	1,725	345,493	--
8/8/2005	1,960	347,453	--
8/29/2005	1,960	349,413	--
9/22/2005	2,229	351,642	--
10/20/2005	2,183	353,825	--
11/15/2005	2,313	356,138	--
12/5/2005	2,216	358,354	--
12/22/2005	1,815	360,169	54,080
1/10/2006	2,245	362,414	--
1/16/2006	5,717	368,131	--
1/26/2006	2,211	370,342	--
2/14/2006	4,693	375,035	--
3/2/2006	2,147	377,182	--
3/21/2006	6,907	384,089	--
3/30/2006	2,036	386,125	--
4/6/2006	9,420	395,545	--
4/13/2006	4,962	400,507	--
4/18/2006	9,439	409,946	--
4/27/2006	6,610	416,556	--
5/11/2006	1,866	418,422	--
5/25/2006	3,757	422,179	--
6/13/2006	1,962	424,141	--
6/29/2006	1,762	425,903	--
7/25/2006	1,919	427,822	--
8/17/2006	2,110	429,932	--
9/7/2006	1,741	431,673	--
10/3/2006	1,921	433,594	--
10/26/2006	2,677	436,271	--
11/21/2006	2,288	438,559	--
12/14/2006	2,080	440,639	80,470
1/9/2007	2,254	442,893	--
2/1/2007	2,055	444,947	--
2/28/2007	2,336	447,283	--
3/22/2007	2,334	449,617	--
3/29/2007	2,672	452,289	--
4/17/2007	2,210	454,499	--
5/15/2007	2,495	456,994	--
5/18/2007	2,572	459,566	--
6/7/2007	2,236	461,802	--
6/29/2007	1,939	463,741	--
7/24/2007	2,134	465,876	--
8/21/2007	2,165	468,041	--
9/13/2007	1,907	469,947	--
10/11/2007	2,204	472,152	--
11/8/2007	2,283	474,435	--
12/6/2007	2,367	476,802	36,163
1/3/2008	2,145	478,946	--
2/5/2008	4,050	482,997	--
2/28/2008	3,320	486,317	--

Table 3. Leachate Removal - January 2001 to June 2018 - Penn Mine Landfill (continued)

Date	Volume Hauled (Gallons)	Cumulative Volume Hauled (Gallons)	Annual Volume Hauled (Gallons)
3/20/2008	2,621	488,938	--
4/10/2008	1,919	490,856	--
5/1/2008	1,698	492,554	--
5/22/2008	1,520	494,074	--
6/19/2008	1,905	495,978	--
7/17/2008	1,849	497,828	--
8/21/2008	2,352	500,180	--
9/25/2008	2,384	502,564	--
10/30/2008	2,571	505,135	--
12/4/2008	2,442	507,576	30,774
1/5/2009	2,329	509,905	--
2/5/2009	2,422	512,327	--
3/5/2009	4,348	516,675	--
4/2/2009	4,573	521,248	--
5/7/2009	3,835	525,083	--
6/11/2009	1,699	526,782	--
7/16/2009	2,200	528,982	--
8/20/2009	1,974	530,956	--
9/24/2009	1,967	532,923	--
10/29/2009	2,101	535,024	--
12/3/2009	2,199	537,223	29,647
1/7/2010	2,162	539,385	--
2/11/2010	2,275	541,660	--
3/18/2010	2,759	544,419	--
3/25/2010	1,997	546,416	--
4/29/2010	2,477	548,893	--
6/3/2010	2,053	550,946	--
7/8/2010	1,842	552,788	--
8/12/2010	1,785	554,573	--
9/16/2010	1,726	556,299	--
10/21/2010	1,767	558,066	--
11/18/2010	1,446	559,512	--
12/16/2010	1,478	560,990	23,767
1/14/2011	1,936	562,926	--
1/18/2011	7,109	570,035	--
2/10/2011	2,262	572,297	--
2/17/2011	1,900	574,197	--
3/10/2011	4,285	578,482	--
4/14/2011	2,100	580,582	--
5/2/2011	2,598	583,180	--
5/19/2011	5,507	588,687	--
5/26/2011	2,370	591,057	--
6/23/2011	4,289	595,346	--
8/2/2011	2,000	597,346	--
9/2/2011	2,034	599,380	--
10/13/2011	1,635	601,015	--
11/17/2011	2,034	603,049	--
12/22/2011	1,993	605,042	44,052
1/19/2012	1,539	606,581	--
2/23/2012	1,853	608,434	--
4/5/2012	2,074	610,508	--
5/17/2012	1,800	612,308	--
6/29/2012	2,151	614,459	--
7/19/2012	2,260	616,719	--

Table 3. Leachate Removal - January 2001 to June 2018 - Penn Mine Landfill (continued)

Date	Volume Hauled (Gallons)	Cumulative Volume Hauled (Gallons)	Annual Volume Hauled (Gallons)
8/23/2012	1,774	618,493	--
9/27/2012	1,653	620,146	--
11/15/2012	2,151	622,297	--
12/20/2012	2,000	624,297	19,255
1/24/2013	2,188	626,485	--
2/28/2013	2,151	628,636	--
4/4/2013	2,048	630,684	--
5/10/2013	1,250	631,934	--
5/23/2013	1,053	632,987	--
6/27/2013	1,500	634,487	--
8/1/2013	1,500	635,987	--
10/3/2013	3,000	638,987	--
11/14/2013	2,500	641,487	--
12/19/2013	3,000	644,487	20,190
1/23/2014	2,200	646,687	--
3/6/2014	2,250	648,937	--
4/17/2014	1,875	650,812	--
5/29/2014	1,500	652,312	--
7/10/2014	1,597	653,909	--
9/4/2014	2,063	655,972	--
10/30/2014	2,170	658,142	--
12/18/2014	1,454	659,596	15,109
2/12/2015	2,752	662,348	--
4/16/2015	2,877	665,225	--
6/11/2015	2,663	667,888	--
8/6/2015	1,910	669,798	--
10/1/2015	1,980	671,778	--
11/23/2015	2,021	673,799	14,203
1/21/2016	2,671	676,470	--
3/24/2016	2,636	679,106	--
5/24/2016	2,400	681,506	--
8/2/2016	2,300	683,806	--
10/13/2016	2,200	686,006	--
12/9/2016	2,100	688,106	14,307
1/23/2017	2,300	690,406	--
3/16/2017	2,600	693,006	--
5/5/2017	2,200	695,206	--
7/14/2017	2,400	697,606	--
10/2/2017	2,100	699,706	--
12/19/2017	2,700	702,406	14,300
2/28/2018	2,700	705,106	7,000
4/24/2018	2,300	707,406	
6/27/2018	2,000	709,406	

Notes:

-- = not applicable

Figures



Figure 1 – Site Vicinity Map

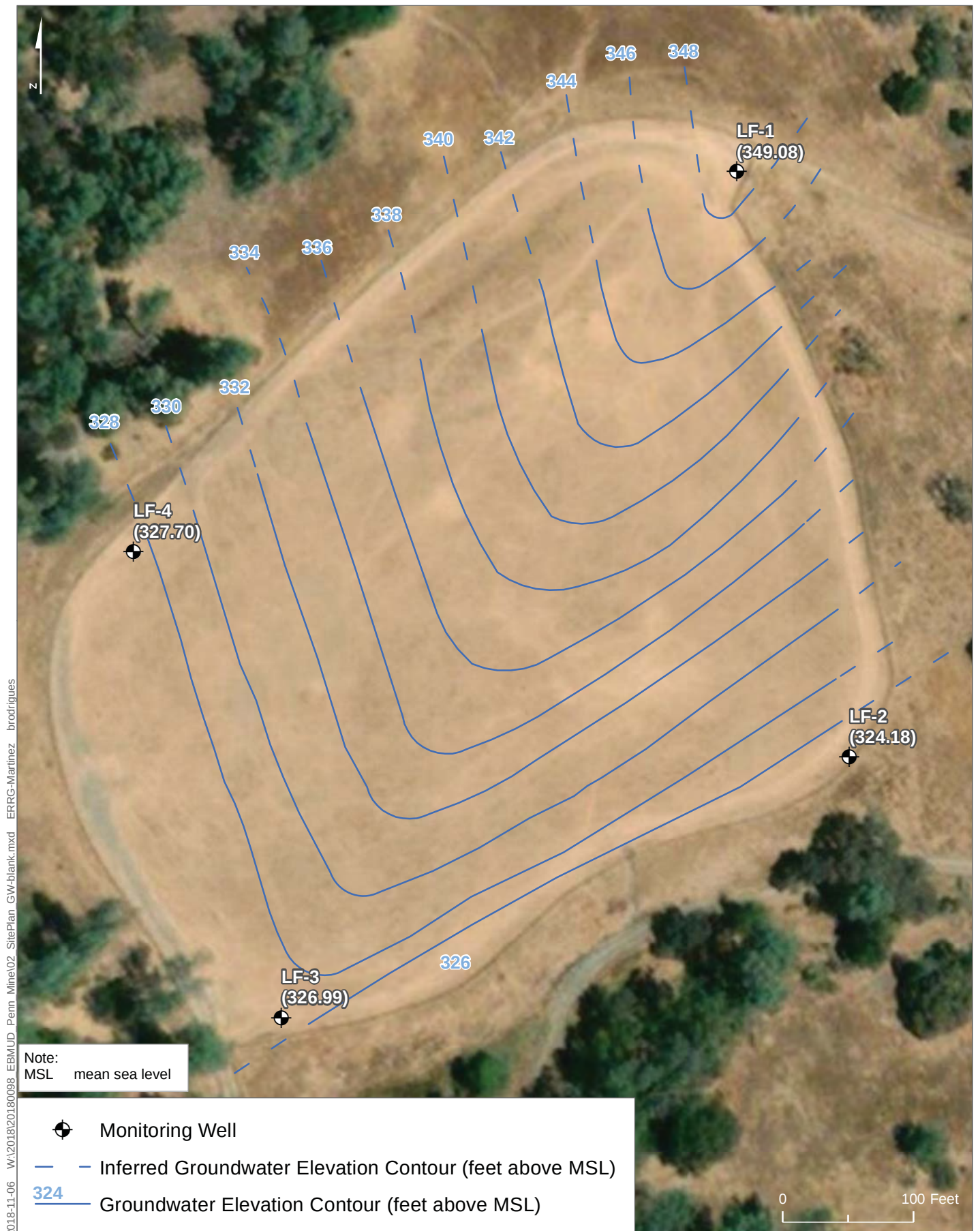


Figure 2. Site Plan and Groundwater Elevation - August 28, 2018

EBMUD – Penn Mine
Calaveras County, California

Figure 3
Well Hydrographs Years 2000-2018

Penn Mine Environmental Restoration Project

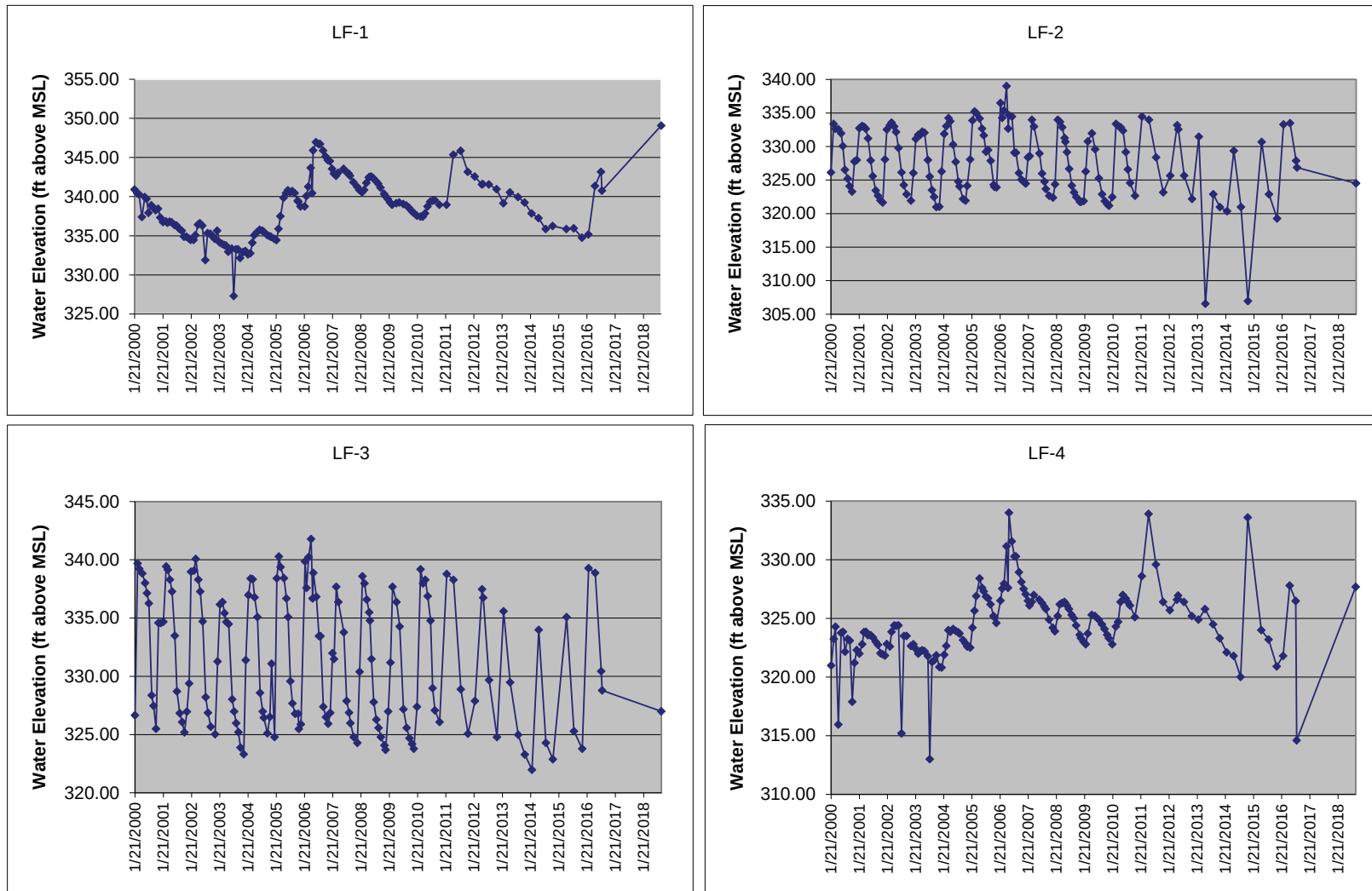


Figure 3. Monitoring Well Hydrographs

Figure 4
Dissolved Copper Concentrations Years 1999-2018
Penn Mine Environmental Restoration Project

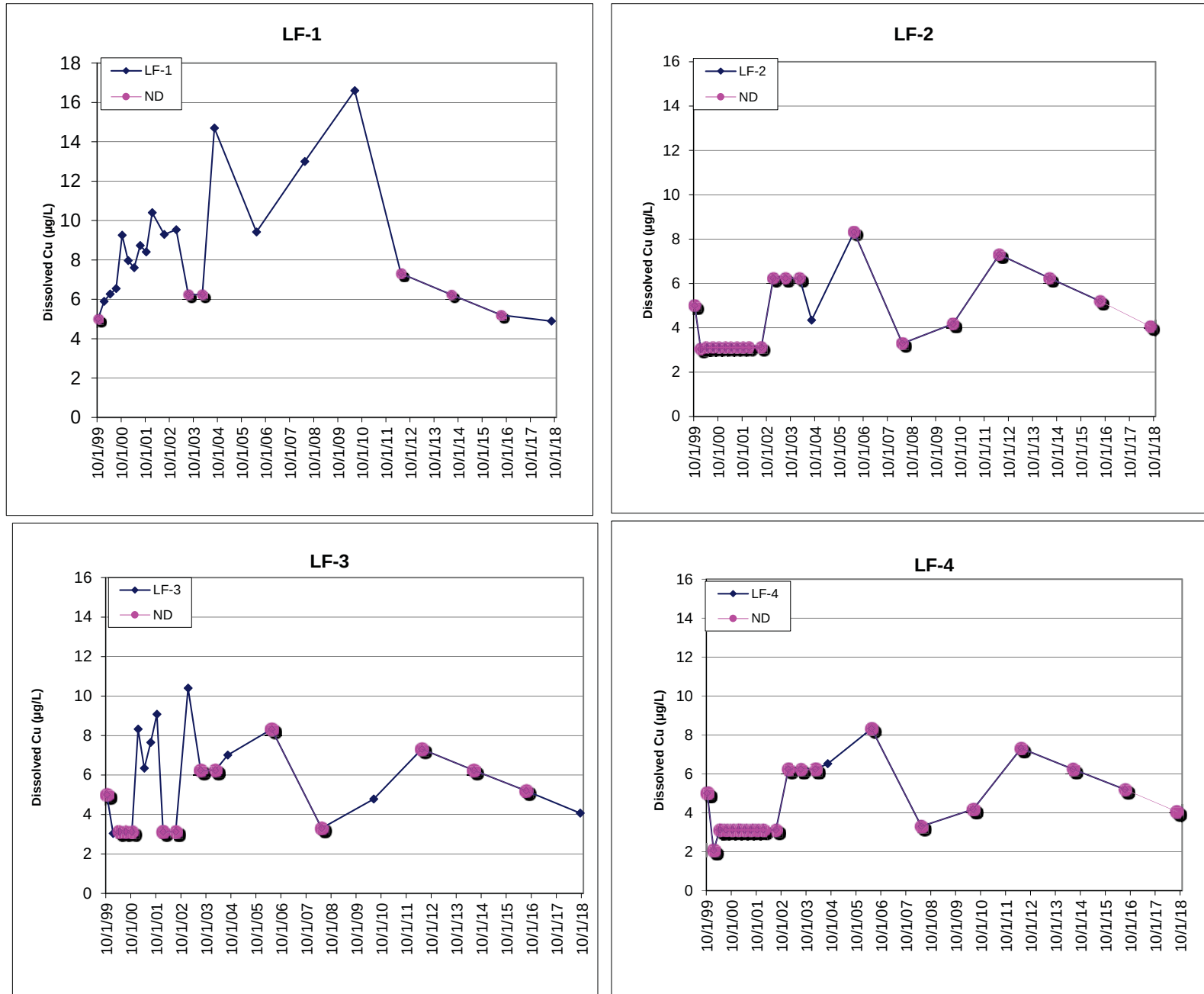


Figure 5
Dissolved Zinc Concentrations Years 1999-2018
Penn Mine Environmental Restoration Project

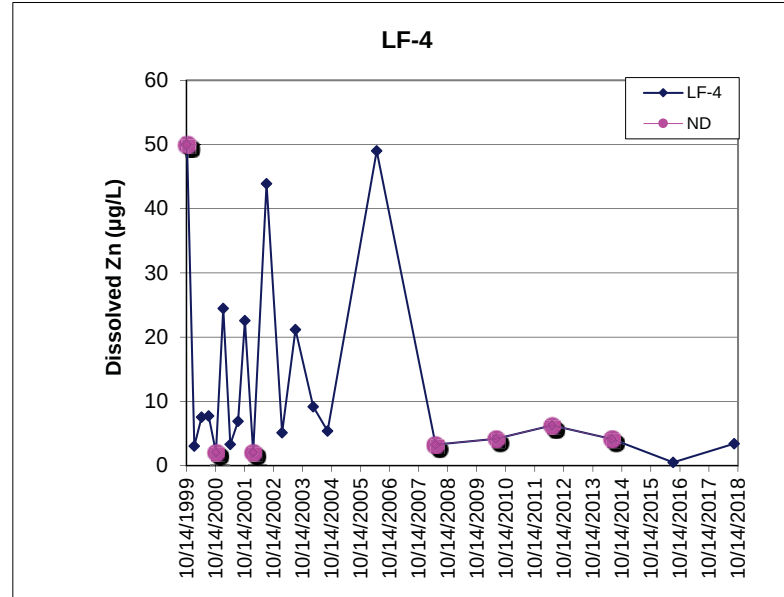
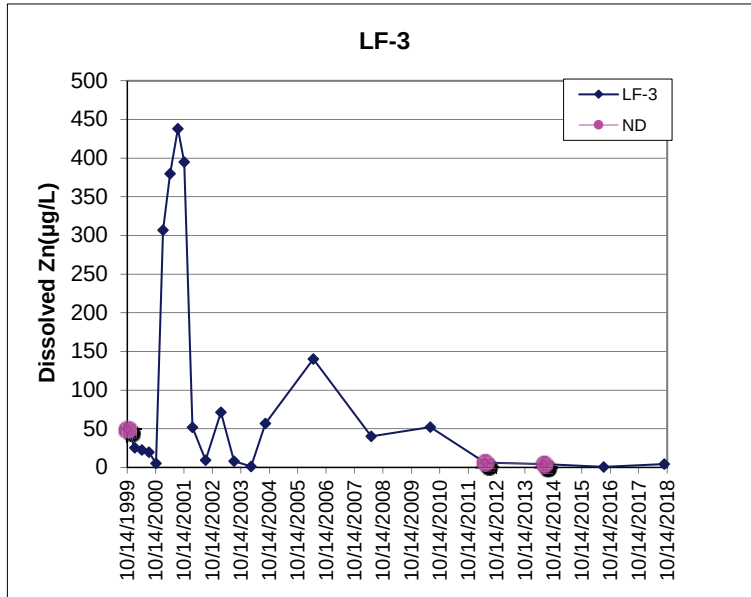
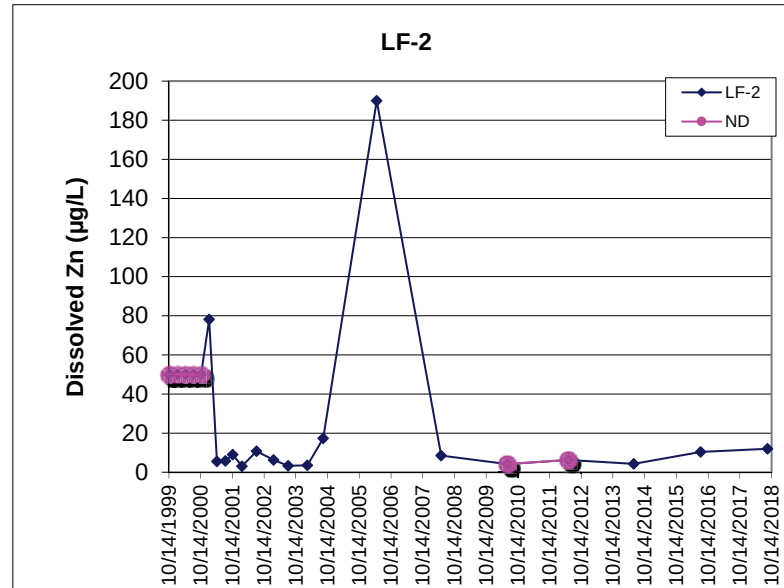
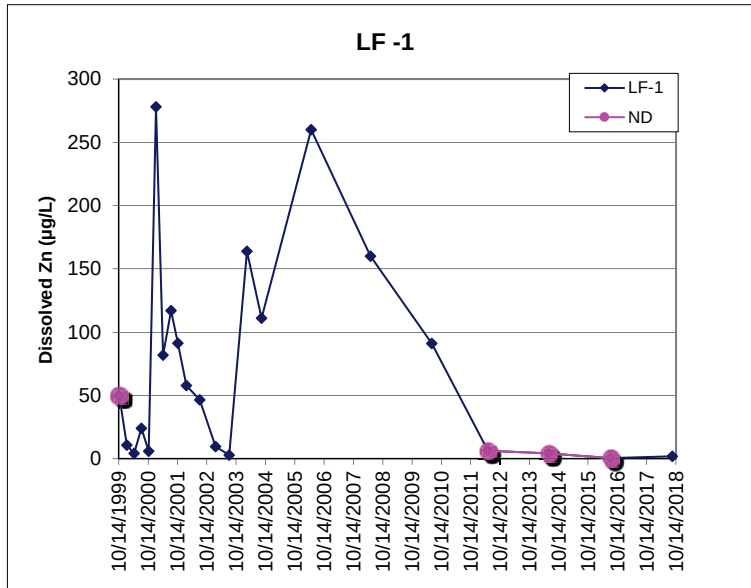


Figure 6
TDS Concentrations Years 1999-2018
Penn Mine Environmental Restoration Project

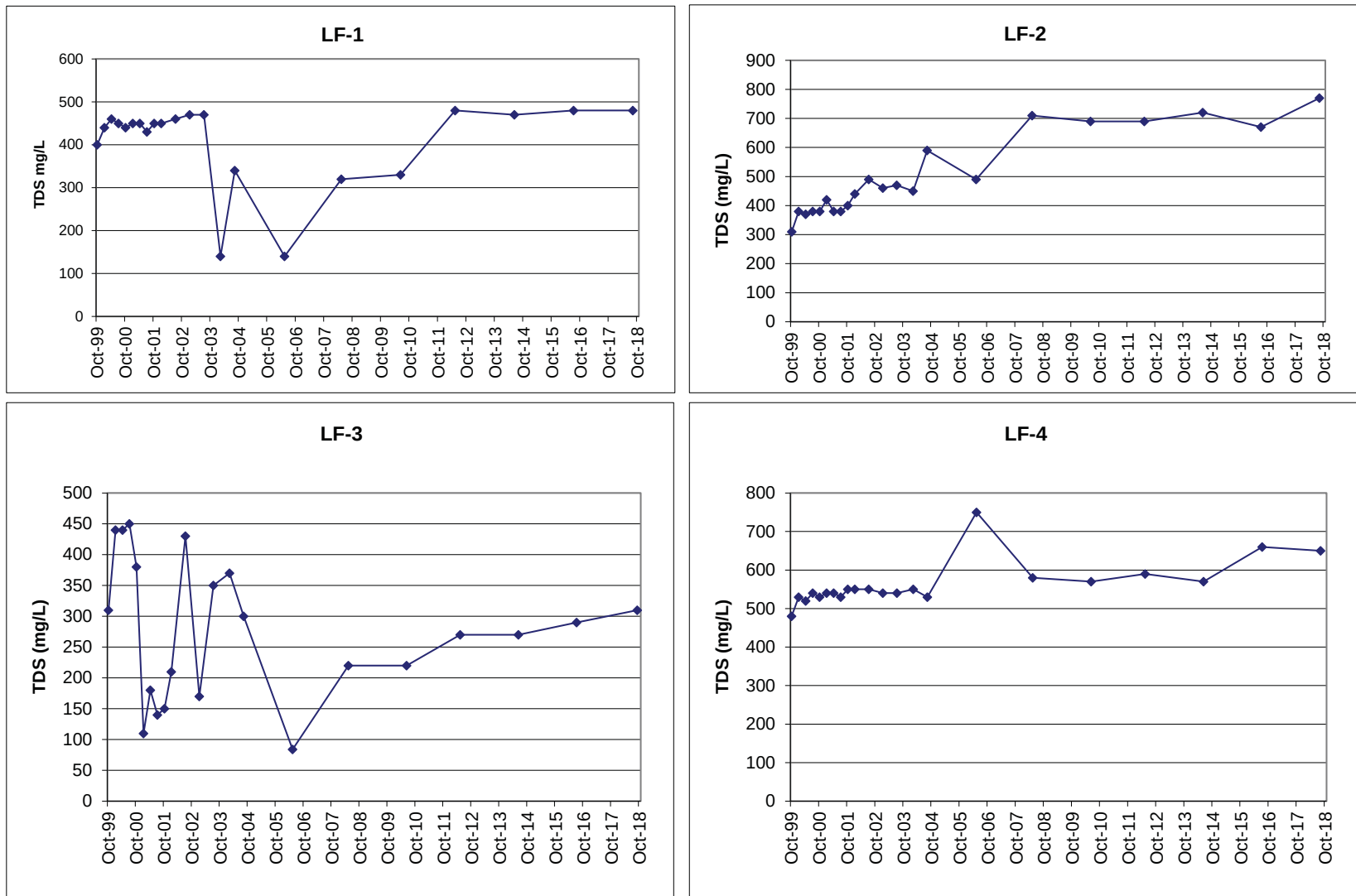


Figure 6. TDS Concentrations, Penn Mine Landfill Wells, Years 1999-2018

Figure 7 - Quantity of Leachate Removed: 2001 - 2018

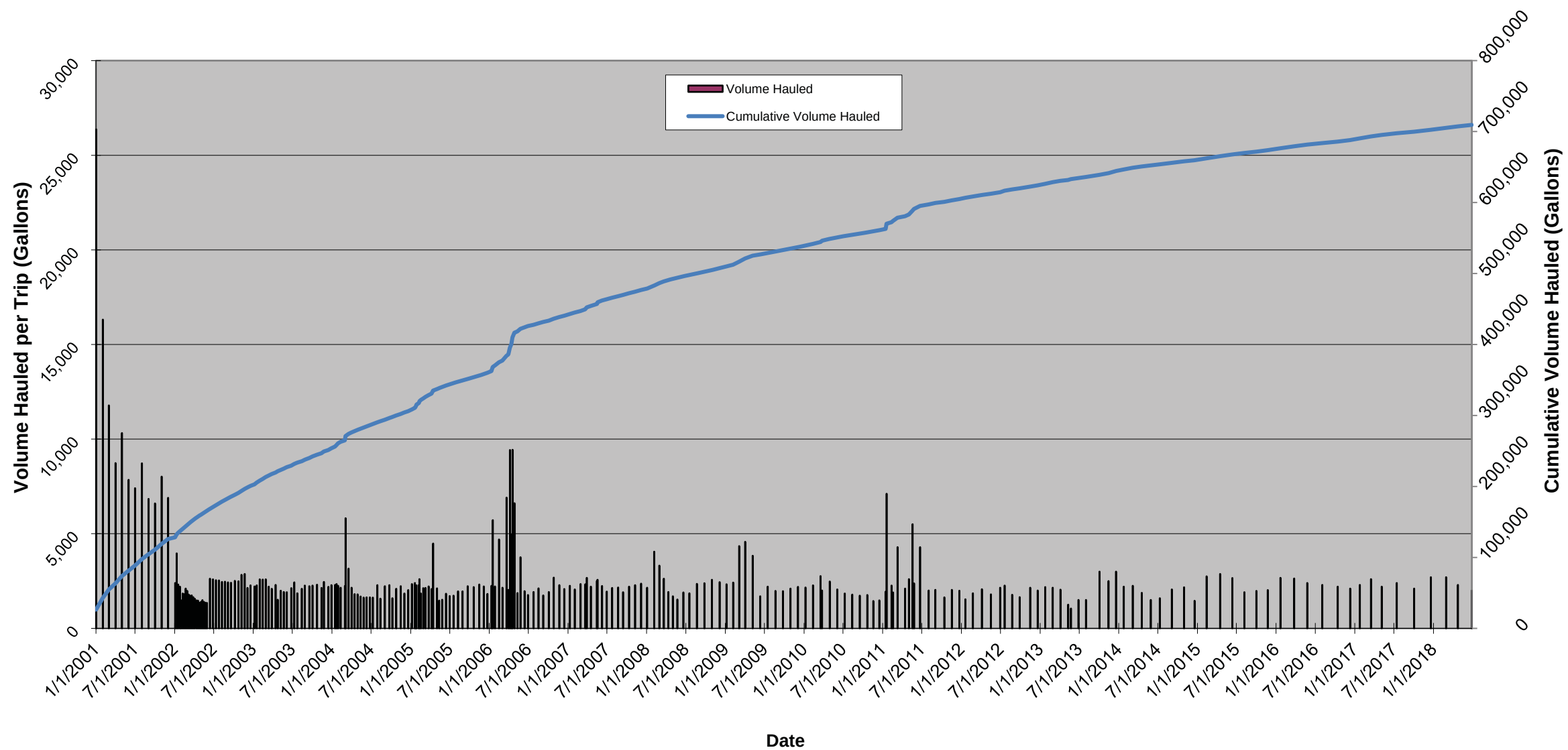


Figure 8 - Leachate Removal Rate: 2001 - 2018

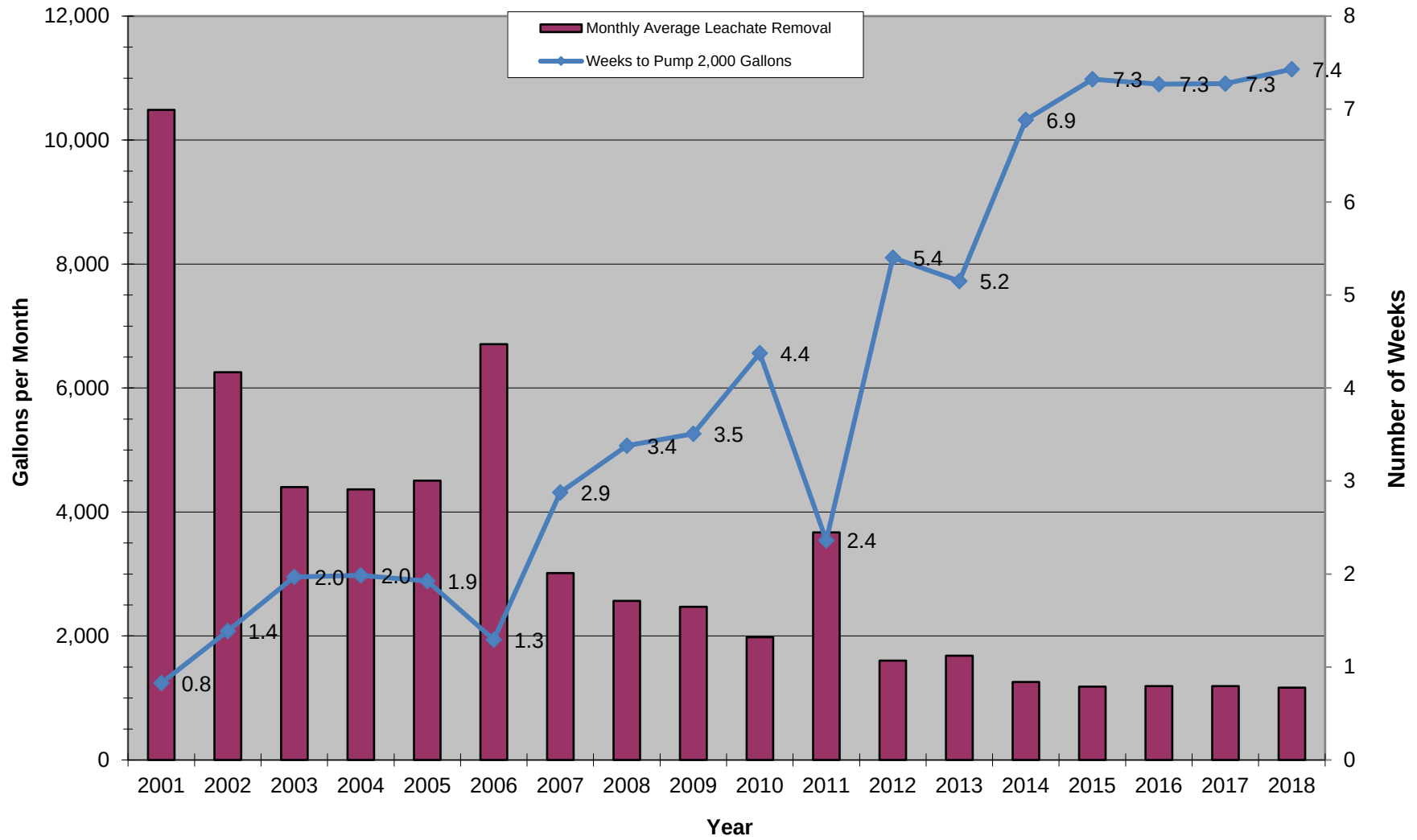
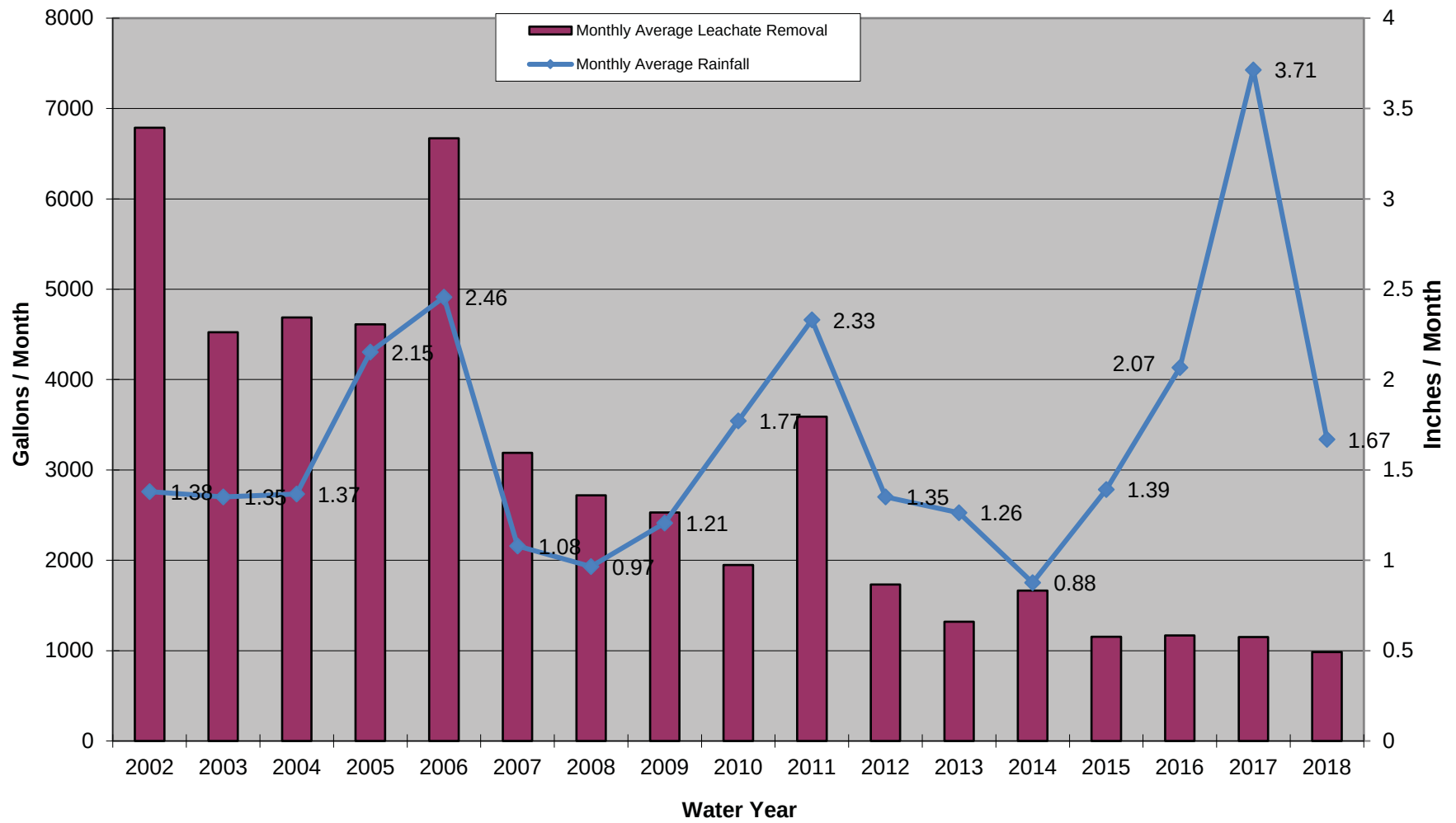


Figure 9 - Leachate Removal vs. Precipitation



Appendix A
Field Sampling Forms & Chain of Custody Records

DAILY FIELD ACTIVITY LOG

Prepared by: SD/WH Client: EBMUD
 Day: Tues Date: 8/28/2018
 Project Name: Penn mine GW sampling Project No.: 20180101-20180098
 Weather: Sunny/Clear Page: 1 of 1
 Site Vistors: N/A

Description of Field Activities:

7:00 am - ERRG crew leave to Camanche Reservoir
 8:20 am - Pick up Pump in Lodi, CA
 / leave to Camanche South Shore
 9:25 am - meet w/ Chris Swann (EBMUD) @ EBMUD laydown
 9:40 am - leave laydown to Penn Mine site
 10:30 am - Tailgate
 / Walk site / uncover wells
 11:00 am: LF-1 DTW - 58.37' | LF-3 DTW - 27.29
 DTB - 144.82' | DTB - 106.32

LF-2 DTW - 39.69 | LF-4 DTW - 49.51'
 DTB - 58.78 | DTB - 177.55'
 12:30 pm: BEGIN PUMPING LF-1
 / Remove pump re-attach tube // @ 150 Hz
 12:45 pm: Begin pumping LF-1 @ 225 Hz
 / LF-1 purged 20 gal - pump stall
 / troubleshoot pump
 14:40 pm: Mob to LF-2 (shallow well)
 / no purge
 15:50 pm: SD leave site to meet envrotech @ EBMUD range station
 / wblt purge LF-4 to dry; attempt to sample well w/ pump
 / pump error
 16:45: SD on-site w/ new pump
 / pump ctrl box broken - no purge
 / trouble shoot
 19:20: ERRG leave site → Jackson, CA

Signed: _____

Date: 08/28/18

DAILY FIELD ACTIVITY LOG

Prepared by: SD Client: EBMUD
 Day: Wed Date: 8/29/2018
 Project Name: Penn Mine GW Sampling Project No.: 20180098
 Weather: Sunny/clear Page: 1 of 1
 Site Visitors: N/A

Description of Field Activities:

08:00 - met Faircloth @ EBMUD Range Station for pump drop-off
 08:45 - ERRG On-site @ Penn Mine
 - Tested Grundel pump - no purge
 - Tested new pump - no purge; ^{control} pump box broken?
 09:45 - Sampled LF-2 (10:05 @ 39.77 ft bgs)
 10:20 - sampled duplicate (10:35 @ 39.77 ft → LF-2)
 10:35 - crew left site to pick up pump from Geotech
 12:15 - lunch
 12:55 - ERRG crew on-site; tested new pump
 13:15 - Begin pumping LF-1
 14:10 - Finish LF-1 purge / clean-up site
 14:40 - DTW LF-4 : 49.54
 14:50 - Begin Purge LF-4
 16:05 - Pump Stall @ 120' DTW
 - Troubleshoot pump, call w/ Mike @ Geotech
 - Call w/ Francois, end purge @ LF-4
 17:00 - move to LF-3; troubleshoot pump - set @ 95'
 - pump stall
 - Call Francois - pack up + move filled drums
 18:00 - Sample LF-1
 18:20 - Sample LF-4
 10:45 - demo

Signed: _____

Date: 8-29-18



**CONFIRMATION
SAMPLE RECORD**

Client: EBMUD
Project No.: 20180098
1 of 1

[illegible]

ERRG

Page: of

Phone: (925) 969-0750

Page: of

4585 Pacheco Blvd.
Martinez, CA 94553
Phone: (925) 969-0750

PROJECT NO: 20180098
DATE: 08/29/18
CLIENT NAME: EBMUD
LOCATION: Camanche SS - Penn Mine
ARRIVAL TIME: 0900

WELL ID: LF-3
 SAMPLE ID: —
 PURGED BY: —
 SAMPLED BY: —
 DEPARTURE TIME: 1930

Casing Diameter: 2" _____ 3" _____ 4"  5" _____ 6" _____ 8" _____ Other: _____
Casing Volume: (0.16) (0.37) (0.65) (1.02) (1.47) (2.61) ()

Total Depth (feet) = 106.32 Depth to Water (feet): 27.29 Depth to Product (feet): —

$$\frac{106.32}{\text{TD}} - \frac{2229}{\text{DTW}} = \frac{79.03}{\text{Casing volume}} \times \frac{0.65}{\text{No. of casing volumes}} = \frac{51.37}{\text{Calculate d Purge}} \times \frac{3}{\text{Calculate d Purge}} = \frac{154.10}{\text{Calculate d Purge}}$$

Time Started: _____

Time ended:

[illegible]

Actual gallons purged: _____

Sample Time: _____

PURGING EQUIPMENT

Active Extraction Well Pump _____ Bailer (Teflon)
 Portable Submersible Pump _____ Bailer (PVC)
 Other: _____ Bailer (Stain. Steel)
 Pump Depth: _____ Dedicated

SAMPLING EQUIPMENT

Sampling Port _____ Bailer (Teflon) _____
 Portable Submersible Pump _____ Bailer (PVC) _____
 Peristaltic Pump _____ Bailer (Stainless Steel) _____
 Other: _____

Well Integrity: Good: ☐ Fair: ☐ Poor: ☐

Lock No. _____

Remarks: pump broken - no purge. DTW/DTB rec. 08/28/18

Signature: 

Reviewed by _____

4585 Pacheco Blvd.
Martinez, CA 94553
Phone: (925) 969-0750

PROJECT NO. 2018 0098
DATE: 08/29/18
CLIENT NAME EBRMD
LOCATION: Carmanche SS - Penn Mine
ARRIVAL TIME: 0900

WELL ID: ~~623~~ LF-4
 SAMPLE ID: P232862-4
 PURGED BY: WBH/SD
 SAMPLED BY: WBH/SD
 DEPARTURE TIME: 1930

Casing Diameter: 2" 3" 4" 5" 6" 8" Other:
Casing Volume: (0.16) (0.37) (0.65) (1.02) (1.47) (2.61) ()

Total Depth (feet) = 177.55 Depth to Water (feet): 49.51 Depth to Product (feet): —

$$\frac{177.55}{\text{TD}} - \frac{49.51}{\text{DTW}} = \frac{128.04}{\text{Casing volume}} \times \frac{0.65}{\text{No. of casing volumes}} = \frac{83.22}{\text{Calculate d Purge}} \times \frac{3}{\text{Calculate d Purge}} = \frac{249.68}{\text{Calculate d Purge}}$$

Time Started: 1500

Time ended: 1610

[illegible]

Actual gallons purged: 92 gal

Sample Time: 1855

PURGING EQUIPMENT

Active Extraction Well Pump _____ Bailer (Teflon)
 Portable Submersible Pump ☒ _____ Bailer (PVC)
 Other: _____ Bailer (Stain. Steel)
 Pump Depth: 160 ft _____ Dedicated

SAMPLING EQUIPMENT

Sampling Port _____ Bailer (Teflon) _____
 Portable Submersible Pump _____ ✓ Bailer (PVC) _____
 Peristaltic Pump _____ Bailer (Stainless Steel) _____
 Other: _____

Well Integrity: Good: ☒ Fair: ☐ Poor: ☐

Lock No. _____

Remarks: Pump stall @ 120.22 ft; sampled before dry

Signature: 

Reviewed by _____

DAILY FIELD ACTIVITY LOG

Prepared by:
Day:
Project Name:
Weather:
Site Visitors:

WBH / MM
~~Wednesday~~ Thursday
Penn Mine
Sunny / Clear
N/A

Client:
Date:
Project No.:
Page:

EBMUD
9/6/18
10180098
1 of 1

Description of Field Activities:

0530 Leave ERRG Warehouse with stakebed
0630 Pickup Matt
0800 Arrive at EBMUD Ranger station, get keys from Chris Swann
0830 Get to site + Health and Safety
0845 Uncap wells. Unload
0915 DTW measured, Pump purge starts
0945 Pumped dry, pull pump and pack
1000 Mob to LF-1 to sample, Let LF-3 recharge
1020 Sample LF-1, Remob to LF-3
1030 Sample LF-3, load drums
1100 Unload drums, label all drums
1115 Remob to Ranger station, offsite

Signed:

William B. H. Jr.

Date:

9/7/18



ERRG

ERRC

PROJECT NO: 20180098
DATE: 9-6-18
CLIENT NAME: ERMUD
LOCATION: Camanche South Shore - Penn Manor
ARRIVAL TIME:

WELL ID: LF-3
SAMPLE ID:
PURGED BY: MDM / WBH
SAMPLED BY: MDM / WBH
ARTURE TIME:

Total Depth (feet) = 106.32 Depth to Water (feet): 27.50 Depth to Product (feet): —

$$\frac{106.32}{TD} - \frac{2750}{DTW} = \frac{78.8282}{\text{Casing volume}} \times 0.65 = \frac{51.23}{\text{No. of casing volumes}} \times 3 = \frac{153.70}{\text{Calculate d Purge}}$$

Time Started: 915

Time ended:

[illegible]

Actual gallons purged: 1.5

Sample Time: 1030

SAMPLING EQUIPMENT

Active Extraction Well Pump _____ Bailer (Teflon)
 Portable Submersible Pump X _____ Bailer (PVC)
 Other: _____ Bailer (Stain. Steel)
 Pump Depth: 100 ft _____ Dedicated

Sampling Port _____ ☒ Bailer (Teflon)
 Portable Submersible Pump _____ ☐ Bailer (PVC)
 Peristaltic Pump _____ ☐ Bailer (Stainless Steel)
 _____ ☐ Other: _____

Well Integrity: Good: ☒ Fair: ☐ Poor: ☐

Lock No. NA

Remarks: Grandfos

Signature: Amal Kumar Bhat

Reviewed by _____

East Bay Municipal Utility District
Laboratory Services Chain of Custody Record

Page 1 of 3

Prelog or Login No.: L223920	Project Title PENN MINE Restoration:Landfill Wells Account or Project: B785-0008-2	Client PM: JOHN WALTER Tel No.: 7524 Lab PM: KRISTI LORENSON	Sampled by: WHix/ERRG Rcvd: 30-AUG-18 11:30 Sample Date: 29-AUG-18
---------------------------------	--	--	--

Lab No.	Sample Type Time	Site	Locator	Sample Matrix	Tests Required	Container ID Barcode	Chemical Preservative	Date pH	DueDate Initials
L223920-1	GRAB 18:45	WS PENN MINE	LF-1	RawH2O	*ICP EPA 200.7;AL EPA 200.7;B EPA 200.7;BA EPA 200.7;BE EPA 200.7;CA EPA 200.7;CU EPA 200.7;FE EPA 200.7;K EPA 200.7;MG EPA 200.7;MN EPA 200.7;NA EPA 200.7;SI EPA 200.7;ZN EPA 200.7	1474373 PLSTL Y	HNO3, pH 2	1474373	20-SEP-18
				RawH2O	*ICP:F EPA 200.7;AL:F EPA 200.7;B:F EPA 200.7;BA:F EPA 200.7;BE:F EPA 200.7;CA:F EPA 200.7;CU:F EPA 200.7;FE:F EPA 200.7;K:F EPA 200.7;MG:F EPA 200.7;MN:F EPA 200.7;NA:F EPA 200.7;SI:F EPA 200.7;ZN:F EPA 200.7	1474374 PLSTM			
				RawH2O	ALKALINITY: CO3;ALKALINITY: HCO3;ALKALINITY: OH;	1474375 C500Z			
				RawH2O	ALKALINITY: TOTAL				
				RawH2O	CHLORIDE: IC;NITRATE: IC;SULFATE: IC	1474377 PLSTM			
				RawH2O	HARDNESS: TOTAL	1474378 PLSTM Y	HNO3, pH 2	8/30/18	
				RawH2O	TDS: GRAVIMETRIC;TSS	1474379 PLSTL			
				RawH2O	*300 IC ANIONS (1-3);+FLD DATA;+REPORT;+SAMP KIT				

ClientID:

Sample Comments: +FLD DATA: pH= 7.08 ; Turbidity = 8.4 NTU; Conductivity = 986 uS; Temperature = 20.2 degC; Depth to Water = 133.11 ft Pricing: STD

L223920-2	GRAB 10:05	WS PENN MINE	LF-2	RawH2O	*ICP EPA 200.7;AL EPA 200.7;B EPA 200.7;BA EPA 200.7;BE EPA 200.7;CA EPA 200.7;CU EPA 200.7;FE EPA 200.7;K EPA 200.7;MG EPA 200.7;MN EPA 200.7;NA EPA 200.7;SI EPA 200.7;ZN EPA 200.7	1474380 PLSTL Y	HNO3, pH 2	1474380	20-SEP-18
				RawH2O	*ICP:F EPA 200.7;AL:F EPA 200.7;B:F EPA 200.7;BA:F EPA 200.7;BE:F EPA 200.7;CA:F EPA 200.7;CU:F EPA 200.7;FE:F EPA 200.7;K:F EPA 200.7;MG:F EPA 200.7;MN:F EPA 200.7;NA:F EPA 200.7;SI:F EPA 200.7;ZN:F	1474381 PLSTM			

East Bay Municipal Utility District
Laboratory Services Chain of Custody Record

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Prelog or Login No.: L223920	Project Title PENN MINE Restoration:Landfill Wells Account or Project: B785-0008-2	Client PM: JOHN WALTER Tel No.: 7524 Lab PM: KRISTI LORENSON	Sampled by: WHIX/ERRG Rcvd: 30-AUG-18 11:30 Sample Date: 29-AUG-18
---------------------------------	--	--	--

Lab No.	Sample Type	Time	Site	Locator	Sample Matrix	Tests Required	Container ID Barcode	Chemical Preservative	Date pH	DueDate Initials
					RawH2O	EPA 200.7				
					RawH2O	ALKALINITY: CO3;ALKALINITY: HCO3;ALKALINITY: TOTAL	1474382	C500Z		
					RawH2O	CHLORIDE: IC;NITRATE: IC;SULFATE: IC	1474384	PLSTM		
					RawH2O	HARDNESS: TOTAL	1474385	PLSTM		
					RawH2O	TDS: GRAVIMETRIC;TSS	1474386	PLSTL		
					RawH2O	*300 IC ANIONS (1-3);+FLD DATA;ALKALINITY: OH				

ClientID:

Sample Comments: +FLD DATA: pH= 9.06; Turbidity = 0.2 NTU; Conductivity = 1062 uS; Temperature = 20.2 degC; Depth to Water = 39.77 ft Pricing: STD

L223920-3	GRAB	18:55	WS PENN MINE	LF-4	RawH2O	*ICP EPA 200.7;AL EPA 200.7;B EPA 200.7;BA EPA 200.7;BE EPA 200.7;CA EPA 200.7;CU EPA 200.7;FE EPA 200.7;K EPA 200.7;MG EPA 200.7;MN EPA 200.7;NA EPA 200.7;SI EPA 200.7;ZN EPA 200.7	1474394	PLSTL	Y	HAO, PH 2.2 8/30/18	20-SEP-18
					RawH2O	200.7;BE EPA 200.7;CA EPA 200.7;CU EPA 200.7;FE EPA 200.7;K EPA 200.7;MG EPA 200.7;MN EPA 200.7;NA EPA 200.7;SI EPA 200.7;ZN EPA 200.7					
					RawH2O	*ICP:F EPA 200.7;AL:F EPA 200.7;B:F EPA 200.7;BA:F EPA 200.7;BE:F EPA 200.7;CA:F EPA 200.7;CU:F EPA 200.7;FE:F EPA 200.7;K:F EPA 200.7;MG:F EPA 200.7;MN:F EPA 200.7;NA:F EPA 200.7;SI:F EPA 200.7;ZN:F EPA 200.7	1474395	PLSTM			
					RawH2O	ALKALINITY: CO3;ALKALINITY: HCO3;ALKALINITY: TOTAL	1474396	C500Z			
					RawH2O	CHLORIDE: IC;NITRATE: IC;SULFATE: IC	1474398	PLSTM			
					RawH2O	HARDNESS: TOTAL	1474399	PLSTM			
					RawH2O	TDS: GRAVIMETRIC;TSS	1474400	PLSTL			
					RawH2O	*300 IC ANIONS (1-3);+FLD DATA;ALKALINITY: OH					

ClientID:

Sample Comments: +FLD DATA: pH= 2.58; Turbidity = 7.7 NTU; Conductivity = 1062 uS; Temperature = 20.9 degC; Depth to Water = 120.22 ft Pricing: STD

L223920-4	QCPR	10:20	MISC	MISC	RawH2O	*ICP EPA 200.7;AL EPA 200.7;B EPA 200.7;BA EPA 200.7;BE EPA 200.7;CA EPA 200.7;CU EPA 200.7;FE EPA 200.7;K EPA 200.7;MG EPA 200.7;MN EPA 200.7;NA EPA 200.7	1474401	PLSTL	Y	HAO, PH 2.2 8/30/18	20-SEP-18
					RawH2O	200.7;BE EPA 200.7;CA EPA 200.7;CU EPA 200.7;FE EPA 200.7;K EPA 200.7;MG EPA 200.7;MN EPA 200.7;NA EPA 200.7					
					RawH2O	EPA 200.7;K EPA 200.7;MG EPA 200.7;MN EPA 200.7;NA EPA 200.7					

East Bay Municipal Utility District
Laboratory Services Chain of Custody Record

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Prelog or Login No.: L223920	Project Title PENN MINE Restoration:Landfill Wells Account or Project: B785-0008-2	Client PM: JOHN WALTER Tel No.: 7524 Lab PM: KRISTI LORENSON	Sampled by: WHIX/ERRG Rcvd: 30-AUG-18 11:30 Sample Date: 29-AUG-18
---------------------------------	--	--	--

Lab No.	Sample Type	Time	Site	Locator	Sample Matrix	Tests Required	Container ID Barcode	Chemical Preservative	Date pH	DueDate Initials
					RawH2O	EPA 200.7;SI EPA 200.7;ZN EPA 200.7				
					RawH2O	*ICP:F EPA 200.7;AL:F EPA 200.7;B:F EPA 200.7;BA:F	1474402	PLSTM		
					RawH2O	EPA 200.7;BE:F EPA 200.7;CA:F EPA 200.7;CU:F EPA				
					RawH2O	200.7;FE:F EPA 200.7;K:F EPA 200.7;MG:F EPA 200.7;				
					RawH2O	MN:F EPA 200.7;NA:F EPA 200.7;SI:F EPA 200.7;ZN:F				
					RawH2O	EPA 200.7				
					RawH2O	ALKALINITY: TOTAL	1474403	C500Z		
					RawH2O	CHLORIDE: IC;NITRATE: IC;SULFATE: IC	1474404	PLSTM		
					RawH2O	HARDNESS: TOTAL	1474405	PLSTM		
					RawH2O	TDS: GRAVIMETRIC;TSS	1474406	PLSTL		
					RawH2O	*300 IC ANIONS (1-3)				

ClientID:
Sample Comments: blind field rep Pricing: STD

Total containers received: 24

Signature	Print Name	Time	Date	Sample Type Descriptions:
Relinquished by				GRAB - Instantaneous Grab QCFR - Field Replicate Grab
Received by				Container Type Descriptions: C500Z - Glass, clear, NM, septa top, 500 mL PLSTM - Plastic, WM, 500 mL PLSTL - Plastic, WM, 1000 mL
Relinquished by				Reviewed by: <u>u</u> Date: <u>8/30/18</u>
Received by				Approved by: <u>FW</u> Date: <u>8/30/18</u>
Relinquished by				
Received by	Cynthia L Soohoo	11:30	30-AUG-18	

Samples will be retained beyond the approval process only if requested by the client.

1223920

East Bay Municipal Utility District
Laboratory Services Chain of Custody Record

Expect date: 15-Aug-2018
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Prelog or
Login No.: P232862

Project Title
PENN MINE Restoration/Landfill Wells
Account or Project: B785-0008-2

Client PM: JOHN WALTER
Tel No.: 7524
Lab PM: KRISTI LORENSON

Sampled by: **WBW/SD**
Rcvd:
Sample Date: **08/29/18**

Lab No.	Sample Type	Time	Site	Locator	Sample Matrix	Tests Required	Container ID Barcode	Chemical Preservative	Date pH	DueDate Initials
P232862-1	GRAB	1055 1845	WS PENN MINE	LF-1	RawH2O	*ICP EPA 200.7;AL EPA 200.7;B EPA 200.7;BA EPA 200.7;BE EPA 200.7;CA EPA 200.7;CU EPA 200.7;FE EPA 200.7;K EPA 200.7;MG EPA 200.7;MN EPA 200.7;NA EPA 200.7;SI EPA 200.7;ZN EPA 200.7	1474373 PLSTL			
					RawH2O	*ICP:F EPA 200.7;AL:F EPA 200.7;B:F EPA 200.7;BA:F EPA 200.7;BE:F EPA 200.7;CA:F EPA 200.7;CU:F EPA 200.7;FE:F EPA 200.7;K:F EPA 200.7;MG:F EPA 200.7;MN:F EPA 200.7;NA:F EPA 200.7;SI:F EPA 200.7;ZN:F EPA 200.7	1474374 PLSTM			
					RawH2O	ALKALINITY: CO3;ALKALINITY: HCO3;ALKALINITY: OH;	1474375 C500Z			
					RawH2O	ALKALINITY: TOTAL				
					RawH2O	CHLORIDE: IC;NITRATE: IC;SULFATE: IC	1474377 PLSTM			
					RawH2O	HARDNESS: TOTAL	1474378 PLSTM			
					RawH2O	TDS: GRAVIMETRIC;TSS	1474379 PLSTL			
					RawH2O	*300 IC ANIONS (1-3);+FLD DATA;+REPORT;+SAMP KIT				

ClientID: **7.08** **8.4**
Sample Comments: +FLD DATA: pH=~~7.58~~ ; Turbidity =~~2.7~~ NTU; Conductivity =~~1062~~ **986** uS; Temperature =~~30.9~~ **20.2** degC; Depth to Water =~~20.22 ft~~ **133.11 ft**
ft Pricing: STD

P232862-2	GRAB	10.05	WS PENN MINE	LF-2	RawH2O	*ICP EPA 200.7;AL EPA 200.7;B EPA 200.7;BA EPA 200.7;BE EPA 200.7;CA EPA 200.7;CU EPA 200.7;FE EPA 200.7;K EPA 200.7;MG EPA 200.7;MN EPA 200.7;NA EPA 200.7;SI EPA 200.7;ZN EPA 200.7	1474380 PLSTL			
					RawH2O	*ICP:F EPA 200.7;AL:F EPA 200.7;B:F EPA 200.7;BA:F EPA 200.7;BE:F EPA 200.7;CA:F EPA 200.7;CU:F EPA 200.7;FE:F EPA 200.7;K:F EPA 200.7;MG:F EPA 200.7;	1474381 PLSTM			

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East Bay Municipal Utility District
Laboratory Services Chain of Custody Record

Expect date: 15-Aug-2018
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Prelog or
Login No.: P232862

Project Title
PENN MINE Restoration:Landfill Wells
Account or Project: B785-0008-2

Client PM: JOHN WALTER
Tel No.: 7524
Lab PM: KRISTI LORENSON

Sampled by: WBH/SD
Rcvd:
Sample Date: 08/29/18

Lab No.	Sample Type Time	Site	Locator	Sample Matrix	Tests Required	Container ID Barcode	Chemical Preservative pH	Date	DueDate Initials
				RawH2O	MN:F EPA 200.7;NA:F EPA 200.7;SI:F EPA 200.7;ZN:F				
				RawH2O	EPA 200.7				
				RawH2O	ALKALINITY: CO3;ALKALINITY: HCO3;ALKALINITY: TOTAL	1474382	C500Z		
				RawH2O	CHLORIDE: IC;NITRATE: IC;SULFATE: IC	1474384	PLSTM		
				RawH2O	HARDNESS: TOTAL	1474385	PLSTM		
				RawH2O	TDS: GRAVIMETRIC;TSS	1474386	PLSTL		
				RawH2O	*300 IC ANIONS (1-3);+FLD DATA;ALKALINITY: OH				

ClientID:

Sample Comments: +FLD DATA: pH=9.06; Turbidity = 0.2 NTU; Conductivity = 1062 uS; Temperature = 20.2 degC; Depth to Water = 39.77 ft
ft Pricing: STD

P232862-3	GRAB	WS PENN MINE	LF-3	RawH2O	*ICP EPA 200.7;AL EPA 200.7;B EPA 200.7;BA EPA	1474387	PLSTL		
				RawH2O	200.7;BE EPA 200.7;CA EPA 200.7;CU EPA 200.7;FE				
				RawH2O	EPA 200.7;K EPA 200.7;MG EPA 200.7;MN EPA 200.7;NA				
				RawH2O	EPA 200.7;SI EPA 200.7;ZN EPA 200.7				
				RawH2O	*ICP:F EPA 200.7;AL:F EPA 200.7;B:F EPA 200.7;BA:F	1474388	PLSTM		
				RawH2O	EPA 200.7;BE:F EPA 200.7;CA:F EPA 200.7;CU:F EPA				
				RawH2O	200.7;FE:F EPA 200.7;K:F EPA 200.7;MG:F EPA 200.7;				
				RawH2O	MN:F EPA 200.7;NA:F EPA 200.7;SI:F EPA 200.7;ZN:F				
				RawH2O	EPA 200.7				
				RawH2O	ALKALINITY: CO3;ALKALINITY: HCO3;ALKALINITY: TOTAL	1474389	C500Z		
				RawH2O	CHLORIDE: IC;NITRATE: IC;SULFATE: IC	1474391	PLSTM		
				RawH2O	HARDNESS: TOTAL	1474392	PLSTM		
				RawH2O	TDS: GRAVIMETRIC;TSS	1474393	PLSTL		
				RawH2O	*300 IC ANIONS (1-3);+FLD DATA;ALKALINITY: OH				

ClientID:

Sample Comments: +FLD DATA: pH= ; Turbidity = - NTU; Conductivity = - uS; Temperature = - degC; Depth to Water = 7 ft
ft Pricing: STD

P232862-4	GRAB	WS PENN MINE	LF-4	RawH2O	*ICP EPA 200.7;AL EPA 200.7;B EPA 200.7;BA EPA	1474394	PLSTL		
				RawH2O	200.7;BE EPA 200.7;CA EPA 200.7;CU EPA 200.7;FE				

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East Bay Municipal Utility District
Laboratory Services Chain of Custody Record

Expect date: 15-Aug-2018
Page 3 of 4

Prelog or
Login No.: P232862

Project Title
PENN MINE Restoration:Landfill Wells
Account or Project: B785-0008-2

Client PM: JOHN WALTER
Tel No.: 7524
Lab PM: KRISTI LORENSON

Sampled by: WBH / SD
Rcvd:
Sample Date: 08/29/2018

Lab No.	Sample Type	Time	Site	Locator	Sample Matrix	Tests Required	Container ID Barcode	Chemical Preservative	Date pH	DueDate Initials
					RawH2O	EPA 200.7;K EPA 200.7;MG EPA 200.7;MN EPA 200.7;NA				
					RawH2O	EPA 200.7;SI EPA 200.7;ZN EPA 200.7				
					RawH2O	*ICP:F EPA 200.7;AL:F EPA 200.7;B:F EPA 200.7;BA:F	1474395	PLSTM		
					RawH2O	EPA 200.7;BE:F EPA 200.7;CA:F EPA 200.7;CU:F EPA				
					RawH2O	200.7;FE:F EPA 200.7;K:F EPA 200.7;MG:F EPA 200.7;				
					RawH2O	MN:F EPA 200.7;NA:F EPA 200.7;SI:F EPA 200.7;ZN:F				
					RawH2O	EPA 200.7				
					RawH2O	ALKALINITY: CO3;ALKALINITY: HCO3;ALKALINITY: TOTAL	1474396	C500Z		
					RawH2O	CHLORIDE: IC;NITRATE: IC;SULFATE: IC	1474398	PLSTM		
					RawH2O	HARDNESS: TOTAL	1474399	PLSTM		
					RawH2O	TDS: GRAVIMETRIC;TSS	1474400	PLSTL		
					RawH2O	*300 IC ANIONS (1-3);+FLD DATA;ALKALINITY: OH				

ClientID:

Sample Comments: +FLD DATA: pH=7.58 ; Turbidity = 7.7 NTU; Conductivity = 1062 uS; Temperature = 20.9 degC; Depth to Water = 120.22 ft Pricing: STD

P232862-5	QCPR	10:20	MISC	MISC	RawH2O	*ICP EPA 200.7;AL EPA 200.7;B EPA 200.7;BA EPA	1474401	PLSTL		
					RawH2O	200.7;BE EPA 200.7;CA EPA 200.7;CU EPA 200.7;FE				
					RawH2O	EPA 200.7;K EPA 200.7;MG EPA 200.7;MN EPA 200.7;NA				
					RawH2O	EPA 200.7;SI EPA 200.7;ZN EPA 200.7				
					RawH2O	*ICP:F EPA 200.7;AL:F EPA 200.7;B:F EPA 200.7;BA:F	1474402	PLSTM		
					RawH2O	EPA 200.7;BE:F EPA 200.7;CA:F EPA 200.7;CU:F EPA				
					RawH2O	200.7;FE:F EPA 200.7;K:F EPA 200.7;MG:F EPA 200.7;				
					RawH2O	MN:F EPA 200.7;NA:F EPA 200.7;SI:F EPA 200.7;ZN:F				
					RawH2O	EPA 200.7				
					RawH2O	ALKALINITY: TOTAL	1474403	C500Z		
					RawH2O	CHLORIDE: IC;NITRATE: IC;SULFATE: IC	1474404	PLSTM		

2223920

East Bay Municipal Utility District
Laboratory Services Chain of Custody Record

Expect date: 15-Aug-2018
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Prelog or
Login No.: P232862

Project Title
PENN MINE Restoration:Landfill Wells
Account or Project: B785-0008-2

Client PM: JOHN WALTER
Tel No.: 7524
Lab PM: KRISTI LORENSON

Sampled by: **WBH/SD**
Rcvd:
Sample Date: **08/29/2018**

Lab No.	Sample Type	Time	Site	Locator	Sample Matrix	Tests Required	Container ID Barcode	Chemical Preservative	Date pH	DueDate Initials
P232862+5	QCFR	10:20	MISC	MISC	RawH2O	HARDNESS: TOTAL	1474405 PLSTM			
					RawH2O	TDS: GRAVIMETRIC;TSS	1474406 PLSTL			
					RawH2O	*300 IC ANIONS (1-3)				

ClientID:
Sample Comments: blind field rep Pricing: STD

Total containers received: 30

	Signature	Print Name	Time	Date
Relinquished by		William B Hix	1127	8/30/18
Received by				
Relinquished by				
Received by				
Relinquished by				
Received by		AYDIAH SOTO	1120	8/30/18

Sample Type Descriptions:
GRAB - Instantaneous Grab
QCFR - Field Replicate Grab

Container Type Descriptions:
C500Z - Glass, clear, NM, septa top, 500 mL
PLSTM - Plastic, WM, 500 mL
PLSTL - Plastic, WM, 1000 mL

Reviewed by: _____ Date: _____

Approved by: _____ Date: _____

0.8 #2

Samples will be retained beyond the approval process only if requested by the client.

☒ All samples on this COC are transported
on ice. Initial **WBH** Date **8/30/18**

EBMUD LABORATORY COOLER RECEIPT FORM

Login Number: L223920 Received: 30-Aug-2018 11:30
Converted from P232862

Cooler ID: 305618

SHIPPING INFORMATION

1. Did cooler come with a shipping slip?
Tracking number:

PACKAGING AND PRESERVATION

1. Ice present?
2. Type of cooler packing:
3. Temperature of a representative sample. Measured temp:
Corrected temperature:
Thermometer used to measure temperature:
4. SWBCT cont. > 10 C received >= 2 hrs. after collection:

LOGIN PHASE

1. Containers intact?
2. Preservation correct?
3. Correct sample containers?
4. Sufficient sample volume?
5. Labels legible?
6. Label info agrees with COC?
7. Label information complete?
8. Bubbles present in VOA-type containers?
Container IDs w/ bubbles:
9. Senior Chemist notified of anomalies?
Senior Chemist called
Who called?

CHAIN OF CUSTODY DOCUMENTATION

1. COC signed by Lab?
2. Project identified on COC?
3. COC info complete?

No					
Yes None .8 .9 IR #2 No					
Yes Yes Yes Yes Yes Yes Yes Yes 1474375 1474382 1474396 1474403 No					
Yes Yes Yes					

Comments:

305618 container 1474375 1474382 - lima bean size air bubble
container 1474396 1474403 - pea size air bubble
Received from night drop refrigerator

Site / locator: WS PENN MINE/LF-1
Site / locator: WS PENN MINE/LF-2
Site / locator: WS PENN MINE/LF-4
Site / locator: MISC/MISC

* Bottle for LF-3 received full; bottle for LF-4 were empty.
Confirmed w/ WHix that LF-4, not LF-3, was the sample.
KJH
8/30/18

East Bay Municipal Utility District
Laboratory Services Chain of Custody Record

Page 1 of 1

Prelog or Login No.: L224061	Project Title PENN MINE Restoration:Landfill Wells Account or Project: B785-0008-2	Client PM: JOHN WALTER Tel No.: 7524 Lab PM: KRISTI LORENSON	Sampled by: W. Hix Rcvd: 07-SEP-18 11:50 Sample Date: 06-SEP-18
---------------------------------	--	--	---

Lab No.	Sample Type Time Site	Locator	Sample Matrix	Tests Required	Container ID Barcode	Chemical Preservative pH	Date	DueDate Initials
L224061-1	GRAB 10:20 WS PENN MINE	LF-1	RawH2O RawH2O	*300 IC ANIONS (1-3);NITRATE: IC +REPORT	1476573 PLSTM			28-SEP-18

ClientID:
Sample Comments: Resample of L223920-1 Pricing: STD

Total containers received: 1

Signature	Print Name	Time	Date
Relinquished by			
Received by			
Relinquished by			
Received by			
Relinquished by			
Received by	Alvin C Ng	11:50	07-SEP-18

Sample Type Descriptions:
GRAB - Instantaneous Grab

Container Type Descriptions:
PLSTM - Plastic, WM, 500 mL

Reviewed by: AN Date: 9/7/18

Approved by: ga Date: 9/10/18

Samples will be retained beyond the approval process only if requested by the client.

L 224061

East Bay Municipal Utility District
Laboratory Services Chain of Custody Record

Expect date: 06-Sep-2018

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Prelog or
Login No.: P233274Project Title
PENN MINE Restoration: Landfill Wells
Account or Project: B785-0008-2Client PM: JOHN WALTER
Tel No.: 7524
Lab PM: KRISTI LORENSONSampled by: **WBH**
Rcvd:
Sample Date: **9-6-18 10:20**

Lab No.	Sample Type	Time	Site	Locator	Sample Matrix	Tests Required	Container ID Barcode	Chemical Preservative	Date pH	DueDate Initials
P233274-1	GRAB		WS PENN MINE	LF-1	RawH2O RawH2O	*300 IC ANIONS (1-3); NITRATE: IC +REPORT	1476573 PLSTM			

Client ID:

Sample Comments: Resample of L223920-1 Pricing: STD

Total containers received: 1

Signature	Print Name	Time	Date
Relinquished by 	William B Hix	1055	9/7/18
Received by			
Relinquished by			
Received by			
Relinquished by			
Received by 	ALVIN NG	1150	9/7/18

Sample Type Descriptions:

GRAB - Instantaneous Grab

Container Type Descriptions:

PLSTM - Plastic, WM, 500 mL

Reviewed by: _____ Date: _____

Approved by: _____ Date: _____

Samples will be retained beyond the approval process only if requested by the client.

3.0
x1

EBMUD LABORATORY COOLER RECEIPT FORM

Login Number: L224061 Received: 07-Sep-2018 11:50
Converted from P233274

Cooler ID: 305913

SHIPPING INFORMATION

1. Did cooler come with a shipping slip?
Tracking number:

No

PACKAGING AND PRESERVATION

1. Ice present?
2. Type of cooler packing:
3. Temperature of a representative sample. Measured temp:
Corrected temperature:
Thermometer used to measure temperature:
4. SWBCT cont. > 10 C received >= 2 hrs. after collection:

No

None

3

2.6

IR #1

No

LOGIN PHASE

1. Containers intact?
2. Preservation correct?
3. Correct sample containers?
4. Sufficient sample volume?
5. Labels legible?
6. Label info agrees with COC?
7. Label information complete?
8. Bubbles present in VOA-type containers?
Container IDs w/ bubbles:
9. Senior Chemist notified of anomalies?
Senior Chemist called
Who called?

Yes

Yes

Yes

Yes

Yes

Yes

Yes

No

No

CHAIN OF CUSTODY DOCUMENTATION

1. COC signed by Lab?
2. Project identified on COC?
3. COC info complete?

Yes

Yes

Yes

Comments:

305913 received from sample drop fridge

Site / locator: WS PENN MINE/LF-1

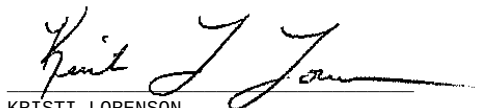
Appendix B

Laboratory Report

Analytical Report Prepared for JOHN WALTER

Report generated on: Sep 14, 2018 04:11 pm
Login No.: L224061

Reported by:



KRISTI LORENSON
Laboratory Program Manager

Approved by:



NIRMELA ARSEM
Laboratory Services Division Manager

LSR B785-0008-2

Project Title: PENN MINE Restoration:Landfill Wells

Login Performance Summary

1 - Sample received by the lab on: Sep 07 2018, 11:50 am
0 - Lost Analyses
0 - Hold Time Exceedences
Turn-around-time met

Samples included in this report:

Sample	Type Collected	Site	Locator	ClientID
L224061-1	GRAB 06-Sep-2018 10:20	WS PENN MINE	LF-1	-

Legend to the laboratory qualifiers used in this report:

No qualifiers are included in this report



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Laboratory Services Division
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Analytical Results Report

LSR B785-0008-2 PENN MINE Restoration:Landfill Wells
Site: WS PENN MINE Watershed Penn Mine Monitoring
Locator: LF-1 Landfill Well #1
Lab ID: L224061-1 (P233274-1)
Sample Type: GRAB (Instantaneous Grab)
Date Collected: Sep 06 2018, 10:20am Sample collector: W. Hix
Date Received: Sep 07 2018, 11:50am Sample receiver: ANG
Sample Comments: Resample of L223920-1

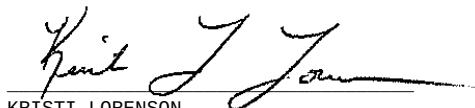
Method Reference	Qualifier	Result	Units	Dilution	MDL	Matrix	Tag
Parameter						RL/ML	
Method: EPA 300.1 - Ion Chromatography						RawH2O	
Instrument calibrated 04-SEP-18							
TARGET ANALYTES							
NITRATE AS N		18	mg/L	50	0.095	0.4	
SURROGATE							
DICHLOROACETATE		99	% recovery	50			
Run ID: R287490 / Work Group No.: WG224515							
Prep Date1: 07-SEP-18 Analyzed 07-Sep-18 13:56							

RL is either the client requested or regulatory mandated Reporting Limit. ML is the regulatory mandated Minimum Level

Analytical Report Prepared for JOHN WALTER

Report generated on: Sep 21, 2018 01:09 pm
Login No.: L223920

Reported by:



KRISTI LORENSON
Laboratory Program Manager

Approved by:



NIRMELA ARSEM
Laboratory Services Division Manager

LSR B785-0008-2

Project Title: PENN MINE Restoration:Landfill Wells

Login Performance Summary

4 - Samples received by the lab on: Aug 30 2018, 11:30 am
0 - Lost Analyses
4 - Hold Time Exceedences
Turn-around-time met

Samples included in this report:

Sample	Type Collected	Site	Locator	ClientID
L223920-1	GRAB 29-Aug-2018 18:45	WS PENN MINE	LF-1	-
L223920-2	GRAB 29-Aug-2018 10:05	WS PENN MINE	LF-2	-
L223920-3	GRAB 29-Aug-2018 18:55	WS PENN MINE	LF-4	-
L223920-4	QCFR 29-Aug-2018 10:20	MISC	MISC	-

Legend to the laboratory qualifiers used in this report:

H - Analyzed past hold time
U - Analyte not detected

Qualifiers for subcontract work - See textvalue for description



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LSR B785-0008-2 PENN MINE Restoration:Landfill Wells
Site: WS PENN MINE Watershed Penn Mine Monitoring
Locator: LF-1 Landfill Well #1
Lab ID: L223920-1 (P232862-1)
Sample Type: GRAB (Instantaneous Grab)
Date Collected: Aug 29 2018, 06:45pm Sample collector: WHix/ERRG
Date Received: Aug 30 2018, 11:30am Sample receiver: CS00H00
Sample Comments: +FLD DATA: pH= 7.08 ; Turbidity = 8.4 NTU; Conductivity = 986 uS;
Temperature = 20.2 degC; Depth to Water = 133.11 ft

Method Reference	Qualifier	Result	Units	Dilution	MDL	Matrix RL/ML	Tag
Parameter							
Method: SAMPLER PROVIDED FIELD MEASUREMENTS - DATA ENTRY LIST FOR FIELD DATA						RawH2O	
FIELD ANALYSIS/OBSERVATION DATA PARAMETERS							
PH		7.08	pH units	1			
TEMPERATURE		20.2	deg C	1			
CONDUCTIVITY		986	umhos/cm	1			
DEPTH		133.11	feet	1			
TURBIDITY		8.4	NTU	1			
Run ID: R287253 / Work Group No.: WG224411							
Prep Date1: 29-AUG-18 Analyzed 29-Aug-18 18:45							
Method: EPA 300.1 - Ion Chromatography						RawH2O	
Instrument calibrated 09-JUL-18							
TARGET ANALYTES							
CHLORIDE		18	mg/L	10	0.35		
SULFATE		52	mg/L	10	0.5	0.5	
SURROGATE							
DICHLOROACETATE		100	% recovery	10			
Run ID: R287402 / Work Group No.: WG224397							
Prep Date1: 31-AUG-18 Analyzed 31-Aug-18 20:18							
Method: EPA 300.1 - Ion Chromatography						RawH2O	1
Instrument calibrated 04-SEP-18							
TARGET ANALYTES							
NITRATE AS N	H	17	mg/L	50	0.095	0.4	
Dilution analyzed past hold time							
SURROGATE							
DICHLOROACETATE		95	% recovery	50			
Run ID: R287423 / Work Group No.: WG224464							
Prep Date1: 05-SEP-18 Analyzed 05-Sep-18 17:03							
Method: SM2320B - 1997, Titration						RawH2O	
TARGET ANALYTES							
ALKALINITY: TOTAL AS CAC03		340	mg/L	1	5		
Run ID: R287237 / Work Group No.: WG224390							
Prep Date1: 31-AUG-18 Analyzed 31-Aug-18 07:06							
Method: SM2320B-1997 - Calculation						RawH2O	
TARGET ANALYTES							
ALKALINITY: BICARBONATE		340	mg/L	1	5		
Run ID: R287236 / Work Group No.: WG224392							
Prep Date1: 31-AUG-18 Analyzed 31-Aug-18 07:06							
Method: SM2320B-1997 - Calculation						RawH2O	
TARGET ANALYTES							
ALKALINITY: CARBONATE	U	0.10	mg/L	1	0.1		
Run ID: R287236 / Work Group No.: WG224392							
Prep Date1: 31-AUG-18 Analyzed 31-Aug-18 07:06							

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Analytical Results Report

LSR B785-0008-2 PENN MINE Restoration:Landfill Wells
Site: WS PENN MINE Watershed Penn Mine Monitoring
Locator: LF-1 Landfill Well #1
Lab ID: L223920-1 (P232862-1)
Sample Type: GRAB (Instantaneous Grab)
Date Collected: Aug 29 2018, 06:45pm Sample collector: WHix/ERRG
Date Received: Aug 30 2018, 11:30am Sample receiver: CS00H00
Sample Comments: +FLD DATA: pH= 7.08 ; Turbidity = 8.4 NTU; Conductivity = 986 uS;
Temperature = 20.2 degC; Depth to Water = 133.11 ft

Method Reference	Qualifier	Result	Units	Dilution	MDL	Matrix RL/ML	Tag
Parameter							
Method: SM2320B-1997 - Calculation						RawH2O	
TARGET ANALYTES							
ALKALINITY: HYDROXIDE	U	0.10	mg/L	1	0.1		
Run ID: R287236 / Work Group No.: WG224392							
Prep Date1: 31-AUG-18 Analyzed 31-Aug-18 07:06							
Method: SM2340C - 1997, Titration: EDTA						RawH2O	
TARGET ANALYTES							
HARDNESS: TOTAL AS CAC03		340	mg/L	2	6		
Run ID: R287552 / Work Group No.: WG224579							
Prep Date1: 11-SEP-18 Analyzed 11-Sep-18 10:25							
Method: SM2540C - 1997, Dried at 180C						RawH2O	
TARGET ANALYTES							
TOTAL DISSOLVED SOLIDS		580	mg/L	2	20		
Run ID: R287450 / Work Group No.: WG224456							
Prep Date1: 05-SEP-18 Analyzed 05-Sep-18 08:05							
Method: SM2540D - 1997, Dried at 103-105C						RawH2O	
TARGET ANALYTES							
TOTAL SUSPENDED SOLIDS		480	mg/L	4	24		
Run ID: R287354 / Work Group No.: WG224401							
Prep Date1: 31-AUG-18 Analyzed 31-Aug-18 14:30							
Method: EPA 200.7 - Rev. 4.4, ICP Scan						RawH2O	
TARGET ANALYTES							
ALUMINUM		5,300	ug/L	1.04	14	50	
BORON		138	ug/L	1.04	18.8	100	
BARIUM		144	ug/L	1.04	0.322	100	
BERYLLIUM	U	0.198	ug/L	1.04	0.198	1	
CALCIUM		61,400	ug/L	1.04	22.4		
COPPER		140	ug/L	1.04	4.06	50	
IRON		10,200	ug/L	1.04	5.2	100	
POTASSIUM		6,760	ug/L	1.04	19.9		
MAGNESIUM		59,000	ug/L	1.04	5.72		
MANGANESE		385	ug/L	1.04	0.0832	20	
SODIUM		55,300	ug/L	1.04	5.62		
SILICON		25,000	ug/L	1.04	19		
ZINC		165	ug/L	1.04	0.582	50	
Run ID: R287601 / Work Group No.: WG224657							
Prep Date1: 10-SEP-18 Prep Date2: 13-SEP-18 Analyzed 13-Sep-18 13:24							
Method: EPA 200.7: FILTERED - Rev. 4.4, Filtered, ICP Scan						RawH2O	
TARGET ANALYTES							
ALUMINUM	U	14.0	ug/L	1.04	14	50	
BORON		133	ug/L	1.04	18.8	100	
BARIUM		71.8	ug/L	1.04	0.322	100	
BERYLLIUM	U	0.198	ug/L	1.04	0.198	1	
CALCIUM		43,000	ug/L	1.04	22.4		
COPPER		4.89	ug/L	1.04	4.06	50	
IRON	U	5.20	ug/L	1.04	5.2	100	
POTASSIUM		5,390	ug/L	1.04	19.9		
MAGNESIUM		50,500	ug/L	1.04	5.72		

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Analytical Results Report

LSR B785-0008-2 PENN MINE Restoration:Landfill Wells
Site: WS PENN MINE Watershed Penn Mine Monitoring
Locator: LF-1 Landfill Well #1
Lab ID: L223920-1 (P232862-1)
Sample Type: GRAB (Instantaneous Grab)
Date Collected: Aug 29 2018, 06:45pm Sample collector: WHix/ERRG
Date Received: Aug 30 2018, 11:30am Sample receiver: CS00H00
Sample Comments: +FLD DATA: pH= 7.08 ; Turbidity = 8.4 NTU; Conductivity = 986 uS;
Temperature = 20.2 degC; Depth to Water = 133.11 ft

Method Reference						Matrix	Tag
Parameter	Qualifier	Result	Units	Dilution	MDL	RL/ML	
MANGANESE	U	0.0832	ug/L	1.04	0.0832	20	
SODIUM		47,900	ug/L	1.04	5.62		
SILICON		14,200	ug/L	1.04	19		
ZINC		1.88	ug/L	1.04	0.582	50	

Run ID: R287724 / Work Group No.: WG224766

Prep Date1: 04-SEP-18 Prep Date2: 19-SEP-18 Analyzed 19-Sep-18 11:21



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Analytical Results Report

LSR B785-0008-2 PENN MINE Restoration:Landfill Wells
Site: WS PENN MINE Watershed Penn Mine Monitoring
Locator: LF-2 Landfill Well #2
Lab ID: L223920-2 (P232862-2)
Sample Type: GRAB (Instantaneous Grab)
Date Collected: Aug 29 2018, 10:05am Sample collector: WHix/ERRG
Date Received: Aug 30 2018, 11:30am Sample receiver: CS00H00
Sample Comments: +FLD DATA: pH= 9.06; Turbidity = 0.2 NTU; Conductivity = 1062 uS;
Temperature = 20.2 degC; Depth to Water = 39.77 ft

Method Reference	Qualifier	Result	Units	Dilution	MDL	Matrix RL/ML	Tag
Parameter							
Method: SAMPLER PROVIDED FIELD MEASUREMENTS - DATA ENTRY LIST FOR FIELD DATA						RawH2O	
FIELD ANALYSIS/OBSERVATION DATA PARAMETERS							
PH		9.06	pH units	1			
TEMPERATURE		20.2	deg C	1			
CONDUCTIVITY		1,062	umhos/cm	1			
DEPTH		39.77	feet	1			
TURBIDITY		0.2	NTU	1			
Run ID: R287253 / Work Group No.: WG224411							
Prep Date1: 29-AUG-18 Analyzed 29-Aug-18 10:05							
Method: EPA 300.1 - Ion Chromatography						RawH2O	
Instrument calibrated 09-JUL-18							
TARGET ANALYTES							
CHLORIDE		16	mg/L	50	1.8		
NITRATE AS N	H	15	mg/L	50	0.095	0.4	
Instrument failure							
SULFATE		100	mg/L	50	2.5	0.5	
SURROGATE							
DICHLOROACETATE		100	% recovery	50			
Run ID: R287402 / Work Group No.: WG224397							
Prep Date1: 31-AUG-18 Analyzed 31-Aug-18 20:56							
Method: SM2320B - 1997, Titration						RawH2O	
TARGET ANALYTES							
ALKALINITY: TOTAL AS CAC03		340	mg/L	1	5		
Run ID: R287237 / Work Group No.: WG224390							
Prep Date1: 31-AUG-18 Analyzed 31-Aug-18 07:06							
Method: SM2320B-1997 - Calculation						RawH2O	
TARGET ANALYTES							
ALKALINITY: CARBONATE	U	0.10	mg/L	1	0.1		
Run ID: R287236 / Work Group No.: WG224392							
Prep Date1: 31-AUG-18 Analyzed 31-Aug-18 07:06							
Method: SM2320B-1997 - Calculation						RawH2O	
TARGET ANALYTES							
ALKALINITY: HYDROXIDE	U	0.10	mg/L	1	0.1		
Run ID: R287236 / Work Group No.: WG224392							
Prep Date1: 31-AUG-18 Analyzed 31-Aug-18 07:06							
Method: SM2320B-1997 - Calculation						RawH2O	
TARGET ANALYTES							
ALKALINITY: BICARBONATE		340	mg/L	1	5		
Run ID: R287236 / Work Group No.: WG224392							
Prep Date1: 31-AUG-18 Analyzed 31-Aug-18 07:06							
Method: SM2340C - 1997, Titration: EDTA						RawH2O	
TARGET ANALYTES							
HARDNESS: TOTAL AS CAC03		510	mg/L	10	30		
Run ID: R287552 / Work Group No.: WG224579							
Prep Date1: 11-SEP-18 Analyzed 11-Sep-18 10:25							

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Analytical Results Report

LSR B785-0008-2 PENN MINE Restoration:Landfill Wells
Site: WS PENN MINE Watershed Penn Mine Monitoring
Locator: LF-2 Landfill Well #2
Lab ID: L223920-2 (P232862-2)
Sample Type: GRAB (Instantaneous Grab)
Date Collected: Aug 29 2018, 10:05am Sample collector: WHix/ERRG
Date Received: Aug 30 2018, 11:30am Sample receiver: CS00H00
Sample Comments: +FLD DATA: pH= 9.06; Turbidity = 0.2 NTU; Conductivity = 1062 uS;
Temperature = 20.2 degC; Depth to Water = 39.77 ft

Method Reference	Qualifier	Result	Units	Dilution	MDL	Matrix RL/ML	Tag
Parameter							
Method: SM2540C - 1997, Dried at 180C						RawH2O	
TARGET ANALYTES							
TOTAL DISSOLVED SOLIDS		770	mg/L	2	20		
Run ID: R287450 / Work Group No.: WG224456							
Prep Date1: 05-SEP-18 Analyzed 05-Sep-18 08:05							
Method: SM2540D - 1997, Dried at 103-105C						RawH2O	
TARGET ANALYTES							
TOTAL SUSPENDED SOLIDS		220	mg/L	2	12		
Run ID: R287354 / Work Group No.: WG224401							
Prep Date1: 31-AUG-18 Analyzed 31-Aug-18 14:30							
Method: EPA 200.7 - Rev. 4.4, ICP Scan						RawH2O	
TARGET ANALYTES							
ALUMINUM		156	ug/L	1.04	14	50	
BORON		20.5	ug/L	1.04	18.8	100	
BARIUM		107	ug/L	1.04	0.322	100	
BERYLLIUM	U	0.198	ug/L	1.04	0.198	1	
CALCIUM		109,000	ug/L	1.04	22.4		
COPPER	U	4.06	ug/L	1.04	4.06	50	
IRON		249	ug/L	1.04	5.2	100	
POTASSIUM		1,080	ug/L	1.04	19.9		
MAGNESIUM		50,700	ug/L	1.04	5.72		
MANGANESE		78.0	ug/L	1.04	0.0832	20	
SODIUM		24,100	ug/L	1.04	5.62		
SILICON		16,400	ug/L	1.04	19		
ZINC		17.9	ug/L	1.04	0.582	50	
Run ID: R287601 / Work Group No.: WG224657							
Prep Date1: 10-SEP-18 Prep Date2: 13-SEP-18 Analyzed 13-Sep-18 13:28							
Method: EPA 200.7: FILTERED - Rev. 4.4, Filtered, ICP Scan						RawH2O	
TARGET ANALYTES							
ALUMINUM	U	14.0	ug/L	1.04	14	50	
BORON		20.2	ug/L	1.04	18.8	100	
BARIUM		98.8	ug/L	1.04	0.322	100	
BERYLLIUM	U	0.198	ug/L	1.04	0.198	1	
CALCIUM		104,000	ug/L	1.04	22.4		
COPPER	U	4.06	ug/L	1.04	4.06	50	
IRON	U	5.20	ug/L	1.04	5.2	100	
POTASSIUM		896	ug/L	1.04	19.9		
MAGNESIUM		49,100	ug/L	1.04	5.72		
MANGANESE		19.5	ug/L	1.04	0.0832	20	
SODIUM		23,000	ug/L	1.04	5.62		
SILICON		15,900	ug/L	1.04	19		
ZINC		12.0	ug/L	1.04	0.582	50	
Run ID: R287724 / Work Group No.: WG224766							
Prep Date1: 04-SEP-18 Prep Date2: 19-SEP-18 Analyzed 19-Sep-18 11:40							

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Analytical Results Report

LSR B785-0008-2 PENN MINE Restoration:Landfill Wells
Site: WS PENN MINE Watershed Penn Mine Monitoring
Locator: LF-4 Landfill Well #4
Lab ID: L223920-3 (P232862-4)
Sample Type: GRAB (Instantaneous Grab)
Date Collected: Aug 29 2018, 06:55pm Sample collector: WHix/ERRG
Date Received: Aug 30 2018, 11:30am Sample receiver: CS00H00
Sample Comments: +FLD DATA: pH= 2.58; Turbidity = 7.7 NTU; Conductivity = 1062 uS;
Temperature = 20.9 degC; Depth to Water = 120.22 ft

Method Reference	Qualifier	Result	Units	Dilution	MDL	Matrix RL/ML	Tag
Parameter							
Method: SAMPLER PROVIDED FIELD MEASUREMENTS - DATA ENTRY LIST FOR FIELD DATA						RawH2O	
FIELD ANALYSIS/OBSERVATION DATA PARAMETERS							
PH		2.58	pH units	1			
TEMPERATURE		20.9	deg C	1			
CONDUCTIVITY		1,062	umhos/cm	1			
DEPTH		120.22	feet	1			
TURBIDITY		7.7	NTU	1			
Run ID: R287253 / Work Group No.: WG224411							
Prep Date1: 29-AUG-18 Analyzed 29-Aug-18 18:55							
Method: EPA 300.1 - Ion Chromatography						RawH2O	
Instrument calibrated 09-JUL-18							
TARGET ANALYTES							
CHLORIDE		32	mg/L	5	0.18		
NITRATE AS N	H	2.0	mg/L	5	0.0095	0.4	
Instrument failure							
SULFATE		18	mg/L	5	0.25	0.5	
SURROGATE							
DICHLOROACETATE		100	% recovery	5			
Run ID: R287402 / Work Group No.: WG224397							
Prep Date1: 31-AUG-18 Analyzed 01-Sep-18 00:05							
Method: SM2320B - 1997, Titration						RawH2O	
TARGET ANALYTES							
ALKALINITY: TOTAL AS CAC03		470	mg/L	1	5		
Run ID: R287237 / Work Group No.: WG224390							
Prep Date1: 31-AUG-18 Analyzed 31-Aug-18 07:06							
Method: SM2320B-1997 - Calculation						RawH2O	
TARGET ANALYTES							
ALKALINITY: CARBONATE	U	0.10	mg/L	1	0.1		
Run ID: R287236 / Work Group No.: WG224392							
Prep Date1: 31-AUG-18 Analyzed 31-Aug-18 07:06							
Method: SM2320B-1997 - Calculation						RawH2O	
TARGET ANALYTES							
ALKALINITY: HYDROXIDE	U	0.10	mg/L	1	0.1		
Run ID: R287236 / Work Group No.: WG224392							
Prep Date1: 31-AUG-18 Analyzed 31-Aug-18 07:06							
Method: SM2320B-1997 - Calculation						RawH2O	
TARGET ANALYTES							
ALKALINITY: BICARBONATE		470	mg/L	1	5		
Run ID: R287236 / Work Group No.: WG224392							
Prep Date1: 31-AUG-18 Analyzed 31-Aug-18 07:06							
Method: SM2340C - 1997, Titration: EDTA						RawH2O	
TARGET ANALYTES							
HARDNESS: TOTAL AS CAC03		220	mg/L	2	6		
Run ID: R287552 / Work Group No.: WG224579							
Prep Date1: 11-SEP-18 Analyzed 11-Sep-18 10:25							

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LSR B785-0008-2 PENN MINE Restoration:Landfill Wells
Site: WS PENN MINE Watershed Penn Mine Monitoring
Locator: LF-4 Landfill Well #4
Lab ID: L223920-3 (P232862-4)
Sample Type: GRAB (Instantaneous Grab)
Date Collected: Aug 29 2018, 06:55pm Sample collector: WHix/ERRG
Date Received: Aug 30 2018, 11:30am Sample receiver: CS00H00
Sample Comments: +FLD DATA: pH= 2.58; Turbidity = 7.7 NTU; Conductivity = 1062 uS;
Temperature = 20.9 degC; Depth to Water = 120.22 ft

Method Reference	Qualifier	Result	Units	Dilution	MDL	Matrix RL/ML	Tag
Parameter							
Method: SM2540C - 1997, Dried at 180C						RawH20	
TARGET ANALYTES							
TOTAL DISSOLVED SOLIDS		630	mg/L	2	20		
Run ID: R287450 / Work Group No.: WG224456							
Prep Date1: 05-SEP-18 Analyzed 05-Sep-18 08:05							
Method: SM2540D - 1997, Dried at 103-105C						RawH20	
TARGET ANALYTES							
TOTAL SUSPENDED SOLIDS		9.0	mg/L	.5	3		
Run ID: R287354 / Work Group No.: WG224401							
Prep Date1: 31-AUG-18 Analyzed 31-Aug-18 14:30							
Method: EPA 200.7 - Rev. 4.4, ICP Scan						RawH20	
TARGET ANALYTES							
ALUMINUM		158	ug/L	1.04	14	50	
BORON		389	ug/L	1.04	18.8	100	
BARIUM		141	ug/L	1.04	0.322	100	
BERYLLIUM	U	0.198	ug/L	1.04	0.198	1	
CALCIUM		34,800	ug/L	1.04	22.4		
COPPER		6.16	ug/L	1.04	4.06	50	
IRON		258	ug/L	1.04	5.2	100	
POTASSIUM		7,950	ug/L	1.04	19.9		
MAGNESIUM		33,300	ug/L	1.04	5.72		
MANGANESE		25.2	ug/L	1.04	0.0832	20	
SODIUM		135,000	ug/L	1.04	5.62		
SILICON		16,800	ug/L	1.04	19		
ZINC		8.10	ug/L	1.04	0.582	50	
Run ID: R287527 / Work Group No.: WG224581							
Prep Date1: 06-SEP-18 Prep Date2: 11-SEP-18 Analyzed 11-Sep-18 13:33							
Method: EPA 200.7: FILTERED - Rev. 4.4, Filtered, ICP Scan						RawH20	1
TARGET ANALYTES							
SODIUM		134,000	ug/L	10.4	56.2		
Run ID: R287724 / Work Group No.: WG224766							
Prep Date1: 04-SEP-18 Prep Date2: 19-SEP-18 Analyzed 19-Sep-18 11:59							
Method: EPA 200.7: FILTERED - Rev. 4.4, Filtered, ICP Scan						RawH20	
TARGET ANALYTES							
ALUMINUM	U	14.0	ug/L	1.04	14	50	
BORON		408	ug/L	1.04	18.8	100	
BARIUM		125	ug/L	1.04	0.322	100	
BERYLLIUM	U	0.198	ug/L	1.04	0.198	1	
CALCIUM		32,500	ug/L	1.04	22.4		
COPPER	U	4.06	ug/L	1.04	4.06	50	
IRON		6.49	ug/L	1.04	5.2	100	
POTASSIUM		6,710	ug/L	1.04	19.9		
MAGNESIUM		29,300	ug/L	1.04	5.72		
MANGANESE		7.01	ug/L	1.04	0.0832	20	
SILICON		16,800	ug/L	1.04	19		
ZINC		3.44	ug/L	1.04	0.582	50	
Run ID: R287724 / Work Group No.: WG224766							
Prep Date1: 04-SEP-18 Prep Date2: 19-SEP-18 Analyzed 19-Sep-18 11:45							

RL is either the client requested or regulatory mandated Reporting Limit. ML is the regulatory mandated Minimum Level



EAST BAY MUNICIPAL UTILITY DISTRICT
Laboratory Services Division
PO Box 24055, MS 59, Oakland, CA 94623
Phone (510)287-1432 Fax (510)465-5462
Analytical Results Report

LSR B785-0008-2 PENN MINE Restoration:Landfill Wells
Site: MISC Miscellaneous - Unidentified Site
Locator: MISC Miscellaneous sample, see sample comments for location
Lab ID: L223920-4 (P232862-5)
Sample Type: QCFR (Field Replicate Grab)
Date Collected: Aug 29 2018, 10:20am Sample collector: WHix/ERRG
Date Received: Aug 30 2018, 11:30am Sample receiver: CS00H00
Sample Comments: blind field rep

Method Reference	Qualifier	Result	Units	Dilution	MDL	Matrix RL/ML	Tag
Parameter							
Method: EPA 300.1 - Ion Chromatography						RawH20	
Instrument calibrated 04-SEP-18							
TARGET ANALYTES							
CHLORIDE		20	mg/L	100	3.5		
NITRATE AS N	H	16	mg/L	100	0.19	0.4	
Dilution analyzed past hold time							
SULFATE		100	mg/L	100	5	0.5	
SURROGATE							
DICHLOROACETATE		98	% recovery	100			
Run ID: R287423 / Work Group No.: WG224464							
Prep Date1: 05-SEP-18 Analyzed 05-Sep-18 14:32							
Method: SM2320B - 1997, Titration						RawH20	
TARGET ANALYTES							
ALKALINITY: TOTAL AS CAC03		350	mg/L	1	5		
Run ID: R287237 / Work Group No.: WG224390							
Prep Date1: 31-AUG-18 Analyzed 31-Aug-18 07:06							
Method: SM2340C - 1997, Titration: EDTA						RawH20	
TARGET ANALYTES							
HARDNESS: TOTAL AS CAC03		500	mg/L	5	15		
Run ID: R287552 / Work Group No.: WG224579							
Prep Date1: 11-SEP-18 Analyzed 11-Sep-18 10:25							
Method: SM2540C - 1997, Dried at 180C						RawH20	
TARGET ANALYTES							
TOTAL DISSOLVED SOLIDS		650	mg/L	2	20		
Run ID: R287450 / Work Group No.: WG224456							
Prep Date1: 05-SEP-18 Analyzed 05-Sep-18 08:05							
Method: SM2540D - 1997, Dried at 103-105C						RawH20	
TARGET ANALYTES							
TOTAL SUSPENDED SOLIDS		9.7	mg/L	.333	2		
Run ID: R287354 / Work Group No.: WG224401							
Prep Date1: 31-AUG-18 Analyzed 31-Aug-18 14:30							
Method: EPA 200.7 - Rev. 4.4, ICP Scan						RawH20	
TARGET ANALYTES							
ALUMINUM		129	ug/L	1.04	14	50	
BORON	U	18.8	ug/L	1.04	18.8	100	
BARIUM		107	ug/L	1.04	0.322	100	
BERYLLIUM	U	0.198	ug/L	1.04	0.198	1	
CALCIUM		107,000	ug/L	1.04	22.4		
COPPER	U	4.06	ug/L	1.04	4.06	50	
IRON		210	ug/L	1.04	5.2	100	
POTASSIUM		1,000	ug/L	1.04	19.9		
MAGNESIUM		49,900	ug/L	1.04	5.72		
MANGANESE		62.2	ug/L	1.04	0.0832	20	
SODIUM		24,000	ug/L	1.04	5.62		
SILICON		16,100	ug/L	1.04	19		
ZINC		26.6	ug/L	1.04	0.582	50	
Run ID: R287601 / Work Group No.: WG224657							
Prep Date1: 10-SEP-18 Prep Date2: 13-SEP-18 Analyzed 13-Sep-18 13:33							

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Analytical Results Report

LSR B785-0008-2 PENN MINE Restoration:Landfill Wells
Site: MISC Miscellaneous - Unidentified Site
Locator: MISC Miscellaneous sample, see sample comments for location
Lab ID: L223920-4 (P232862-5)
Sample Type: QCFR (Field Replicate Grab)
Date Collected: Aug 29 2018, 10:20am Sample collector: WHix/ERRG
Date Received: Aug 30 2018, 11:30am Sample receiver: CS00H00
Sample Comments: blind field rep

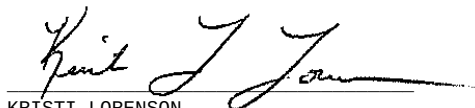
Method Reference						Matrix	Tag
Parameter	Qualifier	Result	Units	Dilution	MDL	RL/ML	
Method: EPA 200.7: FILTERED - Rev. 4.4, Filtered, ICP Scan						RawH2O	
TARGET ANALYTES							
ALUMINUM	U	14.0	ug/L	1.04	14	50	
BORON	U	18.8	ug/L	1.04	18.8	100	
BARIUM		94.9	ug/L	1.04	0.322	100	
BERYLLIUM	U	0.198	ug/L	1.04	0.198	1	
CALCIUM		109,000	ug/L	1.04	22.4		
COPPER	U	4.06	ug/L	1.04	4.06	50	
IRON		6.97	ug/L	1.04	5.2	100	
POTASSIUM		961	ug/L	1.04	19.9		
MAGNESIUM		51,200	ug/L	1.04	5.72		
MANGANESE		18.2	ug/L	1.04	0.0832	20	
SODIUM		22,500	ug/L	1.04	5.62		
SILICON		16,600	ug/L	1.04	19		
ZINC		18.7	ug/L	1.04	0.582	50	
Run ID: R287724 / Work Group No.: WG224766							
Prep Date1: 04-SEP-18 Prep Date2: 19-SEP-18 Analyzed 19-Sep-18 11:50							

RL is either the client requested or regulatory mandated Reporting Limit. ML is the regulatory mandated Minimum Level

Analytical Report Prepared for JOHN WALTER

Report generated on: Oct 05, 2018 03:07 pm
Login No.: L224062

Reported by:



KRISTI LORENSON
Laboratory Program Manager

Approved by:



NIRMELA ARSEM
Laboratory Services Division Manager

LSR B785-0008-2

Project Title: PENN MINE Restoration:Landfill Wells

Login Performance Summary

1 - Sample received by the lab on: Sep 07 2018, 11:55 am
0 - Lost Analyses
0 - Hold Time Exceedences
Turn-around-time not met

Samples included in this report:

Sample	Type Collected	Site	Locator	ClientID
L224062-1	GRAB 06-Sep-2018 10:30	WS PENN MINE	LF-3	-

Legend to the laboratory qualifiers used in this report:

N - Spike recovery outside of control limits
U - Analyte not detected
Qualifiers for subcontract work - See textvalue for description



EAST BAY MUNICIPAL UTILITY DISTRICT
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PO Box 24055, MS 59, Oakland, CA 94623
Phone (510)287-1432 Fax (510)465-5462
Analytical Results Report

LSR B785-0008-2 PENN MINE Restoration:Landfill Wells
Site: WS PENN MINE Watershed Penn Mine Monitoring
Locator: LF-3 Landfill Well #3
Lab ID: L224062-1 (P232862-3)
Sample Type: GRAB (Instantaneous Grab)
Date Collected: Sep 06 2018, 10:30am Sample collector: W. Hix
Date Received: Sep 07 2018, 11:55am Sample receiver: ANG
Sample Comments: +FLD DATA: pH= 7.61; Turbidity = 9.8 NTU; Conductivity = 466.9 uS;
Temperature = 20.2 degC; Depth to Water = 84.5 ft

Method Reference	Qualifier	Result	Units	Dilution	MDL	Matrix RL/ML	Tag
Parameter							
Method: SAMPLER PROVIDED FIELD MEASUREMENTS - DATA ENTRY LIST FOR FIELD DATA						RawH2O	
FIELD ANALYSIS/OBSERVATION DATA PARAMETERS							
PH		7.61	pH units	1			
TEMPERATURE		20.2	deg C	1			
CONDUCTIVITY		466.9	umhos/cm	1			
DEPTH		84.5	feet	1			
TURBIDITY		9.8	NTU	1			
Run ID: R287550 / Work Group No.: WG224617							
Prep Date1: 06-SEP-18 Analyzed 06-Sep-18 10:30							
Method: EPA 300.1 - Ion Chromatography						RawH2O	
Instrument calibrated 04-SEP-18							
TARGET ANALYTES							
CHLORIDE		4.2	mg/L	10	0.35		
NITRATE AS N		2.7	mg/L	10	0.019	0.4	
SULFATE		64	mg/L	10	0.5	0.5	
SURROGATE							
DICHLOROACETATE		98	% recovery	10			
Run ID: R287490 / Work Group No.: WG224515							
Prep Date1: 07-SEP-18 Analyzed 07-Sep-18 13:18							
Method: SM2320B - 1997, Titration						RawH2O	
TARGET ANALYTES							
ALKALINITY: TOTAL AS CAC03		170	mg/L	1	5		
Run ID: R287487 / Work Group No.: WG224552							
Prep Date1: 10-SEP-18 Analyzed 10-Sep-18 08:55							
Method: SM2320B-1997 - Calculation						RawH2O	
TARGET ANALYTES							
ALKALINITY: CARBONATE	U	0.10	mg/L	1	0.1		
Run ID: R287496 / Work Group No.: WG224566							
Prep Date1: 10-SEP-18 Analyzed 10-Sep-18 03:26							
Method: SM2320B-1997 - Calculation						RawH2O	
TARGET ANALYTES							
ALKALINITY: HYDROXIDE	U	0.10	mg/L	1	0.1		
Run ID: R287496 / Work Group No.: WG224566							
Prep Date1: 10-SEP-18 Analyzed 10-Sep-18 03:26							
Method: SM2320B-1997 - Calculation						RawH2O	
TARGET ANALYTES							
ALKALINITY: BICARBONATE		170	mg/L	1	5		
Run ID: R287496 / Work Group No.: WG224566							
Prep Date1: 10-SEP-18 Analyzed 10-Sep-18 03:26							
Method: SM2340C - 1997, Titration: EDTA						RawH2O	
TARGET ANALYTES							
HARDNESS: TOTAL AS CAC03		170	mg/L	2	6		
Run ID: R287736 / Work Group No.: WG224789							
Prep Date1: 19-SEP-18 Analyzed 19-Sep-18 13:40							

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Analytical Results Report

LSR B785-0008-2 PENN MINE Restoration:Landfill Wells
Site: WS PENN MINE Watershed Penn Mine Monitoring
Locator: LF-3 Landfill Well #3
Lab ID: L224062-1 (P232862-3)
Sample Type: GRAB (Instantaneous Grab)
Date Collected: Sep 06 2018, 10:30am Sample collector: W. Hix
Date Received: Sep 07 2018, 11:55am Sample receiver: ANG
Sample Comments: +FLD DATA: pH= 7.61; Turbidity = 9.8 NTU; Conductivity = 466.9 uS;
Temperature = 20.2 degC; Depth to Water = 84.5 ft

Method Reference	Qualifier	Result	Units	Dilution	MDL	Matrix RL/ML	Tag
Parameter							
Method: SM2540C - 1997, Dried at 180C						RawH2O	
TARGET ANALYTES							
TOTAL DISSOLVED SOLIDS		310	mg/L	1	10		
Run ID: R287680 / Work Group No.: WG224597							
Prep Date1: 12-SEP-18 Analyzed 12-Sep-18 08:30							
Method: SM2540D - 1997, Dried at 103-105C						RawH2O	
TARGET ANALYTES							
TOTAL SUSPENDED SOLIDS		19	mg/L	.4	2.4		
Run ID: R287575 / Work Group No.: WG224578							
Prep Date1: 11-SEP-18 Analyzed 11-Sep-18 14:30							
Method: EPA 200.7 - Rev. 4.4, ICP Scan						RawH2O	
TARGET ANALYTES							
ALUMINUM		1,210	ug/L	1.04	14	50	
BORON		87.3	ug/L	1.04	18.8	100	
BARIUM		22.5	ug/L	1.04	0.322	100	
BERYLLIUM	U	0.198	ug/L	1.04	0.198	1	
CALCIUM		34,100	ug/L	1.04	22.4		
COPPER	U	4.06	ug/L	1.04	4.06	50	
IRON	N	1,870	ug/L	1.04	5.2	100	
POTASSIUM		2,460	ug/L	1.04	19.9		
MAGNESIUM		22,500	ug/L	1.04	5.72		
MANGANESE		86.7	ug/L	1.04	0.0832	20	
SODIUM		31,900	ug/L	1.04	5.62		
SILICON		12,900	ug/L	1.04	19		
ZINC		19.5	ug/L	1.04	0.582	50	
Run ID: R288038 / Work Group No.: WG225073							
Prep Date1: 27-SEP-18 Prep Date2: 03-OCT-18 Analyzed 03-Oct-18 11:06							
Method: EPA 200.7: FILTERED - Rev. 4.4, Filtered, ICP Scan						RawH2O	
TARGET ANALYTES							
ALUMINUM	U	14.0	ug/L	1.04	14	50	
BORON		60.2	ug/L	1.04	18.8	100	
BARIUM		13.7	ug/L	1.04	0.322	100	
BERYLLIUM	U	0.198	ug/L	1.04	0.198	1	
CALCIUM		32,400	ug/L	1.04	22.4		
COPPER	U	4.06	ug/L	1.04	4.06	50	
IRON	U	5.20	ug/L	1.04	5.2	100	
POTASSIUM		2,300	ug/L	1.04	19.9		
MAGNESIUM		20,800	ug/L	1.04	5.72		
MANGANESE		0.121	ug/L	1.04	0.0832	20	
SODIUM		31,900	ug/L	1.04	5.62		
SILICON		10,800	ug/L	1.04	19		
ZINC		4.26	ug/L	1.04	0.582	50	
Run ID: R287832 / Work Group No.: WG224868							
Prep Date1: 21-SEP-18 Prep Date2: 24-SEP-18 Analyzed 24-Sep-18 14:06							

RL is either the client requested or regulatory mandated Reporting Limit. ML is the regulatory mandated Minimum Level

Appendix 5-1. Hazardous Materials Inventory, EBMUD

(64 pages)

- Camanche North Shore
- Camanche South Shore
- Pardee Center
- Pardee Recreation Area

EBMUD - Camanche North Shore Recreation (CERSID: 10238980)**Facility Information Accepted Aug 26, 2020**

Submitted on 8/19/2020 11:47:06 AM by *Deirdre Mena* of East Bay Municipal Utility District (Oakland, CA)
Submittal was **Accepted** on 8/26/2020 12:08:51 PM by Scott Meyer

- Business Activities
- Business Owner/Operator Identification

Hazardous Materials Inventory Accepted Aug 26, 2020

Submitted on 8/19/2020 11:47:06 AM by *Deirdre Mena* of East Bay Municipal Utility District (Oakland, CA)
Comments by Submitter: leased 550-gallon diesel fuel tank onsite 180 days/year for potential PG&E PSPS events. Tank supplies fuel for local EBMUD emergency generators.

Submittal was **Accepted** on 8/26/2020 12:08:58 PM by Scott Meyer

- Hazardous Material Inventory (4)
- Site Map (Official Use Only)
 - *Annotated Site Map (Official Use Only)* (Adobe PDF, 1365KB)
 - *CANS Wastewater Treatment Plant* (Adobe PDF, 142KB)
 - *CANS Maintenance Yard Leased 550-Gallon Diesel Fuel Tank* (Adobe PDF, 283KB)

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org.	East Bay Municipal Utility District				Chemical Location		CERS ID	10238980		
Facility Name	EBMUD - Camanche North Shore Recreation				Emergency generators-Storage Yard LS#1, MHP#1 LS#2 & Facility ID				Status	
	2000 Camanche Rd, Ione 95640				#5				Submitted on 8/19/2020 11:47 AM	

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org.	East Bay Municipal Utility District					Chemical Location	CERS ID	10238980		
Facility Name	EBMUD - Camanche North Shore Recreation					Maintenance Yard	Facility ID			
	2000 Camanche Rd, Lone 95640						Status	Submitted on 8/19/2020 11:47 AM		
						Annual Waste Amount	Federal Hazard Categories	Hazardous Components (For mixture only)		
DOT Code/Fire Haz. Class	Common Name	Unit	Max. Daily	Largest Cont.	Avg. Daily			Component Name	% Wt	EHS CAS No.
DOT: 3 - Flammable and Combustible Liquids	Diesel Fuel No. 2	Gallons	550	550	550	0	- Physical			
	CAS No	State	Storage Container		Pressue		Flammable			
	68334-30-5	Liquid	Aboveground Tank, Steel Drum		Ambient	Waste Code	- Health			
Combustible Liquid, Class II		Type			Temperature		Carcinogenicity			
		Pure	Days on Site: 180		Ambient		- Health Acute			
							Toxicity			
							- Health Skin			
							Corrosion			
							Irritation			
							- Health Specific			
							Target Organ			
							Toxicity			
							- Health			
							Aspiration Hazard			

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org.	East Bay Municipal Utility District				Chemical Location	CERS ID	10238980					
Facility Name	EBMUD - Camanche North Shore Recreation				wastewater treatment plant - leased generator for PSPS events			Facility ID				
	2000 Camanche Rd, Ione 95640						Status	Submitted on 8/19/2020 11:47 AM				
							Annual Waste Amount	Federal Hazard Categories		Hazardous Components (For mixture only)		
DOT Code/Fire Haz. Class	Common Name	Unit	Max. Daily	Largest Cont.	Avg. Daily				Component Name	% Wt	EHS	CAS No.
DOT: 3 - Flammable and Combustible Liquids	Diesel Fuel No. 2	Gallons	100	100	100	0		- Physical				
	CAS No	State	Storage Container		Pressue			Flammable				
	68334-30-5	Liquid	Other		Ambient	Waste Code		- Health				
Combustible Liquid, Class II		Type			Temperature			Carcinogenicity				
		Pure	Days on Site: 180		Ambient			- Health Acute				
								Toxicity				
								- Health Skin				
								Corrosion				
								Irritation				
								- Health Specific				
								Target Organ				
								Toxicity				
								- Health				
								Aspiration Hazard				

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org.	East Bay Municipal Utility District				Chemical Location		CERS ID	10238980		
Facility Name	EBMUD - Camanche North Shore Recreation				Water Treatment Plant		Facility ID			
	2000 Camanche Rd, Ione 95640						Status	Submitted on 8/19/2020 11:47 AM		
					Annual Waste		Hazardous Components			
					Amount		(For mixture only)			
DOT Code/Fire Haz. Class	Common Name	Unit	Quantities			Federal Hazard				
			Max. Daily	Largest Cont.	Avg. Daily	Categories	Component Name	% Wt	EHS	CAS No.
Corrosive, Corrosive	Sodium Hypochlorite >5% - 12.5%	Gallons	275	275	175	0	- Physical	SODIUM HYPOCHLORITE	12 %	7681-52-9
	CAS No	State	Storage Container		Pressue	Waste Code	Corrosive To	WATER	88 %	7732-18-5
	7681-52-9	Liquid	Tank Inside Building		Ambient		Metal			
	Map: 2, 4	Type			Temperature		- Health Skin			
	Grid: E3, C5	Mixture	Days on Site: 365		Ambient		Corrosion			
							Irritation			
							- Health Serious			
							Eye Damage Eye			
							Irritation			

CAMANCHE NORTH SHORE WATER TREATMENT PLANT - Map 4

BUILDING E

H

G

F

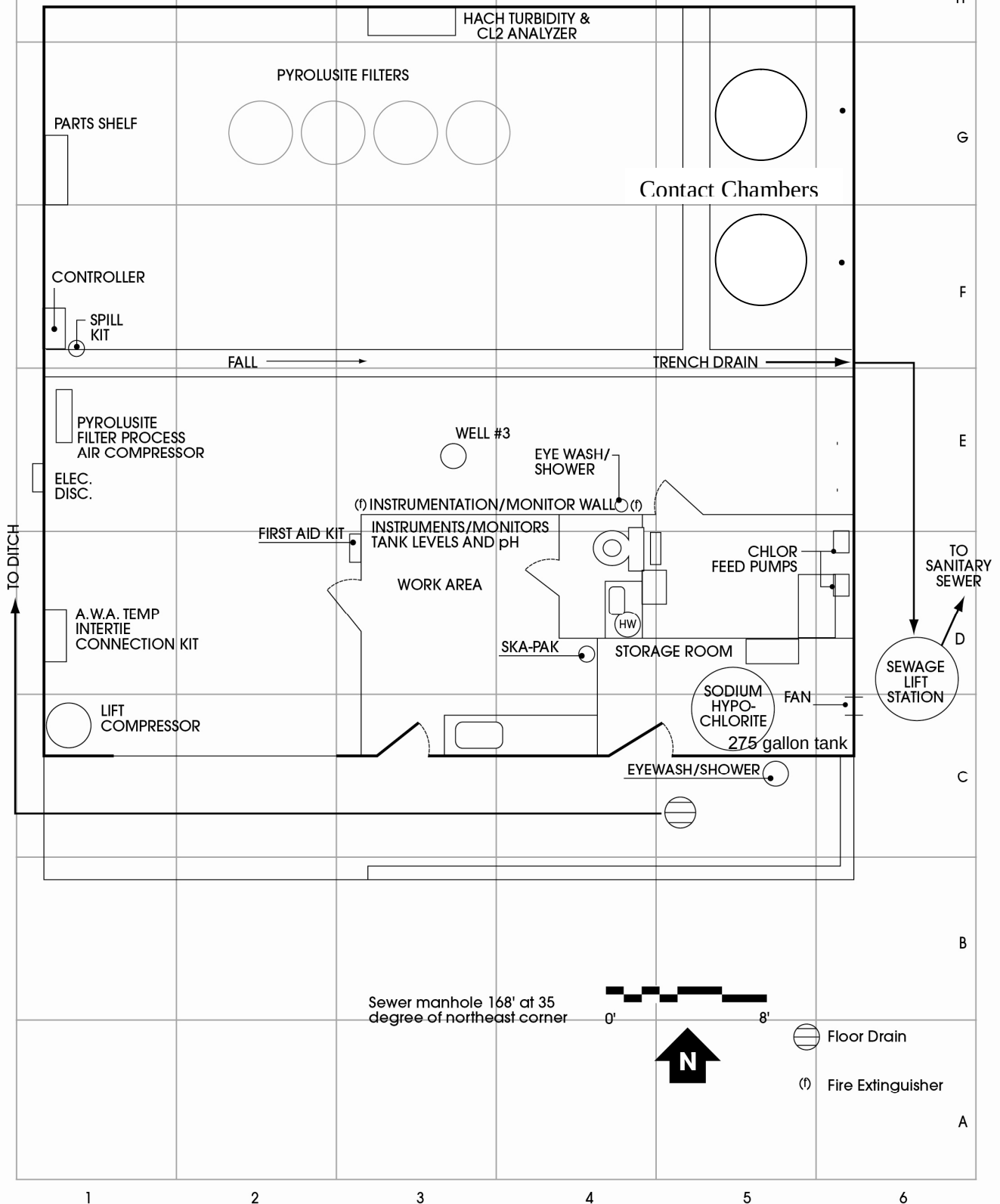
E

D

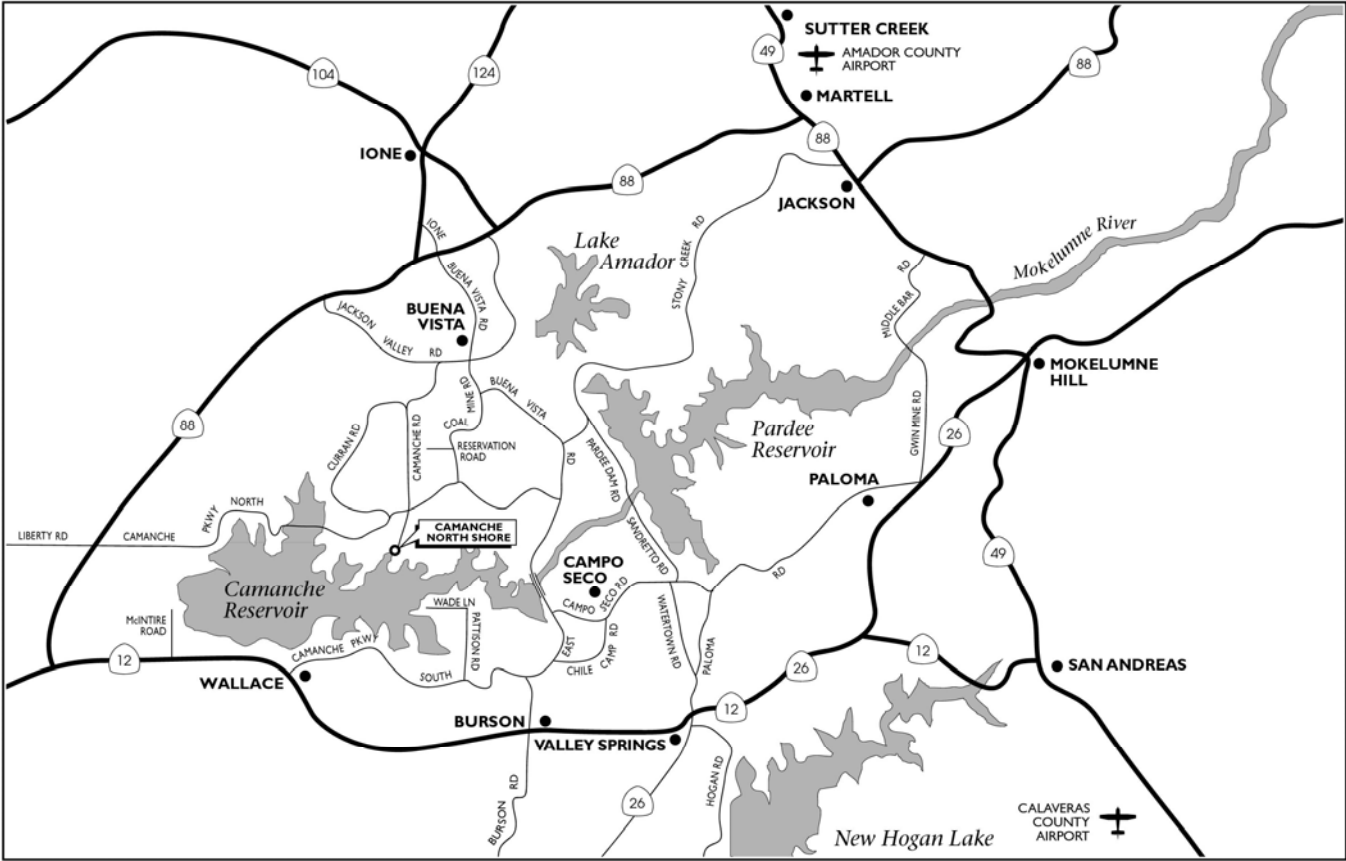
C

B

A



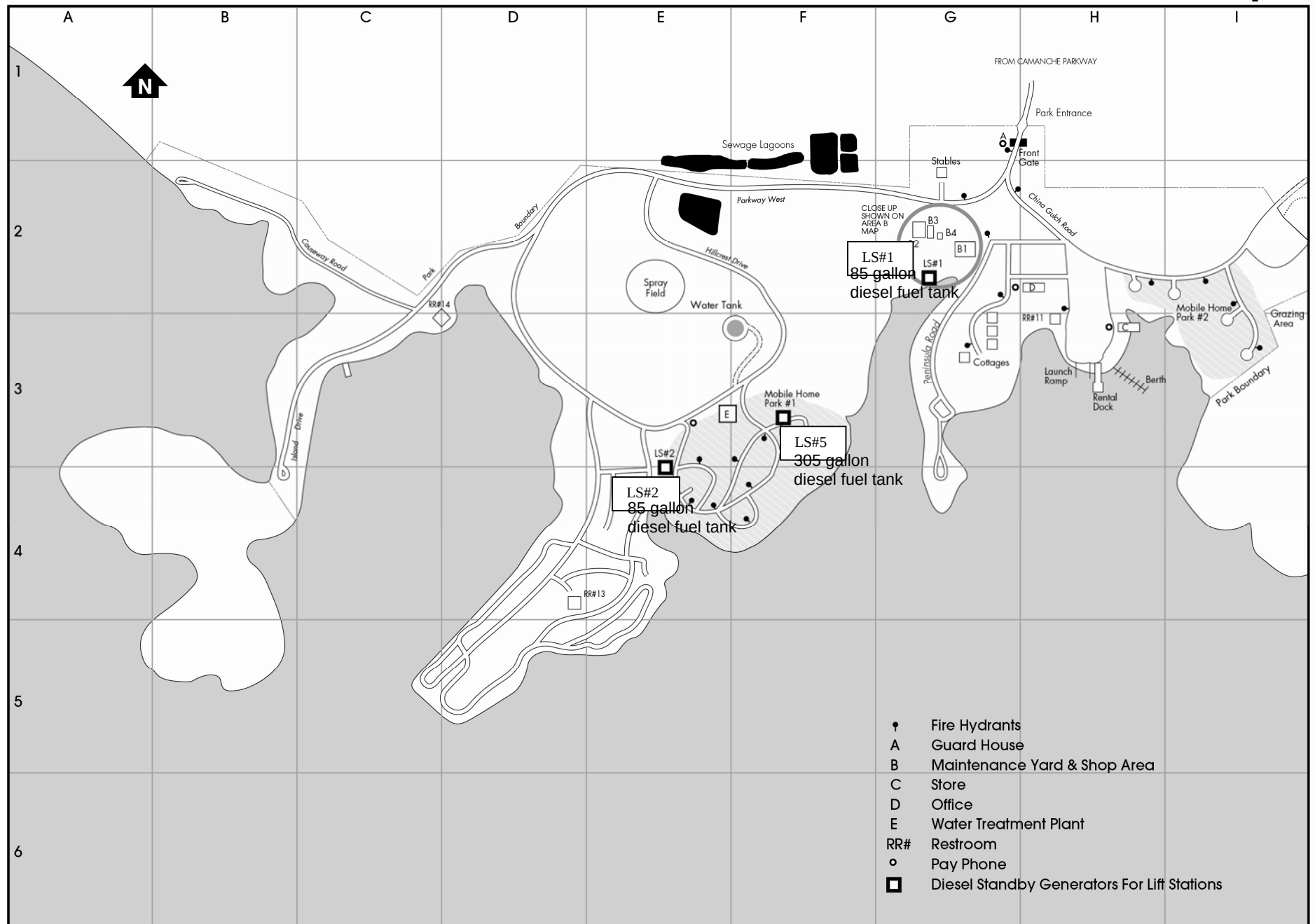
CAMANCHE NORTH SHORE



BP-16A

MAP 1 – VICINITY

CAMANCHE NORTH SHORE - Map 2



Camanche North Shore Wastewater Treatment Plant
Map depicting location of portable generator leased for potential PG&E PSPS Events



EBMUD – Camanche North Shore Recreation Area
Map depicting location of leased diesel fuel tank for potential PG&E PSPS Events



EBMUD - Camanche South Shore Recreation Area (CERSID: 10397710)**Facility Information Accepted Feb 19, 2020**

Submitted on 2/18/2020 3:58:38 PM by *Deirdre Mena* of East Bay Municipal Utility District (Oakland, CA)
Submittal was **Accepted** on 2/19/2020 9:21:54 AM by Lisa Medina

- Business Activities
- Business Owner/Operator Identification

Hazardous Materials Inventory Accepted Feb 19, 2020

Submitted on 2/18/2020 3:58:38 PM by *Deirdre Mena* of East Bay Municipal Utility District (Oakland, CA)
Submittal was **Accepted** on 2/19/2020 9:22:05 AM by Lisa Medina

- Hazardous Material Inventory (12)
- Site Map (Official Use Only)
 - *Map 6 - Maintenance Yard, Bldg. C* (Adobe PDF, 205KB)
 - *Map 7 - Maintenance Shop* (Adobe PDF, 609KB)
 - *Maps 1 & 2 Vicinity_Site Location* (Adobe PDF, 405KB)
 - *Map 5 - Ranger Station Storage Facility* (Adobe PDF, 78KB)
 - *Map 4 - Ranger Station* (Adobe PDF, 288KB)
 - *CASS Wastewater Treatment Plant* (Adobe PDF, 127KB)
 - *Maps 3A-3C Water Treatment Plant* (Adobe PDF, 290KB)

Emergency Response and Training Plans Accepted Feb 19, 2020

Submitted on 2/18/2020 3:58:38 PM by *Deirdre Mena* of East Bay Municipal Utility District (Oakland, CA)
Submittal was **Accepted** on 2/19/2020 9:24:11 AM by Lisa Medina

- Emergency Response/Contingency Plan
 - *Emergency Response/Contingency Plan* (Adobe PDF, 473KB)
 - *CASS WTP Evacuation Plan* (Adobe PDF, 52KB)
- Employee Training Plan
 - *Employee Training Plan* (Adobe PDF, 629KB)

Aboveground Petroleum Storage Act Accepted Feb 19, 2020

Submitted on 2/18/2020 3:58:38 PM by *Deirdre Mena* of East Bay Municipal Utility District (Oakland, CA)
Submittal was **Accepted** on 2/19/2020 9:24:22 AM by Lisa Medina

- Aboveground Petroleum Storage Act Documentation
 - EBMUD has less than 1,320 gallons of aboveground fuel capacity onsite. Contracted concessionaire, Camanche Recreation Company, South Shore Area, holds the SPCC Plan for the site as it operates and maintains the site's aboveground fuel dispensing systems.
- APSA Facility Information

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org.	East Bay Municipal Utility District				Chemical Location		CERS ID	10397710		
Facility Name	EBMUD - Camanche South Shore Recreation Area				Building J1		Facility ID			
	11700 Wade Ln, Wallace 95225						Status	Submitted on 2/18/2020 3:58 PM		
						Annual Waste Amount	Hazardous Components (For mixture only)			
DOT Code/Fire Haz. Class	Common Name	Unit	Quantities			Federal Hazard Categories				
			Max. Daily	Largest Cont.	Avg. Daily		Component Name	% Wt	EHS	CAS No.
	Citric Acid 50%	Gallons	55	55	55	- Health Acute	Citric Acid Anhydrous	50 %		77-92-9
	CAS No	State	Storage Container		Pressue	Waste Code	Toxicity	Water	50 %	7732-18-5
		Liquid	Carboy		Ambient		- Health Skin			
	Map: Map 3A	Type			Temperature		Corrosion			
		Mixture	Days on Site: 365		Ambient		Irritation			
							- Health Serious			
							Eye Damage			
							Irritation			

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org.	East Bay Municipal Utility District				Chemical Location			CERS ID 10397710		
Facility Name	EBMUD - Camanche South Shore Recreation Area				EBMUD Rangers Maintenance Shop, Bldg C1			Facility ID		
	11700 Wade Ln, Wallace 95225							Status Submitted on 2/18/2020 3:58 PM		
						Annual Waste Amount	Federal Hazard Categories	Hazardous Components (For mixture only)		
DOT Code/Fire Haz. Class	Common Name	Unit	Max. Daily	Largest Cont.	Avg. Daily			Component Name	% Wt	EHS CAS No.
DOT: 2.2 - Nonflammable Gases	Oxygen, compressed	Cu. Feet	896	282	614	0	- Physical Gas	Oxygen	100 %	7782-44-7
Oxidizing, Class 2	CAS No	State	Storage Container		Pressue	Waste Code	Under Pressure			
	7782-44-7	Gas	Cylinder		> Ambient		- Physical			
	Map: 2, 6, 7	Type			Temperature		Explosive			
	Grid: E3, A2, B1	Pure	Days on Site: 365		Ambient		- Physical Oxidizer			
DOT: 2.1 - Flammable Gases	Acetylene	Cu. Feet	504	126	378	0	- Physical	Acetylene	100 %	74-86-2
Unstable (Reactive), Class 2, Flammable Gas	CAS No	State	Storage Container		Pressue	Waste Code	Flammable			
	74-86-2	Gas	Cylinder		> Ambient		- Physical Gas			
	Map: 2, 6, 7	Type			Temperature		Under Pressure			
	Grid: E3, A2, B1	Pure	Days on Site: 365		Ambient		- Physical Explosive			

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org. East Bay Municipal Utility District			Chemical Location				CERS ID	10397710		
Facility Name EBMUD - Camanche South Shore Recreation Area			Hypochlorite Room Building J2				Facility ID			
11700 Wade Ln, Wallace 95225							Status	Submitted on 2/18/2020 3:58 PM		
DOT Code/Fire Haz. Class	Common Name	Unit	Quantities			Annual Waste Amount	Federal Hazard Categories	Hazardous Components (For mixture only)		
			Max. Daily	Largest Cont.	Avg. Daily			Component Name	% Wt	EHS CAS No.
DOT: 8 - Corrosives (Liquids and Solids) Corrosive, Oxidizing, Class 2	Sodium Hypochlorite >5% - 12.5%	Gallons	330	330	175	0	- Physical	Sodium Hypochlorite	12 %	7681-52-9
	<u>CAS No</u>	<u>State</u>	<u>Storage Container</u>		<u>Pressue</u>	<u>Waste Code</u>	Corrosive To			
	7681-52-9	Liquid	Tank Inside Building		Ambient		Metal	Water	88 %	7732-18-5
	Map: Map3B	<u>Type</u>	Days on Site: 365		<u>Temperature</u>		- Health Skin Corrosion Irritation - Health Serious Eye Damage Eye Irritation			
	Caustic Soda	Gallons	3	1	3		- Physical	Sodium Hydroxide	50 %	1310-73-2
	<u>CAS No</u>	<u>State</u>	<u>Storage Container</u>		<u>Pressue</u>	<u>Waste Code</u>	Corrosive To	Water	48 %	7732-18-5
	1310-73-2	Liquid	Carboy		Ambient		Metal	Sodium Chloride	2 %	7647-14-5
	Map: Map 3B	<u>Type</u>	Days on Site: 365		<u>Temperature</u>		- Health Acute Toxicity - Health Skin Corrosion Irritation - Health Serious Eye Damage Eye Irritation			

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org.	East Bay Municipal Utility District	Chemical Location	CERS ID	10397710
Facility Name	EBMUD - Camanche South Shore Recreation Area	Membrane Cleaning Room Building J2	Facility ID	
	11700 Wade Ln, Wallace 95225		Status	Submitted on 2/18/2020 3:58 PM

DOT Code/Fire Haz. Class	Common Name	Unit	Quantities			Annual Waste Amount	Federal Hazard Categories	Hazardous Components (For mixture only)			
			Max. Daily	Largest Cont.	Avg. Daily			Component Name	% Wt	EHS	CAS No.
	Hydrochloric Acid Soln 2% - 37%	Gallons	3	1	3		- Physical	Hydrochloric Acid	37 %		7647-01-0
	<u>CAS No</u>	<u>State</u>	<u>Storage Container</u>		<u>Pressue</u>	<u>Waste Code</u>	Corrosive To	Water	63 %		7732-18-5
		<u>Liquid</u>	Carboy		<u>Ambient</u>		Metal				
	<u>Map: Map 3B</u>	<u>Type</u>			<u>Temperature</u>		- Health Acute				
		<u>Mixture</u>	Days on Site: 365		<u>Ambient</u>		Toxicity				
							- Health Skin				
							Corrosion				
							Irritation				
							- Health Serious				
							Eye Damage Eye				
							Irritation				

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org.	East Bay Municipal Utility District	Chemical Location	CERS ID	10397710
Facility Name	EBMUD - Camanche South Shore Recreation Area	Ranger Station by Vessel Decontamination Station	Facility ID	
	11700 Wade Ln, Wallace 95225		Status	Submitted on 2/18/2020 3:58 PM

DOT Code/Fire Haz. Class	Common Name	Unit	Quantities			Annual Waste Amount	Federal Hazard Categories	Hazardous Components (For mixture only)			
			Max. Daily	Largest Cont.	Avg. Daily			Component Name	% Wt	EHS	CAS No.
DOT: 2.1 - Flammable Gases	Liquefied Petroleum Gas (lpg)	Gallons	400	500	350	0	- Physical	Propane	100 %		74-98-6
Flammable Gas	<u>CAS No</u> 74-98-6 Map: 4 Grid: G3	<u>State</u> Gas <u>Type</u> Pure	<u>Storage Container</u> Aboveground Tank Days on Site: 365		<u>Pressue</u> > Ambient <u>Temperature</u> Ambient	<u>Waste Code</u>	Flammable - Physical Gas Under Pressure - Health Carcinogenicity - Health Germ Cell Mutagenicity - Health Simple Asphyxiant				

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org.	East Bay Municipal Utility District				Chemical Location		CERS ID	10397710			
Facility Name	EBMUD - Camanche South Shore Recreation Area				Ranger Station Storage Facility			Facility ID			
	11700 Wade Ln, Wallace 95225							Status	Submitted on 2/18/2020 3:58 PM		
				Quantities		Annual Waste	Federal Hazard	Hazardous Components (For mixture only)			
DOT Code/Fire Haz. Class	Common Name	Unit	Max. Daily	Largest Cont.	Avg. Daily	Amount	Categories	Component Name	% Wt	EHS	CAS No.
	Firefighting Foam	Gallons	20	5	15	0	- Health Skin	Alpha-olefin Sulfonate Soln.	80 %		-----
	CAS No	State	Storage Container		Pressue	Waste Code	Corrosion	2,4-pentanediol, 2-methyl-	10 %		107-41-5
		Liquid	Carboy		Ambient		Irritation	Water	6 %		7732-18-5
	Map: Map 5	Type			Temperature		- Health	Lauryl Alcohol	3 %		68855-56-1
		Mixture	Days on Site: 365		Ambient		Respiratory Skin	D-Limonene	1 %		5989-27-5
							Sensitization				
							- Health Serious				
							Eye Damage Eye				
							Irritation				

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org.	East Bay Municipal Utility District	Chemical Location	CERS ID	10397710
Facility Name	EBMUD - Camanche South Shore Recreation Area	Ranger Station, south side in covered outdoor storage	Facility ID	
	11700 Wade Ln, Wallace 95225		Status	Submitted on 2/18/2020 3:58 PM

DOT Code/Fire Haz. Class	Common Name	Unit	Quantities			Annual Waste Amount	Federal Hazard Categories	Hazardous Components (For mixture only)		
			Max. Daily	Largest Cont.	Avg. Daily			Component Name	% Wt	EHS CAS No.
DOT: 3 - Flammable and Combustible Liquids	Unleaded Gasoline and Diesel #2 Mixture	Gallons	55	55	40	0	- Physical Flammable	Unleaded gasoline	80 %	8006-61-9
Flammable Liquid, Class I-B, Toxic, Flammable Liquid, Class I-B	CAS No 8006-61-9 Map: 2, 4, 5 Grid: G5, F1-2, F4	<u>State</u> Liquid <u>Type</u> Mixture	<u>Storage Container</u> Plastic/Non-metalic Drum		<u>Pressue</u> Ambient <u>Temperature</u> Ambient	<u>Waste Code</u>	- Health Carcinogenicity - Health Acute Toxicity - Health Reproductive Toxicity - Health Skin Corrosion Irritation - Health Serious Eye Damage Eye Irritation - Health Specific Target Organ Toxicity - Health Aspiration Hazard - Health Germ Cell Mutagenicity	Diesel fuel #2	20 %	68476-34-6

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org.	East Bay Municipal Utility District				Chemical Location	CERS ID 10397710			
Facility Name	EBMUD - Camanche South Shore Recreation Area				wastewater treatment - leased port. generator for PG&E				Facility ID
	11700 Wade Ln, Wallace 95225				PSPS events				Status Submitted on 2/18/2020 3:58 PM
							Annual Waste Amount	Hazardous Components (For mixture only)	
DOT Code/Fire Haz. Class	Common Name	Unit	Max. Daily	Largest Cont.	Avg. Daily		Federal Hazard Categories	Component Name	% Wt EHS CAS No.
DOT: 3 - Flammable and Combustible Liquids	Diesel Fuel No. 2	Gallons	100	100	100	0	- Physical		
	CAS No	State	Storage Container		Pressue		Flammable		
	68334-30-5	Liquid	Other		Ambient	Waste Code	- Health		
Combustible Liquid, Class II		Type			Temperature		Carcinogenicity		
		Pure	Days on Site: 180		Ambient		- Health Acute		
							Toxicity		
							- Health Skin		
							Corrosion		
							Irritation		
							- Health Specific		
							Target Organ		
							Toxicity		
							- Health		
							Aspiration Hazard		

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org.	East Bay Municipal Utility District	Chemical Location	CERS ID	10397710
Facility Name	EBMUD - Camanche South Shore Recreation Area	Water Treatment Plant, Bldg J1	Facility ID	
	11700 Wade Ln, Wallace 95225		Status	Submitted on 2/18/2020 3:58 PM

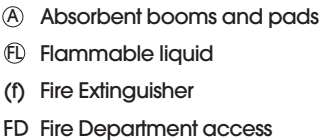
DOT Code/Fire Haz. Class	Common Name	Unit	Quantities			Annual Waste Amount	Federal Hazard Categories	Hazardous Components (For mixture only)			
			Max. Daily	Largest Cont.	Avg. Daily			Component Name	% Wt	EHS	CAS No.
Corrosive, Corrosive	Sodium Hypochlorite >5% - 12.5%	Gallons	275	275	10	0	- Physical	SODIUM HYPOCHLORITE	12 %		7681-52-9
	<u>CAS No</u>	<u>State</u>	<u>Storage Container</u>		<u>Pressue</u>	<u>Waste Code</u>	Corrosive To	WATER	88 %		7732-18-5
	7681-52-9	Liquid	Tank Inside Building		Ambient		Metal				
	<u>Map: 3A</u>	<u>Type</u>			<u>Temperature</u>		- Health Skin				
		Mixture	Days on Site: 365		Ambient		Corrosion				
							Irritation				
							- Health Serious				
							Eye Damage Eye				
							Irritation				

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org.	East Bay Municipal Utility District	Chemical Location	CERS ID	10397710
Facility Name	EBMUD - Camanche South Shore Recreation Area	Water Treatment Plant, Emergency Generator	Facility ID	
	11700 Wade Ln, Wallace 95225		Status	Submitted on 2/18/2020 3:58 PM

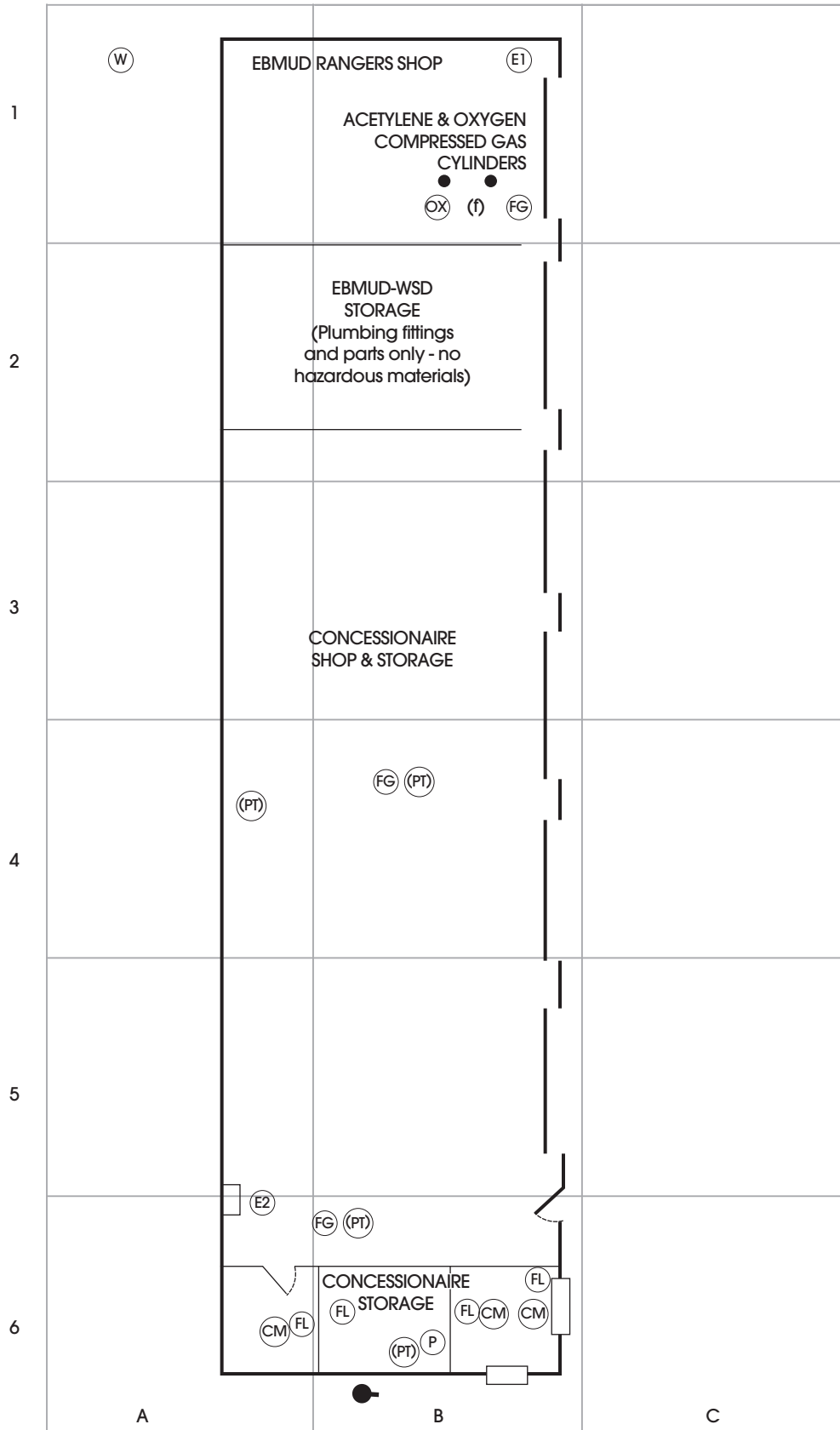
DOT Code/Fire Haz. Class	Common Name	Unit	Quantities			Annual Waste Amount	Federal Hazard Categories	Hazardous Components (For mixture only)		
			Max. Daily	Largest Cont.	Avg. Daily			Component Name	% Wt	EHS CAS No.
DOT: 3 - Flammable and Combustible Liquids	Diesel Fuel No. 2	Gallons	200	233	200	0	- Physical	Petroleum hydrocarbons, blend	100 %	68476-34-6
	<u>CAS No</u>	<u>State</u>	<u>Storage Container</u>		<u>Pressue</u>	<u>Waste Code</u>	Flammable			
	68476-34-6	Liquid	Aboveground Tank		Ambient		- Health			
Combustible Liquid, Class II	Map: 3 Grid: I5	<u>Type</u>			<u>Temperature</u>		Carcinogenicity			
		Mixture	Days on Site: 365		Ambient		- Health Acute			
							Toxicity			
							- Health			
							Reproductive			
							Toxicity			
							- Health Skin			
							Corrosion			
							Irritation			
							- Health Serious			
							Eye Damage Eye			
							Irritation			
							- Health Specific			
							Target Organ			
							Toxicity			
							- Health			
							Aspiration Hazard			

BUILDING C - MAP 6



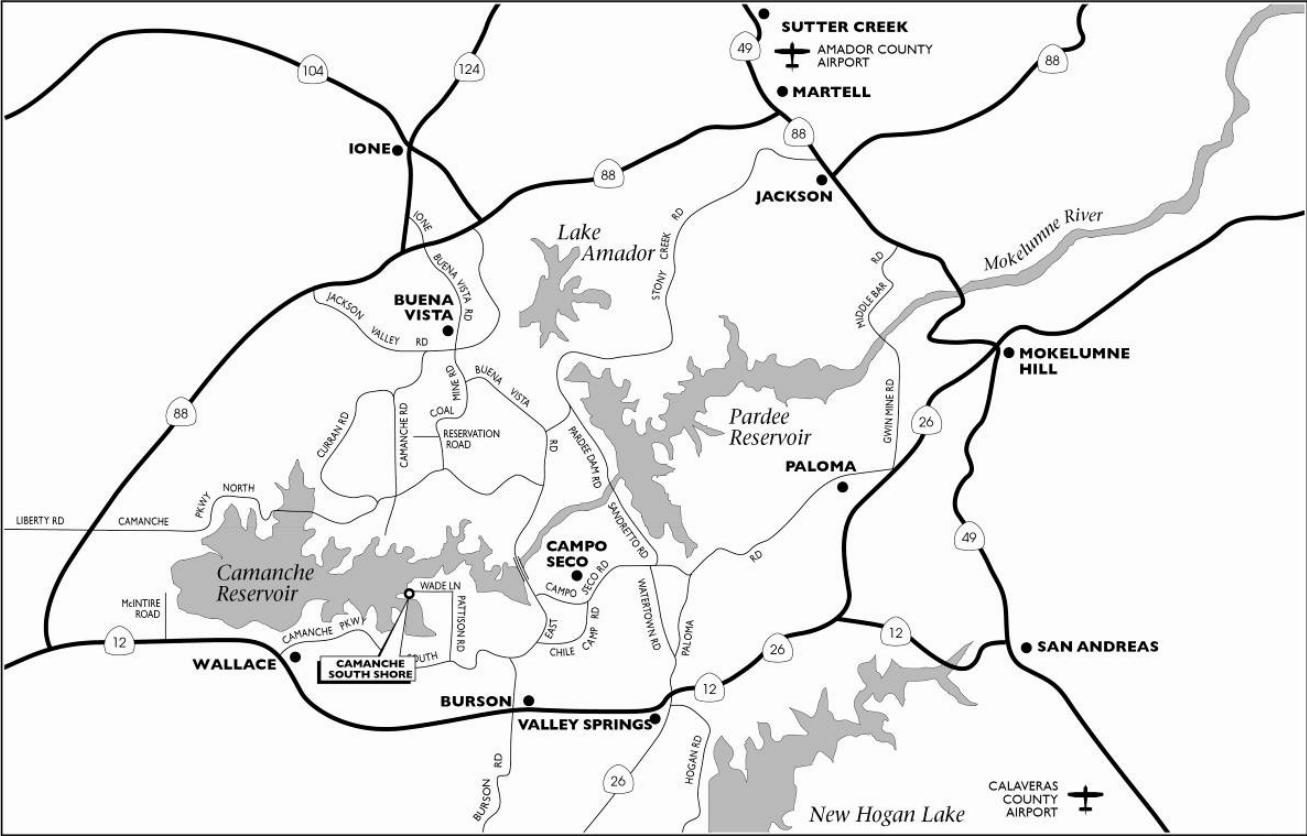
SOUTH SHORE SHOP

BUILDING C1 - MAP 7



- (E1) Main Electrical Panel
- (E2) Electrical Panel for Compressor
- (W) Water shutoff, Above ground
10' from NW Corner
- (f) Fire Extinguisher

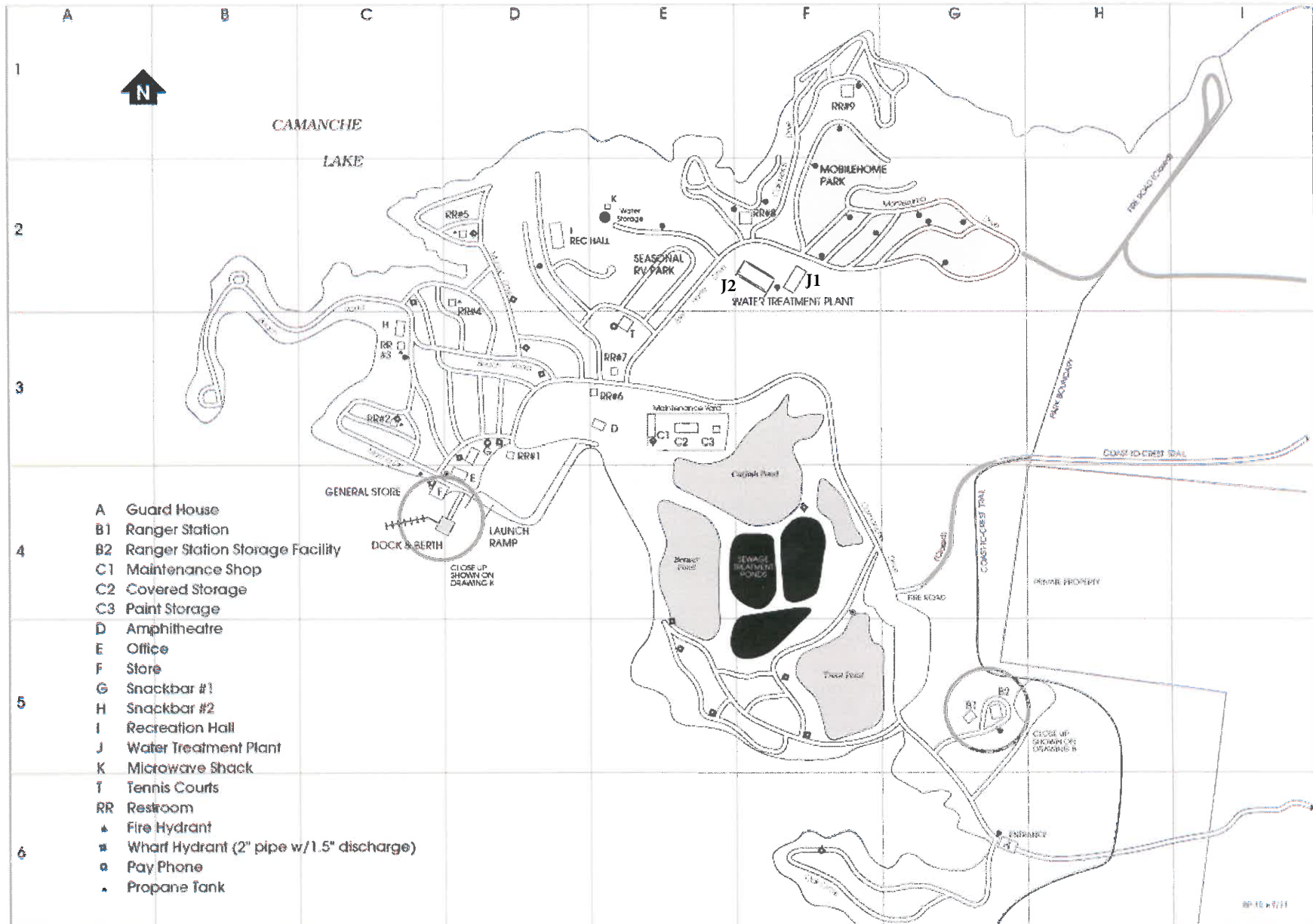
CAMANCHE SOUTH SHORE



MAP 1 - VICINITY

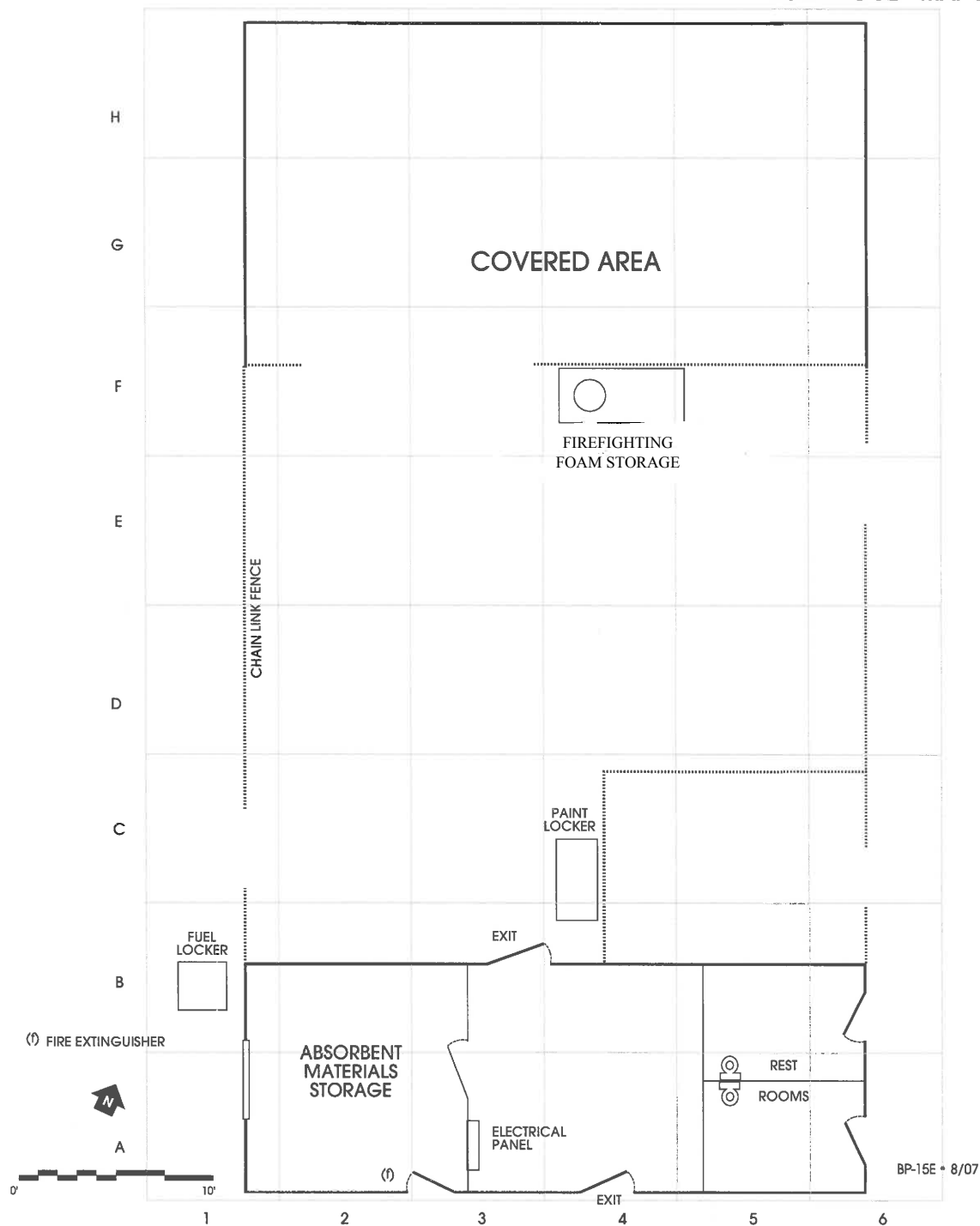
MAP 2 – SITE LOCATION

CAMANCHE SOUTH SHORE

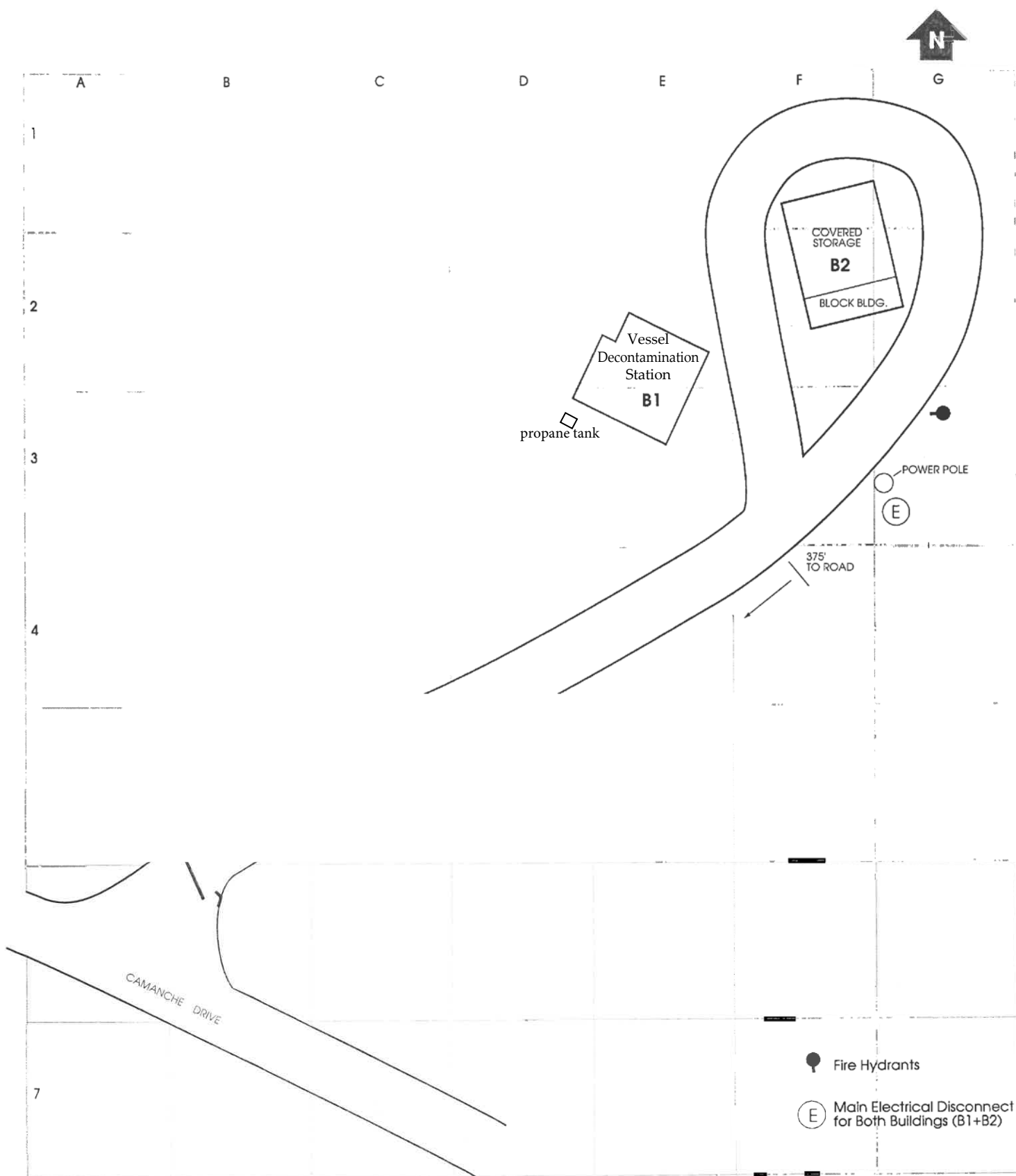


SOUTH SHORE RANGER STATION STORAGE FACILITY

BUILDING B2 - MAP 5



SOUTH SHORE RANGER STATION - Map 4

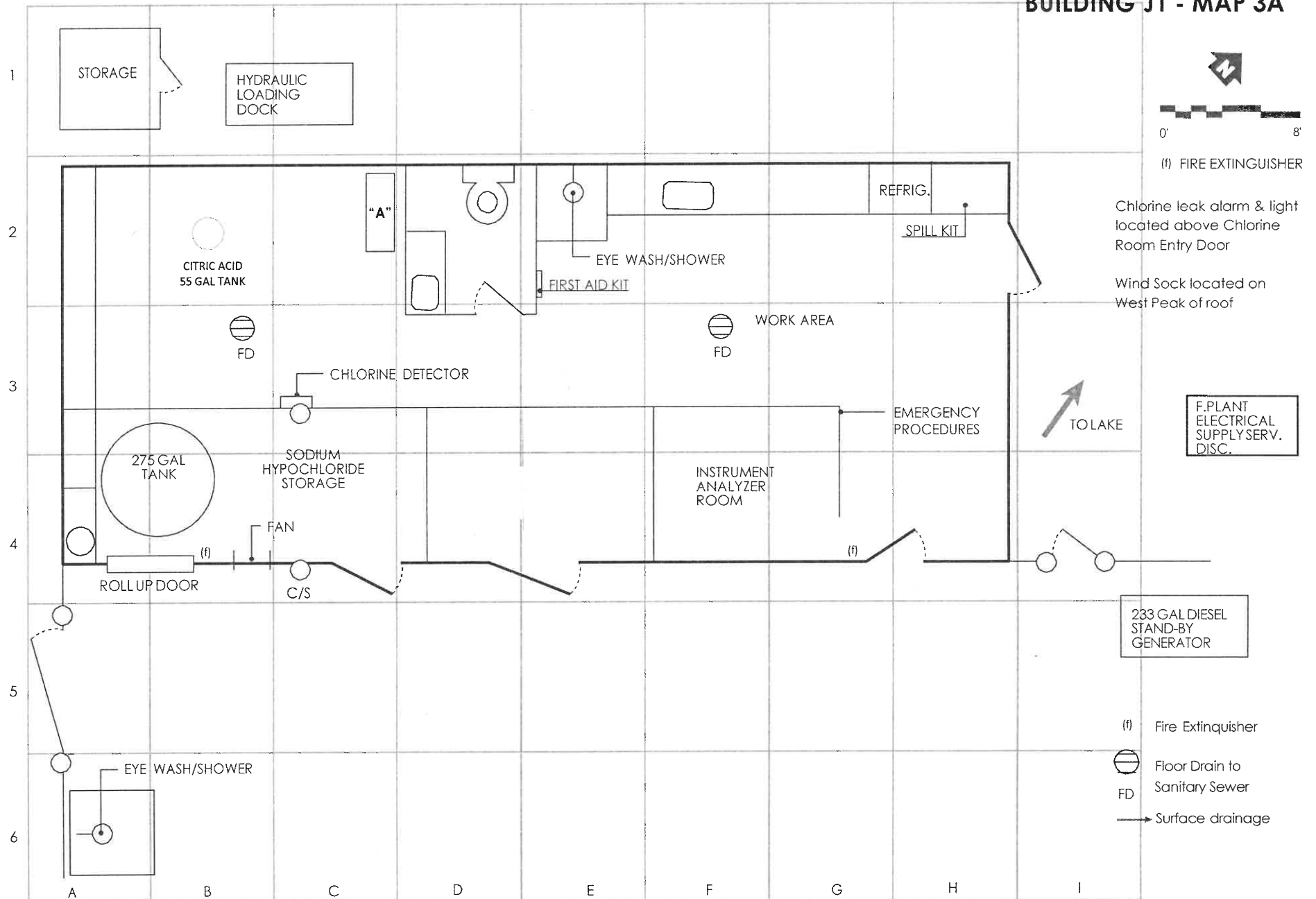


EBMUD - Camanche South Shore Wastewater Treatment Plant
Map depicting location of portable generator leased for potential PG&E PSPS Events



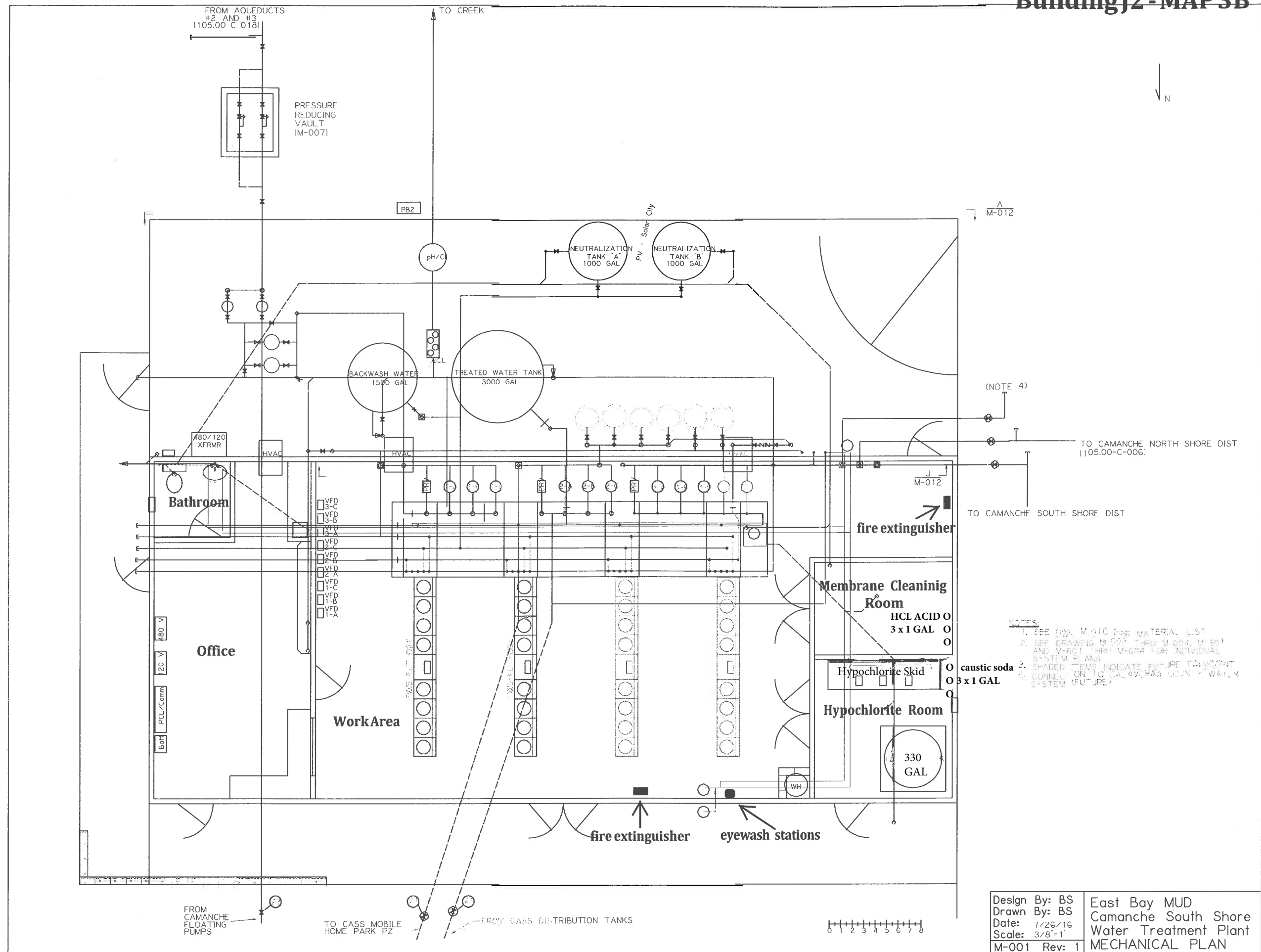
SOUTH SHORE WATER TREATMENT PLANT

BUILDING J1 - MAP 3A



SOUTH SHORE WATER TREATMENT PLANT

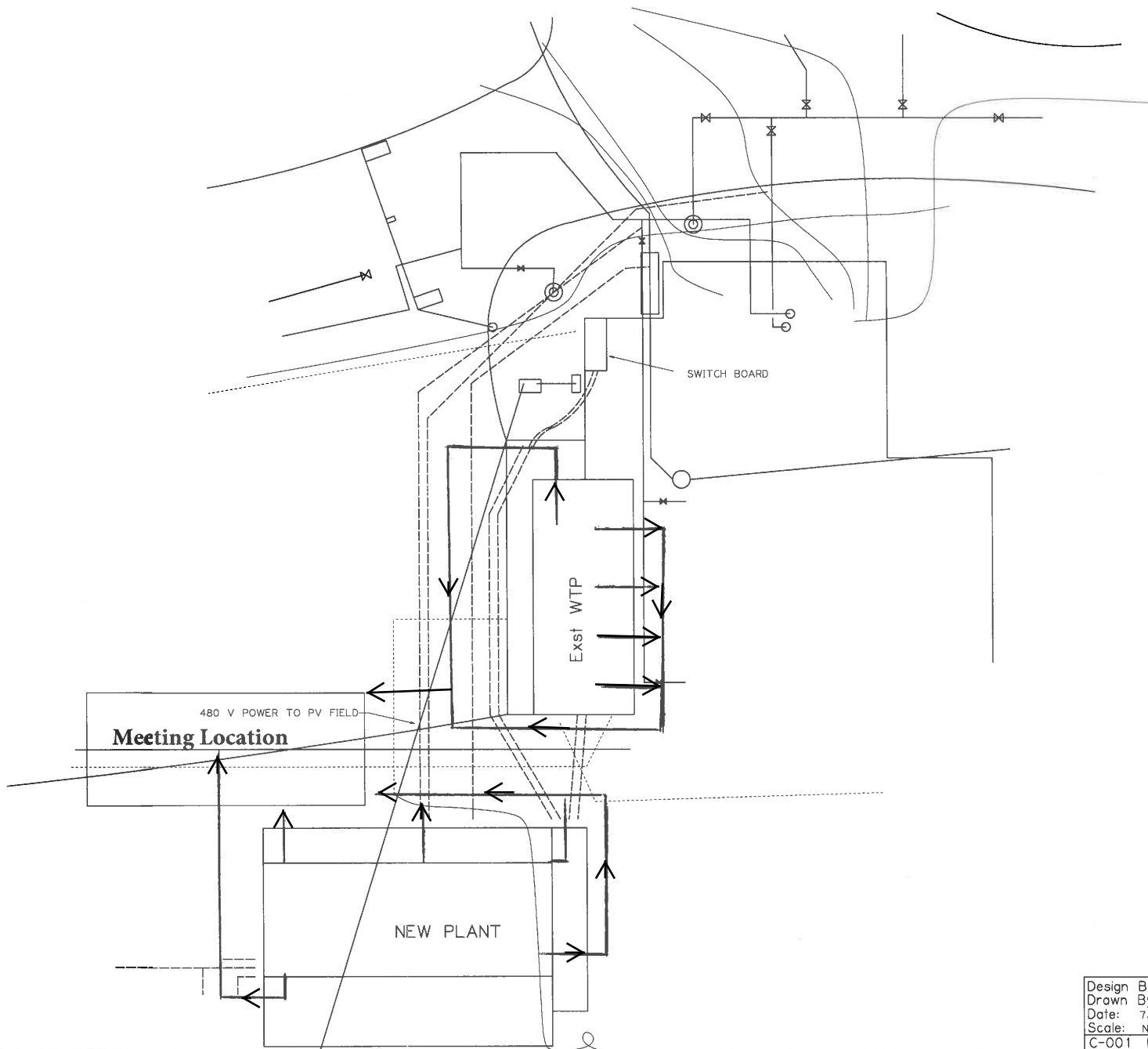
Building J2 - MAP 3B



Camanche South Shore Water Treatment Plant

Buildings J1 & J2 Evacuation Plan - Map 3C

NORTH



Design By: BS	East Bay MUD
Drawn By: BS	Camanche South Shore
Date: 7/26/16	Water Treatment Plant
Scale: NONE	SITE VIEW
C-001 Rev: 1	

EBMUD Pardee Center (CERSID: 10397737)**Facility Information Accepted Apr 21, 2020**

Submitted on 2/27/2020 3:16:14 PM by *Deirdre Mena* of East Bay Municipal Utility District (Oakland, CA)

Comments by Submitter: Seasonal electrical generator with diesel tank onsite for approximately 180 days per year during Public Safety Power Shutoff threat times.

Submittal was **Accepted** on 4/21/2020 8:25:16 AM by Stephanie Hessler

- Business Activities
- Business Owner/Operator Identification

Hazardous Materials Inventory Accepted Apr 21, 2020

Submitted on 2/27/2020 3:16:14 PM by *Deirdre Mena* of East Bay Municipal Utility District (Oakland, CA)

Submittal was **Accepted** on 4/21/2020 8:25:29 AM by Stephanie Hessler

- Hazardous Material Inventory (21)
- Site Map (Official Use Only)
 - *PACT - location of portable generator for PG&E PSPS events* (Adobe PDF, 137KB)
 - *Map 7* (Adobe PDF, 100KB)
 - *Map 6* (Adobe PDF, 97KB)
 - *Map 5 - Maintenance Bldg* (Adobe PDF, 61KB)
 - *Map 4 - Site Detail 2* (Adobe PDF, 137KB)
 - *Map 3 - Site Detail 1* (Adobe PDF, 139KB)
 - *Map 2 - Site Location* (Adobe PDF, 228KB)
 - *Map 1 - Vicinity Map* (Adobe PDF, 60KB)

Emergency Response and Training Plans Accepted Apr 21, 2020

Submitted on 2/27/2020 3:16:14 PM by *Deirdre Mena* of East Bay Municipal Utility District (Oakland, CA)

Submittal was **Accepted** on 4/21/2020 8:25:40 AM by Stephanie Hessler

- Emergency Response/Contingency Plan
 - *Emergency Response/Contingency Plan* (Adobe PDF, 473KB)
- Employee Training Plan
 - *Employee Training Plan* (Adobe PDF, 629KB)

Aboveground Petroleum Storage Act Accepted Apr 21, 2020

Submitted on 2/27/2020 3:16:14 PM by *Deirdre Mena* of East Bay Municipal Utility District (Oakland, CA)

Submittal was **Accepted** on 4/21/2020 8:25:54 AM by Stephanie Hessler

- Aboveground Petroleum Storage Act Documentation
 - *Stored At Facility EBMUD Pardee Center CERSID (10397737)*
- APSA Facility Information

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org.	East Bay Municipal Utility District	Chemical Location	CERS ID 10397737
Facility Name	EBMUD Pardee Center	Auto Shop & Behind Maintenance Bldg - Accumulation Area	Facility ID
	3535 Sandretto Rd, Valley Springs 95252		Status Submitted on 2/27/2020 3:16 PM

DOT Code/Fire Haz. Class	Common Name	Unit	Quantities			Annual Waste Amount	Federal Hazard Categories	Hazardous Components (For mixture only)		
			Max. Daily	Largest Cont.	Avg. Daily			Component Name	% Wt	EHS CAS No.
	Used lubricating oils	Gallons	355	300	140	560	- Health	Waste Petroleum	100 %	70514-12-4
	<u>CAS No</u>	<u>State</u>	<u>Storage Container</u>		<u>Pressue</u>	<u>Waste Code</u>	Carcinogenicity			
	70514-12-4	Liquid	Aboveground Tank		Ambient	221	- Health			
	Map: 2, 5 Grid: B4, C5	<u>Type</u>			<u>Temperature</u>		Reproductive			
		Pure	Days on Site: 365		Ambient		Toxicity			
							- Health Skin			
							Corrosion			
							Irritation			
							- Health			
							Respiratory Skin			
							Sensitization			
							- Health Serious			
							Eye Damage Eye			
							Irritation			
							- Health Specific			
							Target Organ			
							Toxicity			
							- Health			
							Aspiration Hazard			
							- Health Germ			
							Cell Mutagenicity			

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org.		East Bay Municipal Utility District			Chemical Location		CERS ID		10397737	
Facility Name		EBMUD Pardee Center			Behind Maintenance Building		Facility ID			
		3535 Sandretto Rd, Valley Springs 95252					Status		Submitted on 2/27/2020 3:16 PM	

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org.	East Bay Municipal Utility District	Chemical Location	CERS ID	10397737
Facility Name	EBMUD Pardee Center	Chemical Building	Facility ID	
	3535 Sandretto Rd, Valley Springs 95252		Status	Submitted on 2/27/2020 3:16 PM

DOT Code/Fire Haz. Class	Common Name	Unit	Quantities			Annual Waste Amount	Federal Hazard Categories	Hazardous Components (For mixture only)		
			Max. Daily	Largest Cont.	Avg. Daily			Component Name	% Wt	EHS CAS No.
Corrosive	BCS CBA	Gallons	10000	10000	5000	0	- Health Skin	calcium hydroxide	70 %	1305-62-0
	<u>CAS No</u>	<u>State</u>	<u>Storage Container</u>		<u>Pressue</u>	<u>Waste Code</u>	Corrosion	magnesium hydroxide	3 %	1309-42-8
		Liquid	Aboveground Tank				Irritation	silicon dioxide	1 %	14808-60-7
	Map: 2,6 Grid: H6, C-D4, 5, 6	<u>Type</u>			<u>Temperature</u>		- Health Serious			
		Mixture	Days on Site: 365				Eye Damage Eye			
							Irritation			
							- Health Specific			
							Target Organ			
							Toxicity			
DOT: 3 - Flammable and Combustible Liquids	Diesel Fuel No. 2	Gallons	194	194	194	0	- Physical	Petroleum hydrocarbons, blend	100 %	68476-34-6
	<u>CAS No</u>	<u>State</u>	<u>Storage Container</u>		<u>Pressue</u>	<u>Waste Code</u>	Flammable			
Combustible Liquid, Class II	68476-34-6	Liquid	Aboveground Tank		Ambient		- Health			
	Map: Map 6	<u>Type</u>			<u>Temperature</u>		Carcinogenicity			
		Pure			Ambient		- Health Acute			
							Toxicity			
							- Health			
							Reproductive			
							Toxicity			
							- Health Skin			
							Corrosion			
							Irritation			
							- Health Specific			
							Target Organ			
							Toxicity			
							- Health			
							Aspiration Hazard			

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org.	East Bay Municipal Utility District	Chemical Location	CERS ID	10397737
Facility Name	EBMUD Pardee Center	Equipment Parking	Facility ID	
	3535 Sandretto Rd, Valley Springs 95252		Status	Submitted on 2/27/2020 3:16 PM

DOT Code/Fire Haz. Class	Common Name	Unit	Quantities			Annual Waste Amount	Federal Hazard Categories	Hazardous Components (For mixture only)		
			Max. Daily	Largest Cont.	Avg. Daily			Component Name	% Wt	EHS CAS No.
DOT: 3 - Flammable and Combustible Liquids	Diesel Fuel No. 2	Gallons	170	170	170	0	- Physical			
	<u>CAS No</u>	<u>State</u>	<u>Storage Container</u>		<u>Pressue</u>	<u>Waste Code</u>	Flammable			
	68476-34-6	Liquid	Other		Ambient		- Health			
Combustible Liquid, Class II	Map: 2 Grid: B4	<u>Type</u>			<u>Temperature</u>		Carcinogenicity			
		Pure	Days on Site: 365		Ambient		- Health Acute			
							Toxicity			
							- Health Skin			
							Corrosion			
							Irritation			
							- Health			
							Respiratory Skin			
							Sensitization			
							- Health Specific			
							Target Organ			
							Toxicity			
							- Health			
							Aspiration Hazard			

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org.	East Bay Municipal Utility District	Chemical Location	CERS ID	10397737
Facility Name	EBMUD Pardee Center	Fueling island	Facility ID	
	3535 Sandretto Rd, Valley Springs 95252		Status	Submitted on 2/27/2020 3:16 PM

DOT Code/Fire Haz. Class	Common Name	Unit	Quantities			Annual Waste Amount	Federal Hazard Categories	Hazardous Components (For mixture only)		
			Max. Daily	Largest Cont.	Avg. Daily			Component Name	% Wt	EHS CAS No.
DOT: 3 - Flammable and Combustible Liquids	Gasoline, unleaded	Gallons	2000	2000	1250	0	- Physical Flammable	Methyl tert butyl ether	15 %	1634-04-4
	<u>CAS No</u>	<u>State</u>	<u>Storage Container</u>		<u>Pressue</u>	<u>Waste Code</u>	- Health	Toluene	15 %	108-88-3
Flammable Liquid, Class I-B,	8006-61-9	Liquid	Aboveground Tank		Ambient		Carcinogenicity	Xylene	21 %	1330-20-7
Toxic, Flammable Liquid, Class I-B	Map: 2, 5 Grid: B2, D1	<u>Type</u>			<u>Temperature</u>		- Health	Benzene		71-43-2
		Mixture	Days on Site: 365		Ambient		Reproductive	1,2,4-Trimethyl benzene		95-63-6
							Toxicity			
							- Health Skin			
							Corrosion			
							Irritation			
							- Health Specific			
							Target Organ			
							Toxicity			
							- Health			
							Aspiration Hazard			
							- Health Germ			
							Cell Mutagenicity			
DOT: 3 - Flammable and Combustible Liquids	Diesel Fuel No. 2	Gallons	500	500	450	0	- Physical Flammable	Diesel fuel #2	100 %	68476-34-6
	<u>CAS No</u>	<u>State</u>	<u>Storage Container</u>		<u>Pressue</u>	<u>Waste Code</u>	- Health	Naphthalene	1 %	91-20-3
Combustible Liquid, Class II	68476-34-6	Liquid	Aboveground Tank		Ambient		Carcinogenicity	Other petroleum distillates <0.5%		
	Map: 2, 4, 5, 6, 7 Grid: B4,C3,H6,D2,B4,	<u>Type</u>			<u>Temperature</u>		- Health Acute			
		Mixture	Days on Site: 365		Ambient		Toxicity			
							- Health			
							Reproductive			
							Toxicity			
							- Health Skin			
							Corrosion			
							Irritation			
							- Health Specific			
							Target Organ			
							Toxicity			
							- Health			
							Aspiration Hazard			

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org. East Bay Municipal Utility District			Chemical Location				CERS ID	10397737		
Facility Name EBMUD Pardee Center			Maintenance Bldg - Storage Area				Facility ID			
3535 Sandretto Rd, Valley Springs 95252							Status	Submitted on 2/27/2020 3:16 PM		
DOT Code/Fire Haz. Class	Common Name	Unit	Quantities			Annual Waste Amount	Federal Hazard Categories	Hazardous Components (For mixture only)		
			Max. Daily	Largest Cont.	Avg. Daily			Component Name	% Wt	EHS CAS No.
DOT: 3 - Flammable and Combustible Liquids	Motor Oil	Gallons	55	55	55	0	- Physical Flammable	highly refined mineral oil (C15 - C50)	99 %	Mixture
	CAS No	State	Storage Container		Pressure	Waste Code		ZINC ALKYLDITHIOPHOSPHATE	1 %	68649-42-3
Combustible Liquid, Class III-B	Map: 5 Grid: C6	Liquid	Steel Drum		Ambient	221				
		Type	Mixture Days on Site: 365		Temperature					
		Mixture			Ambient					
DOT: 3 - Flammable and Combustible Liquids	Motor Oil	Gallons	55	55	55	0	- Physical Flammable	Highly refined mineral oil (C15 - C50)	99 %	Mixture
	CAS No	State	Storage Container		Pressure	Waste Code				
Combustible Liquid, Class III-B	Map: 5 Grid: C6	Liquid	Steel Drum		Ambient	221				
		Type	Mixture Days on Site: 365		Temperature					
		Mixture			Ambient					
DOT: 3 - Flammable and Combustible Liquids	Motor Oil	Gallons	55	55	55	0	- Physical Flammable	highly refined mineral oil (C15 - C50)	99 %	mixture
	CAS No	State	Storage Container		Pressure	Waste Code				
Combustible Liquid, Class III-B	Map: 5 Grid: C6	Liquid	Steel Drum		Ambient	221				
		Type	Mixture Days on Site: 365		Temperature					
		Mixture			Ambient					

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org.	East Bay Municipal Utility District				Chemical Location	CERS ID 10397737				
Facility Name	EBMUD Pardee Center				Mobile refuelers mounted on utility trucks parked onsite or active in field				Facility ID	
	3535 Sandretto Rd, Valley Springs 95252								Status Submitted on 2/27/2020 3:16 PM	
						Annual Waste Amount	Federal Hazard Categories	Hazardous Components (For mixture only)		
DOT Code/Fire Haz. Class	Common Name	Unit	Max. Daily	Largest Cont.	Avg. Daily			Component Name	% Wt	EHS CAS No.
DOT: 3 - Flammable and Combustible Liquids	Diesel Fuel No. 2	Gallons	360	100	150	0	- Physical			
		State	Storage Container		Pressue		Flammable			
Combustible Liquid, Class II	CAS No	Liquid	Other		Ambient	Waste Code	- Health			
	68334-30-5	Type			Temperature		Carcinogenicity			
		Pure	Days on Site: 265		Ambient		- Health Acute			
							Toxicity			
							- Health Skin			
							Corrosion			
							Irritation			
							- Health Specific			
							Target Organ			
							Toxicity			
							- Health			
							Aspiration Hazard			

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org. East Bay Municipal Utility District			Chemical Location				CERS ID	10397737		
Facility Name EBMUD Pardee Center			Pardee Area Control Center Office				Facility ID			
3535 Sandretto Rd, Valley Springs 95252							Status	Submitted on 2/27/2020 3:16 PM		
DOT Code/Fire Haz. Class	Common Name	Unit	Quantities			Annual Waste Amount	Federal Hazard Categories	Hazardous Components (For mixture only)		
			Max. Daily	Largest Cont.	Avg. Daily			Component Name	% Wt	EHS CAS No.
DOT: 9 - Misc. Hazardous Materials	Bromochlorodifluoromethane, Halon 1221	Pounds	244	226	244	0	- Physical Gas Under Pressure	Bromochlorodifluoromethane	100 %	353-59-3
Toxic	CAS No 353-59-3 Map: 2 Grid: B2	State Gas Type Pure	Storage Container Cylinder		Pressue > Ambient Temperature Ambient	Waste Code	- Physical Explosive			
DOT: 3 - Flammable and Combustible Liquids	Diesel Fuel No. 2	Gallons	100	100	100	0	- Physical Flammable	Petroleum hydrocarbons, blend	100 %	68476-34-6
Combustible Liquid, Class II	CAS No 68476-34-6 Map: Map 3	State Liquid Type Pure	Storage Container Aboveground Tank		Pressue Ambient Temperature Ambient	Waste Code	- Health Acute Toxicity - Health Reproductive Toxicity - Health Skin Corrosion Irritation - Health Specific Target Organ Toxicity - Health Aspiration Hazard			

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org.	East Bay Municipal Utility District				Chemical Location	CERS ID 10397737				
Facility Name	EBMUD Pardee Center				Pardee Center Shops - portable generator for PG&E PSPS events			Facility ID		
	3535 Sandretto Rd, Valley Springs 95252							Status	Submitted on 2/27/2020 3:16 PM	
DOT Code/Fire Haz. Class		Common Name	Unit	Quantities		Annual Waste Amount	Federal Hazard Categories	Hazardous Components (For mixture only)		
				Max. Daily	Largest Cont.	Avg. Daily		Component Name	% Wt	EHS CAS No.
DOT: 3 - Flammable and Combustible Liquids		Diesel Fuel No. 2	Gallons	100	100	100	0	- Physical		
		CAS No	State	Storage Container		Pressue		Flammable		
		68334-30-5	Liquid	Other		Ambient	Waste Code	- Health		
Combustible Liquid, Class II			Type			Temperature		Carcinogenicity		
			Pure	Days on Site: 180		Ambient		- Health Acute		
								Toxicity		
								- Health Skin		
								Corrosion		
								Irritation		
								- Health Specific		
								Target Organ		
								Toxicity		
								- Health		
								Aspiration Hazard		

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org.	East Bay Municipal Utility District	Chemical Location	CERS ID 10397737
Facility Name	EBMUD Pardee Center	Pardee Center Water Treatment Plant	Facility ID
	3535 Sandretto Rd, Valley Springs 95252		Status Submitted on 2/27/2020 3:16 PM

DOT Code/Fire Haz. Class	Common Name	Unit	Quantities			Annual Waste Amount	Federal Hazard Categories	Hazardous Components (For mixture only)			
			Max. Daily	Largest Cont.	Avg. Daily			Component Name	% Wt	EHS	CAS No.
DOT: 3 - Flammable and Combustible Liquids	Diesel Fuel No. 2	Gallons	75	75	75		- Physical	Petroleum hydrocarbons, blend	100 %		68476-34-6
	<u>CAS No</u>	<u>State</u>	<u>Storage Container</u>		<u>Pressue</u>	<u>Waste Code</u>	Flammable				
	68476-34-6	Liquid	Aboveground Tank		Ambient		- Health				
Combustible Liquid, Class II	Map: Map 7	<u>Type</u>			<u>Temperature</u>		Carcinogenicity				
		Pure	Days on Site: 365		Ambient		- Health Acute				
							Toxicity				
							- Health				
							Reproductive				
							Toxicity				
							- Health Skin				
							Corrosion				
							Irritation				
							- Health Specific				
							Target Organ				
							Toxicity				
							- Health				
							Aspiration Hazard				

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org.	East Bay Municipal Utility District	Chemical Location	CERS ID	10397737
Facility Name	EBMUD Pardee Center	Pardee Chemical Plant - Main Chemical Building	Facility ID	
	3535 Sandretto Rd, Valley Springs 95252		Status	Submitted on 2/27/2020 3:16 PM

DOT Code/Fire Haz. Class	Common Name	Unit	Quantities			Annual Waste Amount	Federal Hazard Categories	Hazardous Components (For mixture only)			
			Max. Daily	Largest Cont.	Avg. Daily			Component Name	% Wt	EHS	CAS No.
Corrosive, Toxic	Sodium Hypochlorite >5% - 12.5%	Gallons	0	10000	0	0	- Physical	SODIUM HYPOCHLORITE	12 %		7681-52-9
	<u>CAS No</u>	<u>State</u>	<u>Storage Container</u>		<u>Pressue</u>	<u>Waste Code</u>	Corrosive To				
	7681-52-9	Liquid	Aboveground Tank		Ambient		Metal				
	Map: 2, 6 Grid: H6, A-B-C 4-5-6	<u>Type</u>			<u>Temperature</u>		- Health Skin				
		Pure	Days on Site: 0		Ambient		Corrosion				
							Irritation				
							- Health Serious				
							Eye Damage Eye				
							Irritation				

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org.	East Bay Municipal Utility District	Chemical Location	CERS ID	10397737
Facility Name	EBMUD Pardee Center	Swim Pool, MacLean Hall	Facility ID	
	3535 Sandretto Rd, Valley Springs 95252		Status	Submitted on 2/27/2020 3:16 PM

DOT Code/Fire Haz. Class	Common Name	Unit	Quantities			Annual Waste Amount	Federal Hazard Categories	Hazardous Components (For mixture only)			
			Max. Daily	Largest Cont.	Avg. Daily			Component Name	% Wt	EHS	CAS No.
DOT: 2.1 - Flammable Gases	Liquefied Petroleum Gas (lpg)	Gallons	700	400	400	0	- Physical	Propane	100 %		74-98-6
Flammable Gas	<u>CAS No</u> 74-98-6 Map: 2 Grid: D3, C3	<u>State</u> Liquid <u>Type</u> Pure	<u>Storage Container</u> Cylinder Days on Site: 365		<u>Pressue</u> > Ambient <u>Temperature</u> Ambient	<u>Waste Code</u>	Flammable - Physical Gas Under Pressure - Physical Explosive - Health Carcinogenicity - Health Germ Cell Mutagenicity - Health Simple Asphyxiant				

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org. East Bay Municipal Utility District			Chemical Location				CERS ID	10397737		
Facility Name EBMUD Pardee Center			Welding Shop and behind Maintenance Building				Facility ID			
3535 Sandretto Rd, Valley Springs 95252							Status	Submitted on 2/27/2020 3:16 PM		
DOT Code/Fire Haz. Class	Common Name	Unit	Quantities			Annual Waste Amount	Federal Hazard Categories	Hazardous Components (For mixture only)		
			Max. Daily	Largest Cont.	Avg. Daily			Component Name	% Wt	EHS CAS No.
DOT: 2.2 - Nonflammable Gases	Oxygen, compressed	Cu. Feet	960	480	960	0	- Physical Gas	Oxygen	100 %	7782-44-7
Oxidizing, Class 2	CAS No 7782-44-7 Map: 2, 5 Grid: B4, E8	State Gas Type Pure	Storage Container Cylinder Days on Site: 365		Pressue > Ambient Temperature Ambient	Waste Code	Under Pressure - Physical Explosive - Physical Oxidizer			
DOT: 2.2 - Nonflammable Gases	Argon Compressed	Cu. Feet	1080	270	1080	0	- Physical Gas	Argon	100 %	7440-37-1
Explosive	CAS No 7440-37-1 Map: 2, 5 Grid: B4, E8	State Gas Type Pure	Storage Container Cylinder Days on Site: 365		Pressue > Ambient Temperature Ambient	Waste Code	Under Pressure - Physical Explosive			
DOT: 2.1 - Flammable Gases	Acetylene	Cu. Feet	500	145	415		- Physical	Acetylene	100 %	74-86-2
Unstable (Reactive), Class 2, Flammable Gas	CAS No 74-86-2 Map: 2, 5 Grid: B4, E8	State Gas Type Pure	Storage Container Cylinder Days on Site: 365		Pressue > Ambient Temperature Ambient	Waste Code	Flammable - Physical Gas Under Pressure - Physical Explosive			

EBMUD - Pardee Center

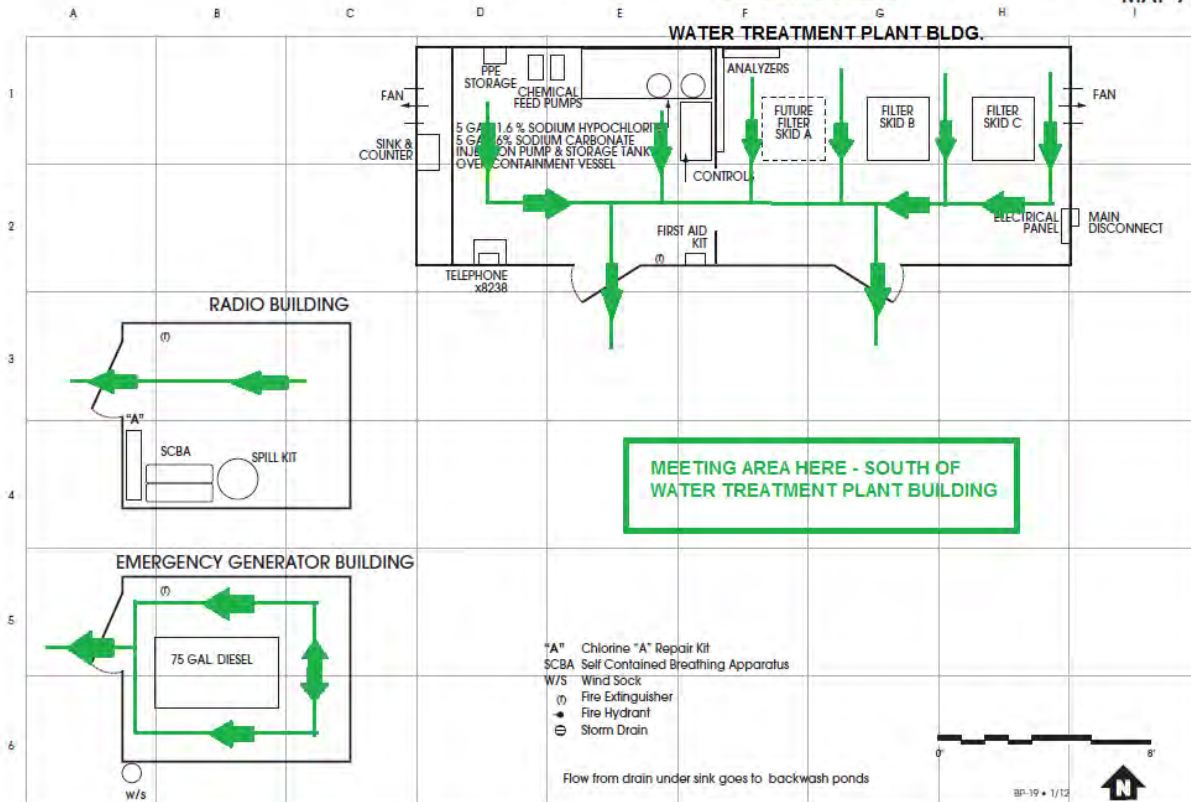
Map depicting location of portable generator leased for potential PG&E PSPS Events



PARDEE CENTER WATER TREATMENT PLANT

EVACUATION PLAN

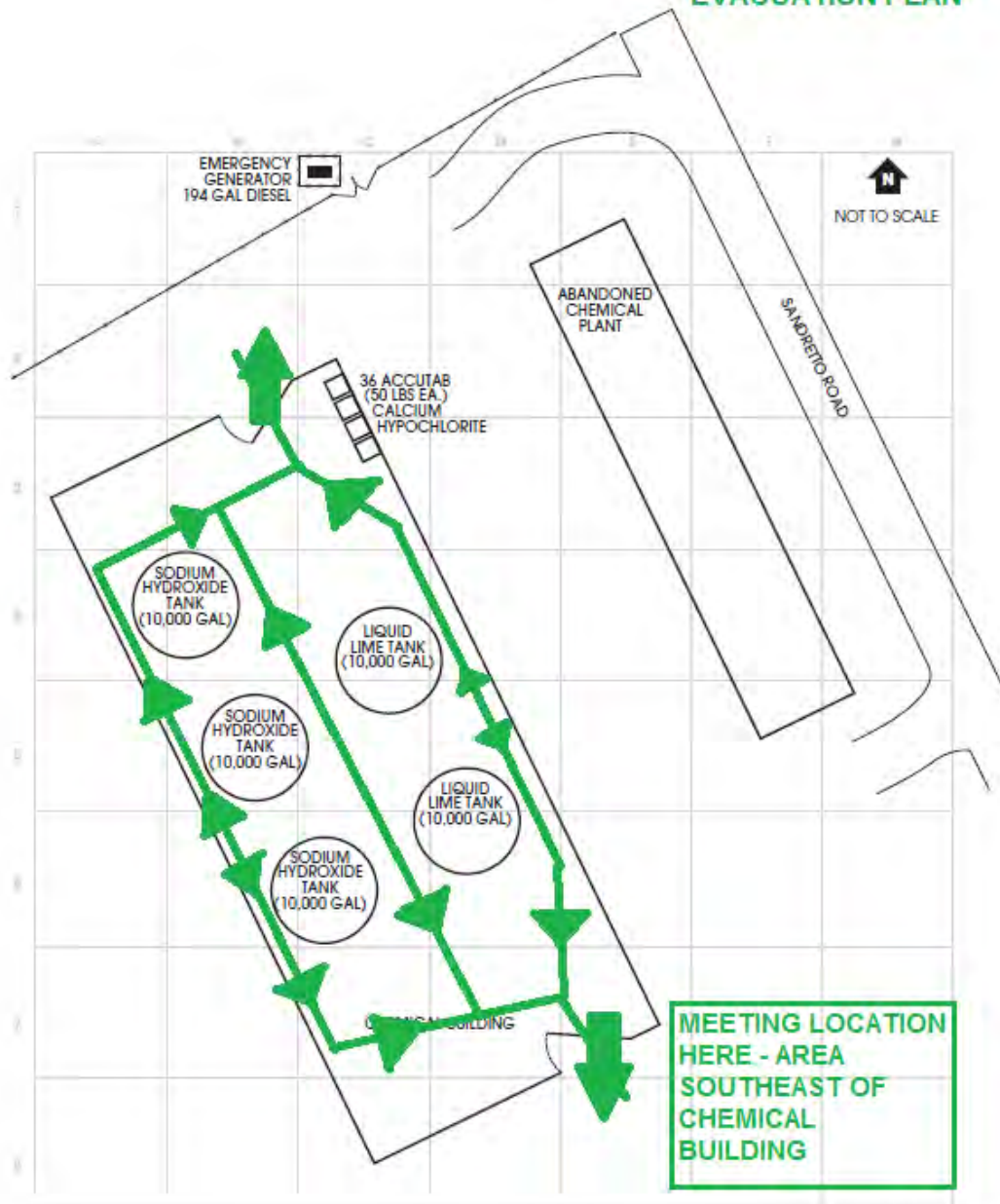
MAP 7



PARDEE CENTER

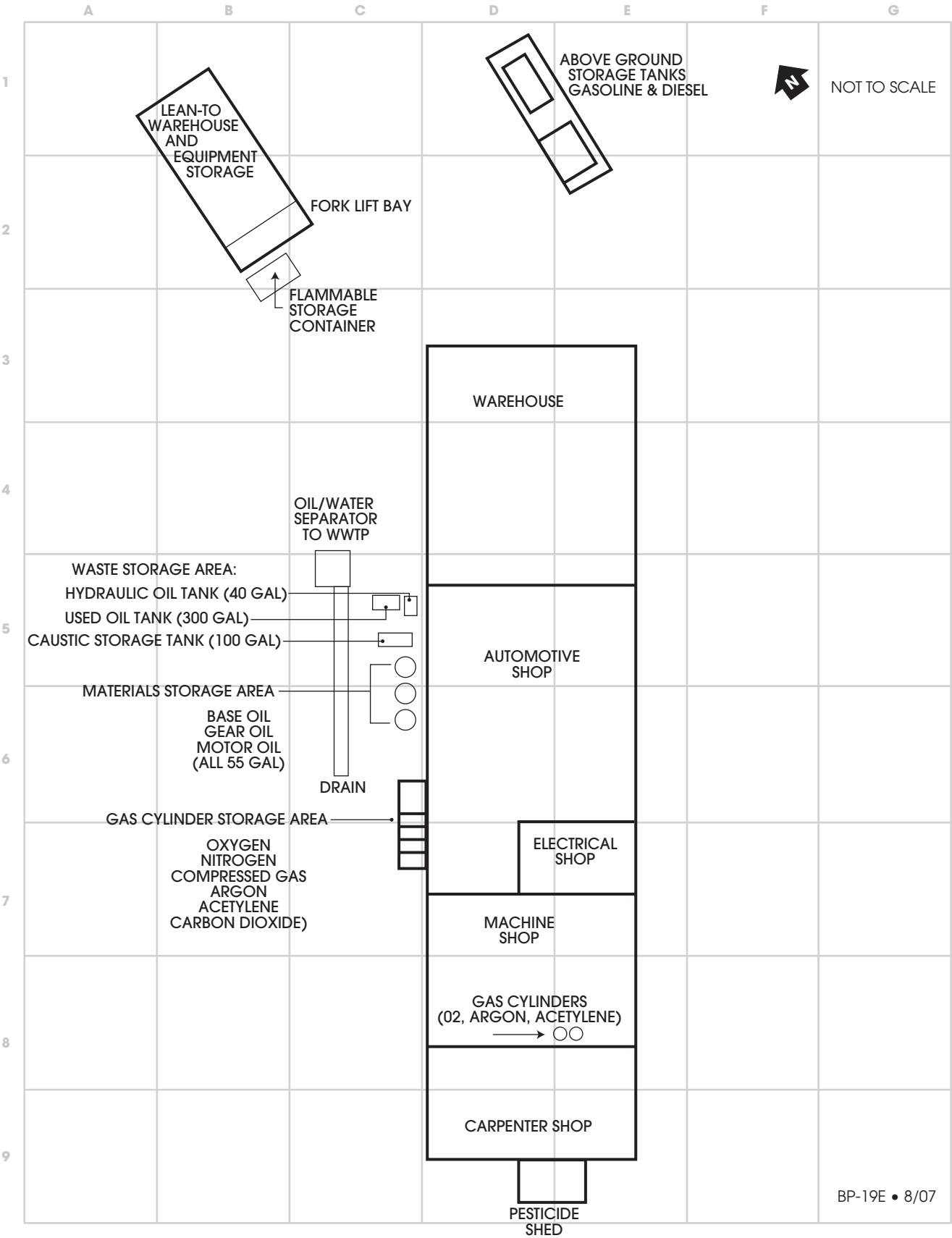
CHEMICAL BUILDING SITE PLAN - MAP 6

EVACUATION PLAN



PARDEE CENTER

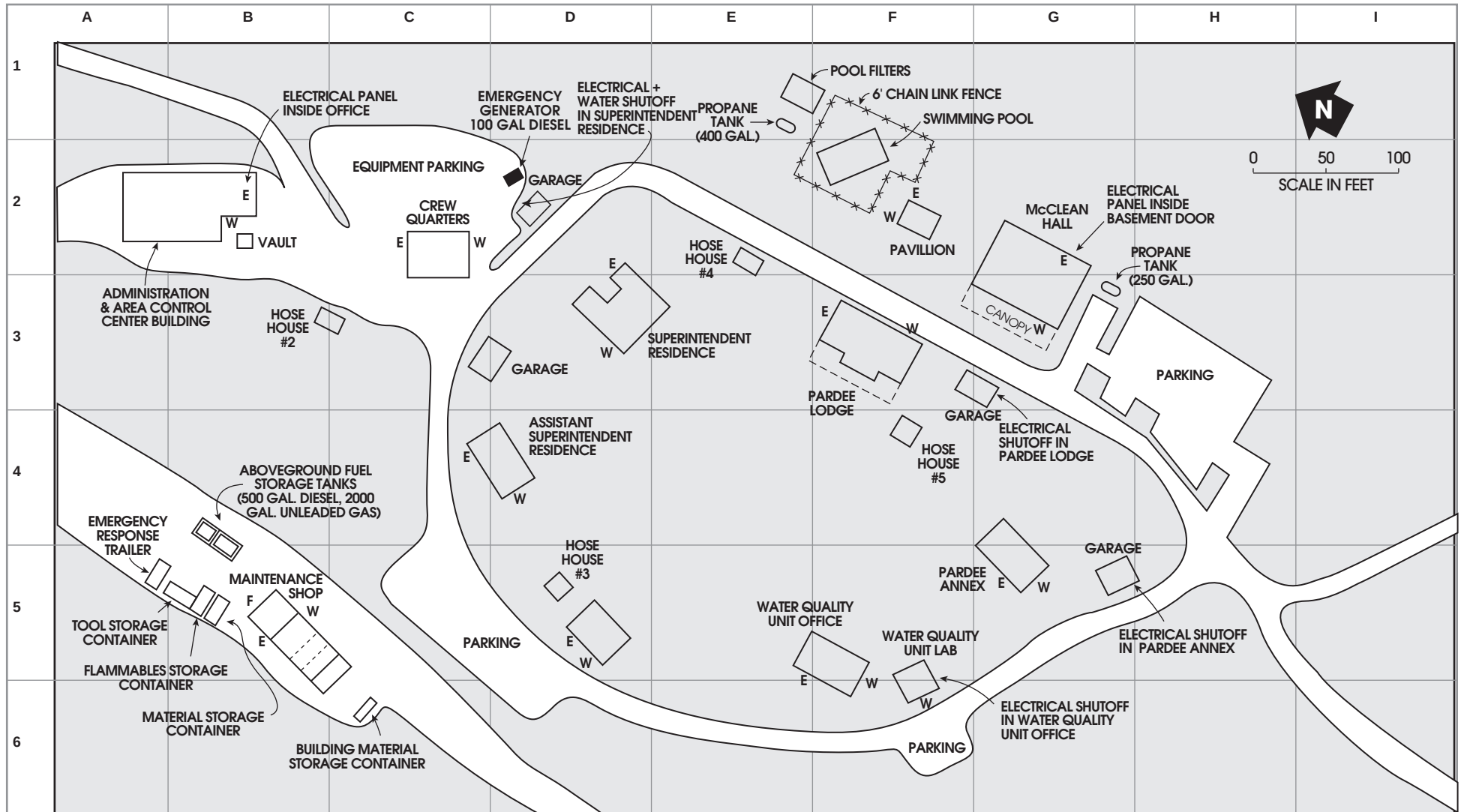
MAINTENANCE BUILDING SITE PLAN - MAP 5



CAMP PARDEE DETAIL-2

(UTILITY SHUTOFFS INCLUDING BUILDING
ELECTRICAL PANELS + WATER VALVES;
EMERGENCY FUEL PUMP SHUTOFF)

E = ELECTRICAL PANEL
W = BUILDING WATER VALVE
F = EMERGENCY FUEL PUMP SHUTOFF

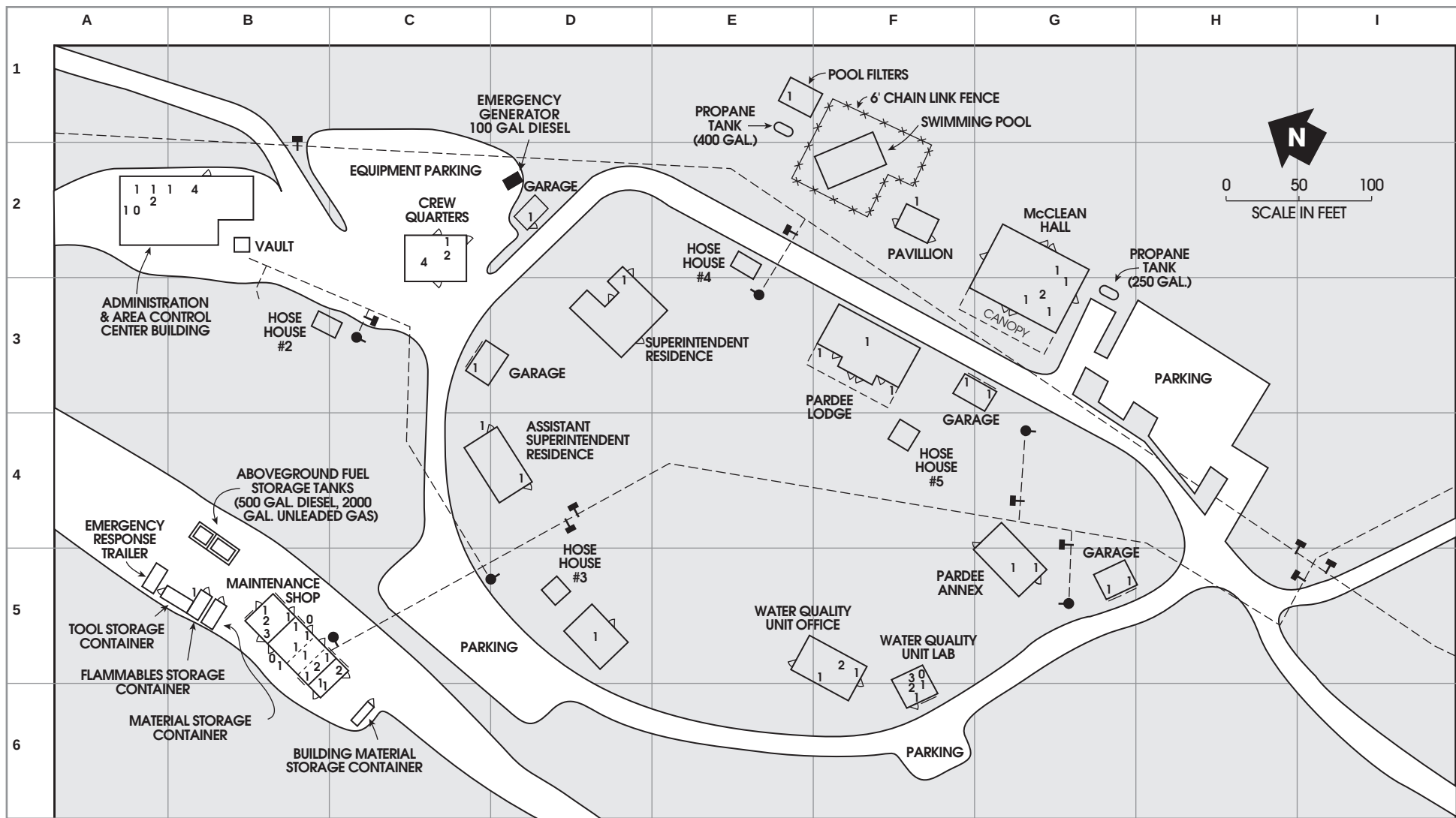


SITE PLAN - MAP #4

CAMP PARDEE DETAIL-1

(BUILDING EXITS, WATER DISTRIBUTION SYSTEM, HYDRANTS AND SAFETY EQUIPMENT)

- | | |
|---|---|
| <ul style="list-style-type: none"> ⊥ WATER LINE VALVES ● HYDRANTS --- WATER DISTRIBUTION PIPING △ DOORWAYS ⌋ ROLL UP DOORS | <ul style="list-style-type: none"> 0 EMERGENCY EYE WASH/SHOWER 1 FIRE EXTINGUISHERS 2 FIRST AID KITS 3 SPILL KIT 4 MSDS/EMERGENCY PROCEDURES |
|---|---|



SITE PLAN - MAP #3

PARDEE CENTER

E - Electrical Panel
 □ - Transformers
 T - Water Valves
 ● - Hydrants
 G# - Gate No. X

- ① Pardee Chemical Plant
- ② Pardee Center Water Treatment Plant
- ③ Outlet Tower

- ④ Storage Building
- ⑤ Garage
- ⑥ Pardee Annex
- ⑦ Water Quality Unit Laboratory

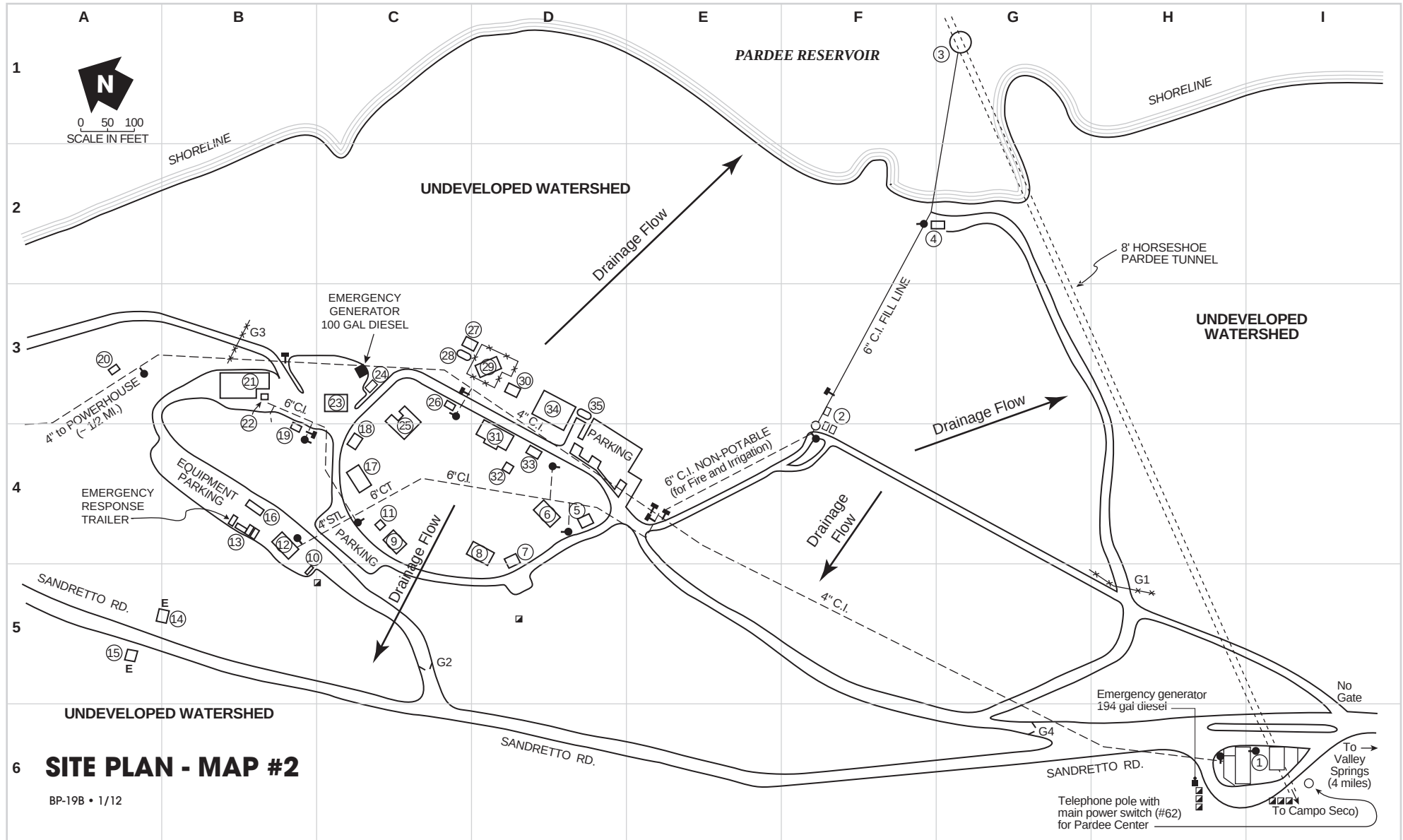
- ⑧ Water Quality Unit Office
- ⑨ Pardee House

- ⑩ Building Material Storage Container
- ⑪ Hose House # 3
- ⑫ Maintenance Shop
- ⑬ Equipment Storage Containers & Emergency Response Trailer
- ⑭ Wastewater Package Plant
- ⑮ Wastewater Pumping Plant

- ⑯ Aboveground Fuel Tanks (500 Gal. Diesel, 2000 Gal. Unleaded Gasoline)
- ⑰ Assistant Superintendent Residence
- ⑱ Garage
- ⑲ Hose House # 2
- ⑳ Hose House # 1

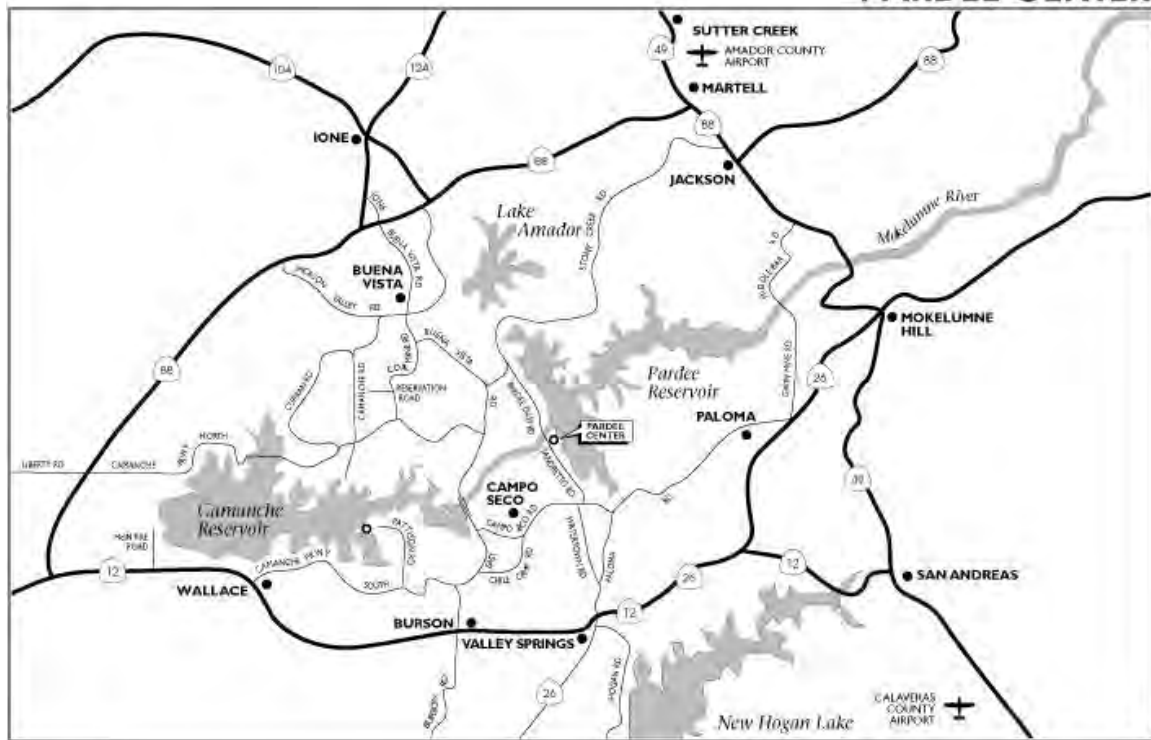
- ㉑ Administration & Area Control Center Building
- ㉒ Vault
- ㉓ Crew Quarters
- ㉔ Garage
- ㉕ Superintendent Residence
- ㉖ Hose House # 4
- ㉗ Pool Filters

- ㉘ Propane Tank (400 Gal.)
- ㉙ Swimming Pool
- ㉚ Pavilion
- ㉛ Lodge
- ㉜ Hose House # 5
- ㉝ Garage
- ㉞ McLean Hall
- ㉟ Propane Tank (250 Gal.)



6 **SITE PLAN - MAP #2**

PARDEE CENTER



MAP 1 - VICINITY

EBMUD - Pardee Reservoir Recreation Area (CERSID: 10238983)**Facility Information Accepted Aug 26, 2020**

Submitted on 8/19/2020 12:18:12 PM by *Deirdre Mena* of East Bay Municipal Utility District (Oakland, CA)

Comments by Submitter: Updated label on "20 kw" emergency generator for potential PG&E PSPS events from "20 kw" to correct rating of "25 kw." The 25 kw generator is located by Pardee Reservoir shoreline, near the Water Treatment Plant's pumping platform.

Submittal was **Accepted** on 8/26/2020 12:10:45 PM by Scott Meyer

- Business Activities
- Business Owner/Operator Identification

Hazardous Materials Inventory Accepted Aug 26, 2020

Submitted on 8/19/2020 12:18:12 PM by *Deirdre Mena* of East Bay Municipal Utility District (Oakland, CA)

Submittal was **Accepted** on 8/26/2020 12:10:54 PM by Scott Meyer

- Hazardous Material Inventory (5)
- Site Map (Official Use Only)
 - *Emergency Evacuation Plan Building 7* (Adobe PDF, 65KB)
 - *Site Maps* (Adobe PDF, 1418KB)
 - *Wastewater Treatment Plant - Location of Emergency Generator for PG&E PSPS Events* (Adobe PDF, 145KB)
 - *Water Treatment Plant & Pumping Platform Emergency Generator Locations for PG&E PSPS Events* (Adobe PDF, 179KB)

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org.	East Bay Municipal Utility District				Chemical Location	CERS ID	10238983				
Facility Name	EBMUD - Pardee Reservoir Recreation Area				Wastewater Treatment Facility - portable generator for PG&E PSPS events			Facility ID			
	4900 Stony Creek RD, Ione 95640							Status	Submitted on 8/19/2020 12:18 PM		
						Annual Waste Amount	Federal Hazard Categories	Hazardous Components (For mixture only)			
DOT Code/Fire Haz. Class	Common Name	Unit	Max. Daily	Largest Cont.	Avg. Daily			Component Name	% Wt	EHS	CAS No.
DOT: 3 - Flammable and Combustible Liquids	Diesel Fuel No. 2	Gallons	100	100	100	0	- Physical				
	CAS No	State	Storage Container		Pressue		Flammable				
	68334-30-5	Liquid	Other		Ambient	Waste Code	- Health				
Combustible Liquid, Class II		Type			Temperature		Carcinogenicity				
		Pure	Days on Site: 180		Ambient		- Health Acute				
							Toxicity				
							- Health Skin				
							Corrosion				
							Irritation				
							- Health Specific				
							Target Organ				
							Toxicity				
							- Health				
							Aspiration Hazard				

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org. East Bay Municipal Utility District			Chemical Location				CERS ID	10238983		
Facility Name EBMUD - Pardee Reservoir Recreation Area			Wastewater Treatment Facility, Bldg #7				Facility ID			
4900 Stony Creek RD, Ione 95640							Status	Submitted on 8/19/2020 12:18 PM		
DOT Code/Fire Haz. Class	Common Name	Unit	Quantities			Annual Waste Amount	Federal Hazard Categories	Hazardous Components (For mixture only)		
			Max. Daily	Largest Cont.	Avg. Daily			Component Name	% Wt	EHS CAS No.
DOT: 8 - Corrosives (Liquids and Solids) Corrosive, Water Reactive, Class 1	Sulfuric Acid 36%	Pounds	4876	4876	1590	0	- Health	Sulfuric Acid	36 %	7664-93-9
	CAS No <u>7664-93-9</u> ✓ EHS	<u>State</u>	<u>Storage Container</u>		<u>Pressure</u>		Carcinogenicity			
	Map: 2, 3 Grid: C1, B5	Liquid	Aboveground Tank		Ambient	<u>Waste Code</u>	- Health Skin	Water	64 %	7732-18-5
		<u>Type</u>	Days on Site: 365		<u>Temperature</u>	791	Corrosion			
Corrosive, Toxic	Sodium Hypochlorite >5% - 12.5% Gallons	Gallons	660	330	150	0	- Physical	SODIUM HYPOCHLORITE	12 %	7681-52-9
	CAS No <u>7681-52-9</u>	<u>State</u>	<u>Storage Container</u>		<u>Pressure</u>		Corrosive To	WATER	88 %	7732-18-5
	Map: 2, 3 Grid: C1, C-D5	Liquid	Tank Inside Building		Ambient		Metal			
		<u>Type</u>	Days on Site: 365		<u>Temperature</u>		- Health Skin			
		Mixture			Ambient		Corrosion			
							Irritation			
							- Health Serious			
							Eye Damage Eye			
							Irritation			

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org.	East Bay Municipal Utility District				Chemical Location	CERS ID	10238983			
Facility Name	EBMUD - Pardee Reservoir Recreation Area				Water Treatment Facility - portable generator for PG&E			Facility ID		
	4900 Stony Creek RD, Ione 95640				PSPS events			Status Submitted on 8/19/2020 12:18 PM		
DOT Code/Fire Haz. Class		Common Name	Unit	Quantities		Annual Waste Amount	Federal Hazard Categories	Hazardous Components (For mixture only)		
			Max. Daily	Largest Cont.	Avg. Daily			Component Name	% Wt	EHS CAS No.
DOT: 3 - Flammable and Combustible Liquids		Diesel Fuel No. 2	Gallons	170	170	170	0	- Physical		
		CAS No	State	Storage Container		Pressue		Flammable		
		68334-30-5	Liquid	Other		Ambient	Waste Code	- Health		
Combustible Liquid, Class II			Type			Temperature		Carcinogenicity		
			Pure	Days on Site: 180		Ambient		- Health Acute		
								Toxicity		
								- Health Skin		
								Corrosion		
								Irritation		
								- Health Specific		
								Target Organ		
								Toxicity		
								- Health		
								Aspiration Hazard		

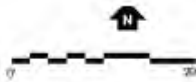
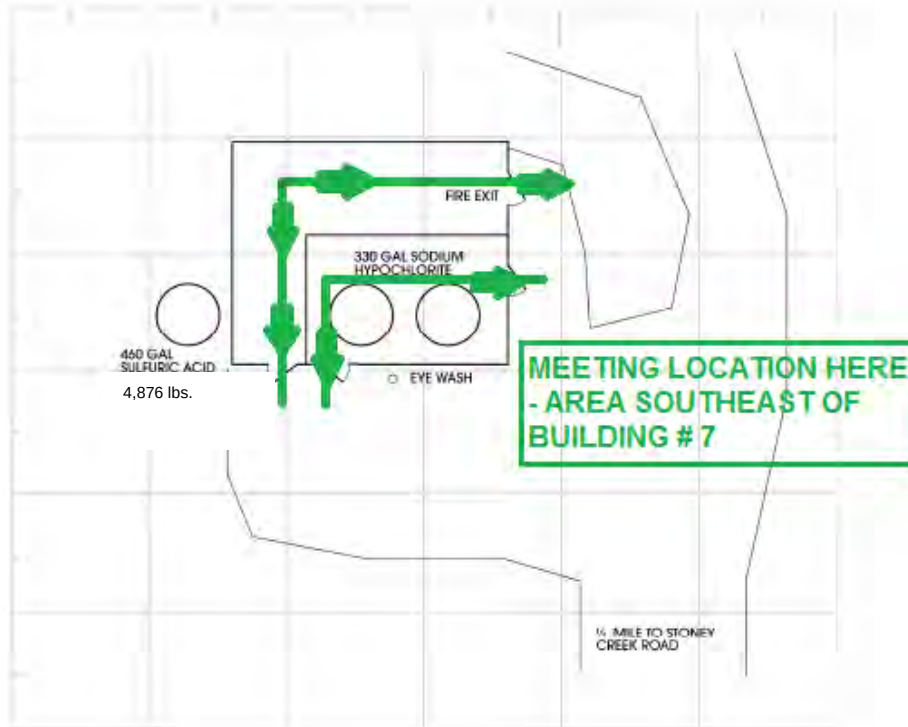
Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org.	East Bay Municipal Utility District				Chemical Location		CERS ID	10238983			
Facility Name	EBMUD - Pardee Reservoir Recreation Area				Water Treatment Plant Pumping Platform - portable generator for PG&E PSPS events				Facility ID		
	4900 Stony Creek RD, Ione 95640								Status	Submitted on 8/19/2020 12:18 PM	
						Annual Waste Amount	Federal Hazard Categories	Hazardous Components (For mixture only)			
DOT Code/Fire Haz. Class	Common Name	Unit	Max. Daily	Largest Cont.	Avg. Daily			Component Name	% Wt	EHS	CAS No.
DOT: 3 - Flammable and Combustible Liquids	Diesel Fuel No. 2	Gallons	100	100	100	0	- Physical				
	CAS No	State	Storage Container		Pressue	Waste Code	- Health				
Combustible Liquid, Class II	68334-30-5	Liquid	Other				Carcinogenicity				
		Type			Temperature		- Health Acute				
		Pure	Days on Site: 180				Toxicity				
							- Health Skin				
							Corrosion				
							Irritation				
							- Health Specific				
							Target Organ				
							Toxicity				
							- Health				
							Aspiration Hazard				

PARDEE RECREATION AREA

WASTEWATER TREATMENT FACILITY (BUILDING #7)

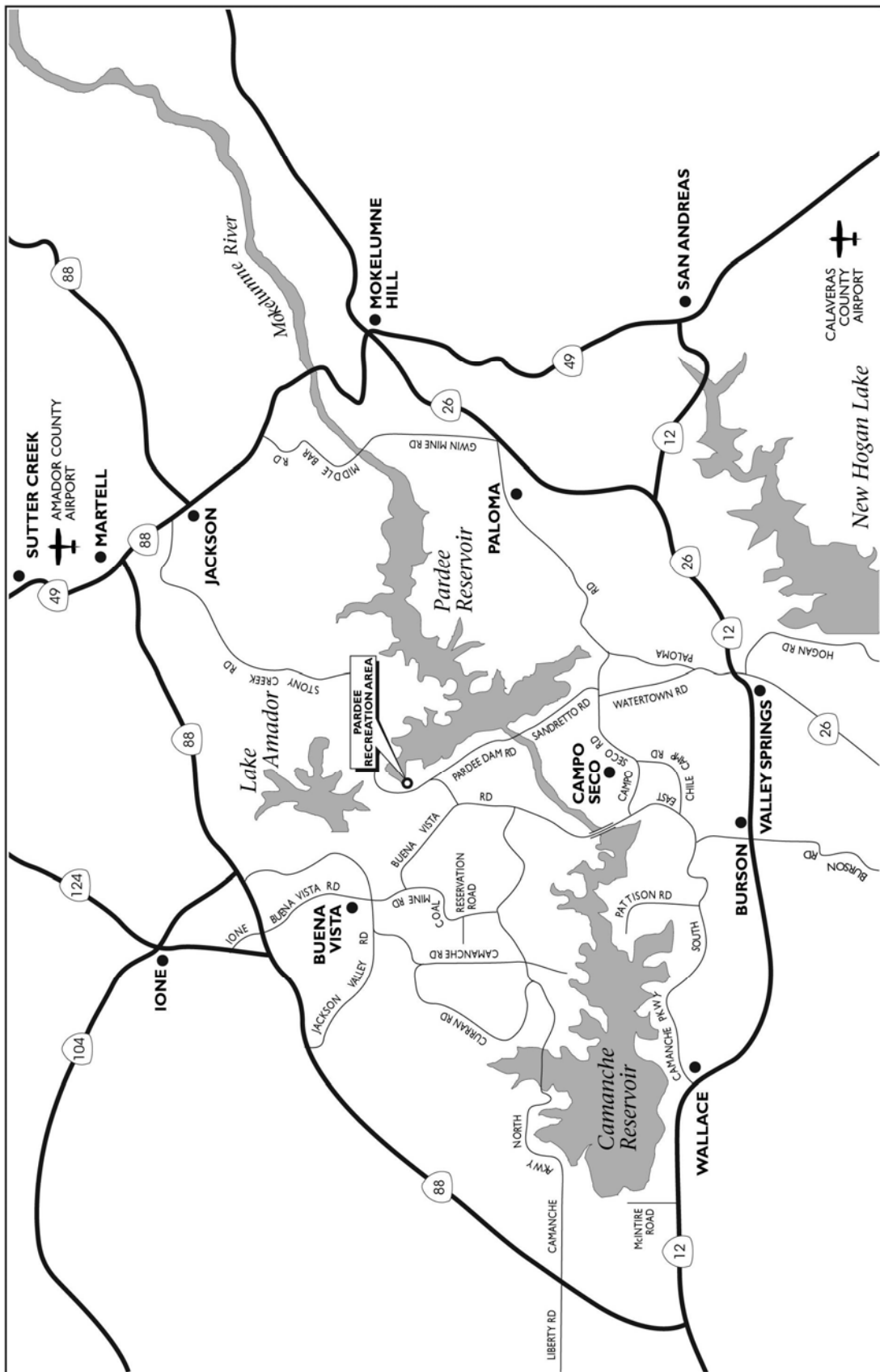
EMERGENCY EVACUATION PLAN



BP-17D

Map No. 3 Wastewater Chemical Treatment Building #7, EBMUD

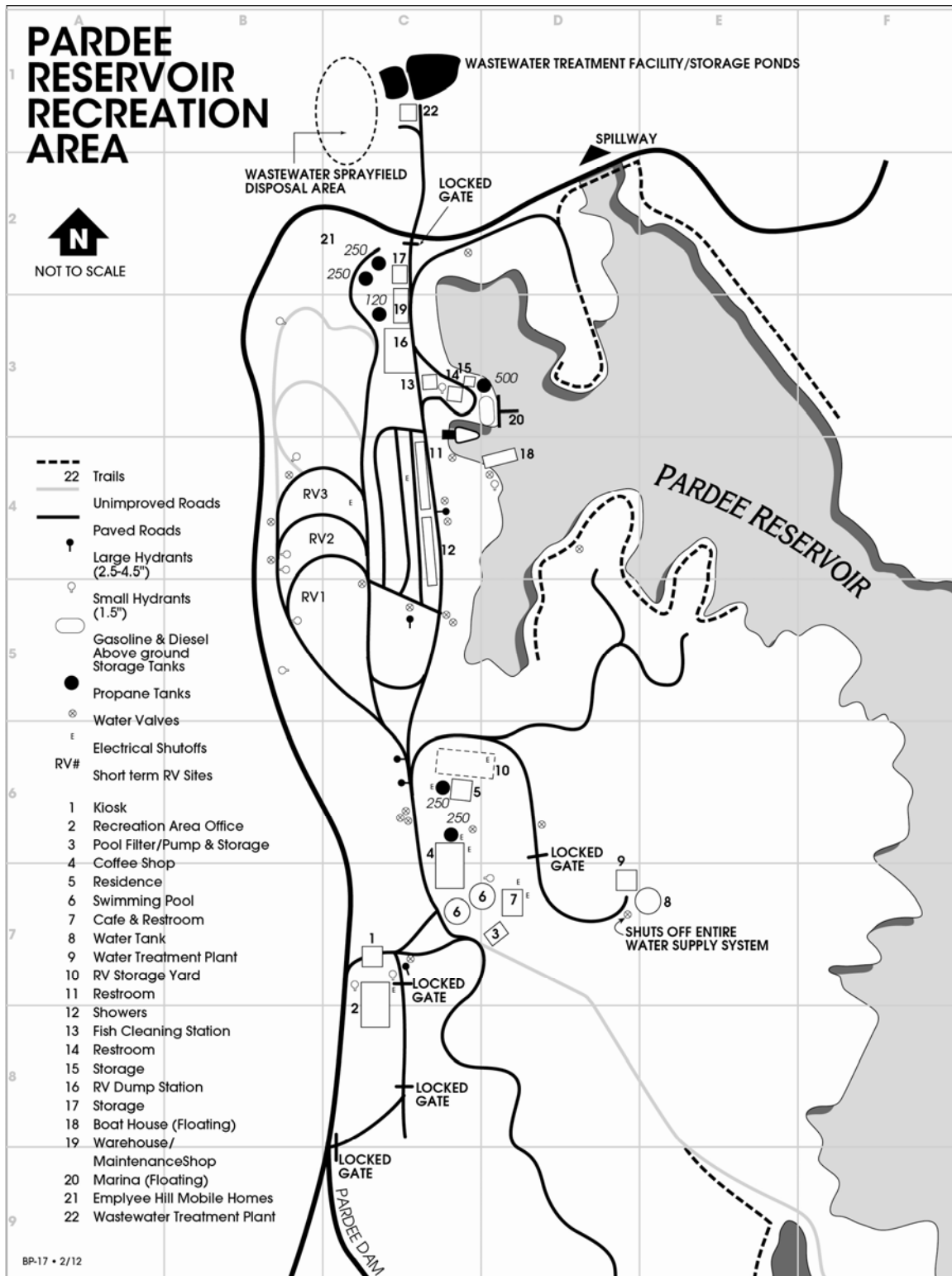
PARDEE RECREATION AREA



BP-16F

VICINITY

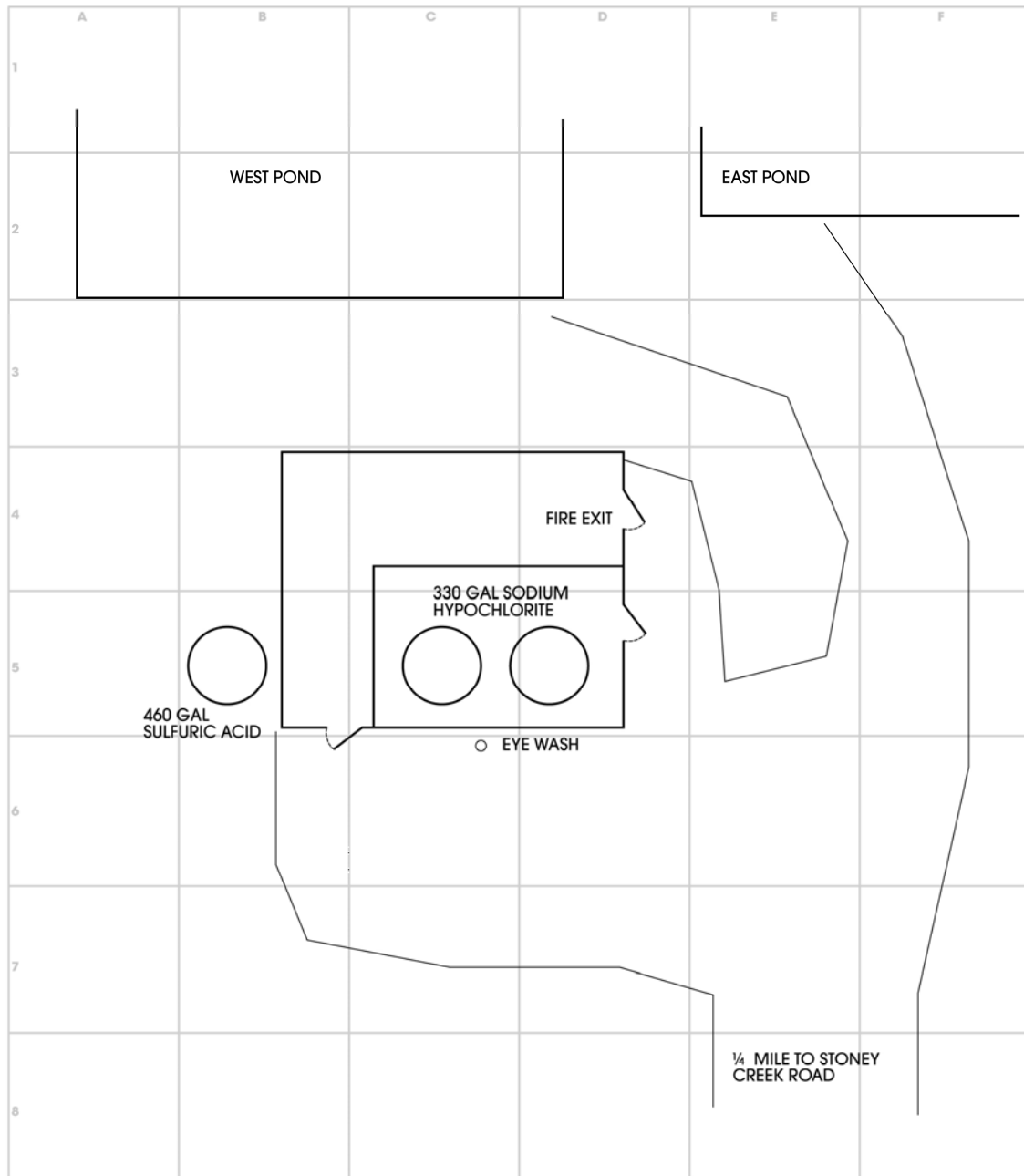
Map No. 1 Vicinity Map of Pardee Recreation Area, Pardee Lake Recreation/EBMUD



Map No. 2 Pardee Recreation Area, Pardee Lake Recreation/EBMUD

PARDEE RECREATION AREA

WASTEWATER TREATMENT FACILITY (BUILDING #7)



BP-17D

Map No. 3 Wastewater Chemical Treatment Building #7, EBMUD

EBMUD Pardee Recreation Area Wastewater Treatment Plant

Map depicting location of portable generator leased for potential PG&E PSPS Events



EBMUD – Pardee Recreation Area Water Treatment Plant
Map depicting location of portable generators for potential PG&E PSPS Events



**Appendix 5-2. Waste Discharge Requirements, Monitoring
and Reporting Requirements, Revised 2011
(32 pages)**

- Pardee Center WWTP
- Pardee Recreation Area WWTP
- Camanche North Shore WWTP
- Camanche South Shore WWTP



Matthew Rodriguez
Secretary for
Environmental Protection

**California Regional Water Quality Control Board
Central Valley Region
Katherine Hart, Chair**

11020 Sun Center Drive, #200, Rancho Cordova, California 95670-6114
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Edmund G. Brown Jr.
Governor

ECS - Received

AUG 23 2011

22 August 2011

Mr. John Schroeter
East Bay Municipal Utility District
375 Eleventh Street
Oakland, CA 94607-4240

**CERTIFIED MAIL
7010 1670 0002 0652 1176**

**REVISED MONITORING AND REPORTING PROGRAM, EAST BAY MUNICIPAL UTILITY
DISTRICT PARDEE CENTER WASTEWATER TREATMENT FACILITY, CALAVERAS
COUNTY**

Central Valley Regional Water Quality Control Board (Central Valley Water Board) staff has reviewed the East Bay Municipal Utility District's 5 February 2009 request to modify the requirements of Monitoring and Reporting Program (MRP) No. R5-2003-0119. In addition, we have reviewed the self-monitoring data submitted in monthly, quarterly, and annual reports.

Our review of the data indicates that a revision of the MRP is acceptable. As indicated in the attached revised MRP, the groundwater monitoring frequency will be changed from quarterly to semi-annually.

Please note that the Revised MRP must be implemented on the first day of the month following issuance. Therefore, the September 2011 monitoring report is to conform to the requirements of this Revised MRP.

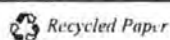
Please contact Ms. Lixin Fu at (916) 464-4689 or lfu@waterboards.ca.gov if you have any questions regarding this revised MRP. All monitoring reports and compliance and enforcement questions should be directed to Ms. Mary Boyd at (916) 464-4676 or Mboyd@waterboards.ca.gov.

ANNE OLSON, P.E.
Senior Water Resource Control Engineer

Enclosed: Revised MRP No. R5-2003-0119

cc: Brian Moss, Calaveras County Environmental Health Department, San Andreas

California Environmental Protection Agency



CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION
REVISED MONITORING AND REPORTING PROGRAM NO. R5-2003-0119

FOR
EAST BAY MUNICIPAL UTILITY DISTRICT
PARDEE CENTER WASTEWATER TREATMENT FACILITY
CALAVERAS COUNTY

This revised Monitoring and Reporting Program (MRP) describes requirements for monitoring influent, effluent, pond, land application area, groundwater, solid waste and sludge, and water supply. This MRP is issued pursuant to Water Code Section 13267. The East Bay Municipal Utility District (Discharger) shall not implement any changes to this MRP unless and until a revised MRP is issued by the Executive Officer. Section 13267 of the California Water Code states, in part:

"In conducting an investigation specified in subdivision (a), the regional board may require that any person who has discharged, discharges, or is suspected of having discharged or discharging, or who proposes to discharge waste within its region, or any citizen or domiciliary, or political agency or entity of this state who has discharged, discharges, or is suspected of having discharged or discharging, or who proposes to discharge, waste outside of its region that could affect the quality of waters within its region shall furnish, under penalty of perjury, technical or monitoring program reports which the regional board requires. The burden, including costs, of these reports shall bear a reasonable relationship to the need for the report and the benefits to be obtained from the reports. In requiring those reports, the regional board shall provide the person with a written explanation with regard to the need for the reports, and shall identify the evidence that supports requiring that person to provide the reports."

Section 13268 of the California Water Code states, in part:

"(a) Any person failing or refusing to furnish technical or monitoring program reports as required by subdivision (b) of Section 13267, or failing or refusing to furnish a statement of compliance as required by subdivision (b) of Section 13399.2, or falsifying and information provided therein, is guilty of a misdemeanor and may be liable civilly in accordance with subdivision (b).

(b)(1) Civil liability may be administratively imposed by a regional board in accordance with Article 2.5 (commencing with section 13323) of Chapter 5 for a violation of subdivision (a) in an amount which shall not exceed one thousand dollars (\$1,000) for each day in which the violation occurs."

The Discharger owns and operates the facility that is subject to Waste Discharge Requirements (WDRs) Order No. R5-2003-0119. The monitoring reports are necessary to ensure that the Discharger complies with the WDRs.

All samples shall be representative of the volume and nature of the discharge or matrix of material sampled. The time, date, and location of each sample shall be recorded on the sample chain of custody form.

POND MONITORING

The evaporation/percolation pond shall be monitored as follows. If the pond is empty on the scheduled monitoring date, the Discharger may report the freeboard monitoring result as "dry".

<u>Constituent</u>	<u>Units</u>	<u>Type of Sample</u>	<u>Sampling Frequency</u>	<u>Reporting Frequency</u>
Dissolved Oxygen ^{1, 2}	mg/L	Grab	Weekly	Monthly
Freeboard	0.1 feet	Measurement	Weekly	Monthly
Odors	--	Observation	Weekly	Monthly
Berm condition ³	--	Observation	Weekly	Monthly

¹ If the pond depth exceeds one foot, samples shall be collected at a depth of one foot from each pond in use, opposite the inlet. If the water depth is less than one foot, surface sampling is acceptable.

² Record any upset conditions that could effect monitoring interpretation, such as less than one foot of wastewater in pond.

³ Berm shall be observed for signs of seepage or surfacing water along the exterior toe of the berm. If surfacing water is found, then a sample shall be collected and tested for total coliform organisms and total dissolved solids.

LAND APPLICATION AREA MONITORING

Monitoring of the land application area shall be conducted daily when the wastewater is applied, and the results shall be included in the monthly monitoring report. Evidence of erosion, saturation, irrigation runoff, or the presence of nuisance conditions shall be noted in the report. Effluent monitoring results shall be used in calculations to ascertain loading rates at the land application area. Monitoring of the land application area shall include the following:

<u>Constituent</u>	<u>Units</u>	<u>Type of Sample</u>	<u>Sampling Frequency</u>	<u>Reporting Frequency</u>
Flow	Gallons	Meter	Daily	Monthly
Rainfall	Inches	Observation	Daily	Monthly
Acreage Applied	Acres	Calculated	Daily	Monthly
Water Application Rate	gal/acre/day	Calculated	Daily	Monthly

At least once per month when the land application area is being used, the entire land application area shall be inspected on the morning following an irrigation event to identify any equipment malfunction or other circumstances that might allow irrigation runoff to leave the irrigation area and/or create ponding conditions that violate the WDRs. A daily log of these inspections shall be kept at the facility and made available for review upon request.

GROUNDWATER MONITORING

Groundwater samples shall be collected from each groundwater monitoring well in accordance with an approved groundwater sampling plan. Prior to sampling, depth to groundwater shall be measured to the nearest 0.01 feet. Water table elevations shall be calculated and used to determine groundwater gradient and flow direction. Samples shall be collected and analyzed using approved EPA methods or other methods approved by the

Field test instruments (such as those used to test pH and dissolved oxygen) may be used provided that:

1. The operator is trained in proper use and maintenance of the instruments;
2. The instruments are calibrated prior to each monitoring event;
3. Instruments are serviced and/or calibrated by the manufacturer at the recommended frequency; and
4. Field calibration reports are submitted as described in the "Reporting" section of this MRP.

INFLUENT MONITORING

Samples shall be collected at approximately the same time as effluent samples and shall be representative of the influent. Influent monitoring shall include the following:

<u>Constituent</u>	<u>Units</u>	<u>Type of Sample</u>	<u>Sampling Frequency</u>	<u>Reporting Frequency</u>
Flow ¹	gpd	Meter	Daily	Monthly
BOD ₅ ²	mg/L	Grab	Monthly	Monthly

¹ Flow may be monitored from the pump station that conveys effluent into evaporation/percolation pond and/or the land application area.

² 5-day biochemical oxygen demand.

EFFLUENT MONITORING

Samples of effluent shall be collected from the pump station downstream of the wastewater treatment plant prior to discharge to the evaporation/percolation pond and/or the land application area. At a minimum, effluent monitoring shall consist of the following:

<u>Constituent</u>	<u>Units</u>	<u>Type of Sample</u>	<u>Sampling Frequency</u>	<u>Reporting Frequency</u>
Total Coliform Organisms ¹	MPN/100 mL ²	Grab	Weekly	Monthly
pH	Standard	Grab	Monthly	Monthly
BOD ₅	mg/L	Grab	Monthly	Monthly
Electrical Conductivity	mg/L	Grab	Quarterly	Semi-annually
Total Dissolved Solids	mg/L	Grab	Quarterly	Semi-annually
Sodium	mg/L	Grab	Quarterly	Semi-annually
Chloride	mg/L	Grab	Quarterly	Semi-annually
Total Nitrogen	mg/L	Grab	Quarterly	Semi-annually
Standard Minerals ³	mg/L	Grab	Annually	Annually

¹ Total Coliform Organisms shall be monitored when the wastewater is applied to the land application area.

² Most probable number per 100 mL.

³ Standard Minerals shall include, at a minimum, the following elements/compounds: boron, calcium, magnesium, potassium, sulfate, total alkalinity (including alkalinity series), and hardness.

Central Valley Water Board. Semi-annual groundwater monitoring shall occur in January and July. Groundwater monitoring shall include, at a minimum, the following:

<u>Constituents</u>	<u>Units</u>	<u>Type of Sample</u>	<u>Sampling and Reporting Frequency</u>
Depth to Groundwater	0.01 feet	Measurement	Semi-annually
Groundwater Elevation ¹	0.01 feet	Calculated	Semi-annually
Gradient Magnitude	feet/feet	Calculated	Semi-annually
Gradient Direction	degrees	Calculated	Semi-annually
Electrical Conductivity	mg/L	Grab	Semi-annually
Total Dissolved Solids	mg/L	Grab	Semi-annually
Nitrate Nitrogen	mg/L	Grab	Semi-annually
pH	pH units	Grab	Semi-annually
Total Coliform Organisms	MPN/100 mL	Grab	Semi-annually
Standard Minerals ²	mg/L	Grab	Annually

¹ Groundwater elevation shall be determined based on depth-to-water measurements using a surveyed measuring point elevation on the well and a surveyed reference elevation.

² Standard Minerals shall include, at a minimum, the following elements/compounds: boron, iron, manganese, calcium, magnesium, potassium, sulfate, sodium, chloride, total alkalinity (including alkalinity series), and hardness.

SOLID WASTE AND SLUDGE MONITORING

A log shall be kept of solid waste (grits and screenings) and sludge quantities generated and of handling and disposal activities, and shall be submitted as part of the monthly monitoring reports.

WATER SUPPLY MONITORING

A sampling station shall be established where a representative sample of the municipal water supply can be obtained. Water supply monitoring shall include at least the following for each water source used during the previous year:

<u>Constituents</u>	<u>Units</u>	<u>Sampling Frequency</u>
Electrical Conductivity	mg/L	Annually
Total Dissolved Solids	mg/L	Annually
pH	pH units	Annually
Standard Minerals ¹	mg/L	Annually

¹ Standard Minerals shall include, at a minimum, the following elements/compounds: boron, calcium, magnesium, sodium, potassium, chloride, nitrogen, sulfate, total alkalinity (including alkalinity series), and hardness.

REPORTING

In reporting monitoring data, the Discharger shall arrange the data in tabular form so that the date, sample type (e.g., effluent, pond, etc.), and reported analytical result for each sample are readily discernible. The data shall be summarized in such a manner to clearly illustrate

compliance with waste discharge requirements and spatial or temporal trends, as applicable. The results of any monitoring done more frequently than required at the locations specified in the MRP shall be reported in the next scheduled monitoring report.

As required by the California Business and Professions Code Sections 6735, 7835, and 7835.1, all Groundwater Monitoring Reports shall be prepared under the direct supervision of a California Registered Engineer or Geologist and signed by the registered professional.

A. Monthly Monitoring Reports

Monthly monitoring reports shall be submitted to the Central Valley Water Board by the **1st day of the second month** following the end of the reporting period (e.g., the January monthly report is due by 1 March). At a minimum, the reports shall include:

1. Results of the influent, effluent, pond, solid waste and sludge, and land application area monitoring;
2. A comparison of the monitoring data to the discharge specifications and an explanation of any violation of those requirements;
3. If requested by staff, copies of laboratory analytical report(s);
4. A calibration log verifying calibration of all monitoring instruments and devices used to fulfill the prescribed monitoring program; and
5. Whether wastewater was discharged to the land application area during that month.
6. Loading rates at the land application area.

B. Semi-Annual Monitoring Reports

In addition to the monthly monitoring reports, the Discharger shall establish a semi-annual sampling schedule for groundwater monitoring such that samples are obtained approximately every six months. Semi-Annual Monitoring Reports shall be submitted to the Central Valley Water Board by the **1st day of March and September**. The Semi-Annual Monitoring Reports shall include the following:

1. Results of the quarterly effluent monitoring;
2. Results of groundwater monitoring;
3. A narrative description of all preparatory, monitoring, sampling, and analytical testing activities for the groundwater monitoring. The narrative shall be sufficiently detailed to verify compliance with the WDR, this revised MRP, and the Standard Provisions and Reporting Requirements. The narrative shall be supported by field logs for each well documenting depth to groundwater and method of sampling;
4. Calculation of groundwater elevations, an assessment of groundwater flow direction and gradient on the date of measurement, comparison of previous flow direction and gradient data, and discussion of seasonal trends if any;
5. A narrative discussion of the analytical results for all groundwater locations monitored including spatial and temporal trends, with reference to summary data tables, graphs, and

appended analytical reports (as applicable);

6. Summary data tables of historical and current water table elevations and analytical results;
7. A comparison of monitoring data to the groundwater limitations and an explanation of any violation of those requirements;
8. A scaled map showing relevant structures and features of the facility, the locations of monitoring wells and any other sampling stations, and groundwater elevation contours referenced to mean sea level datum; and
9. Copies of laboratory analytical report(s) for groundwater monitoring.

C. Annual Report

In addition to the monthly and semi-annual monitoring reports, an Annual Report shall be prepared. The Annual Report shall be submitted to the Central Valley Water Board by **1 February** each year. The Annual Report shall include the following:

1. If requested by staff, tabular and graphical summaries of all data collected during the year;
2. An evaluation of the groundwater quality beneath the wastewater treatment facility and the land application area;
3. A discussion of compliance and the corrective actions taken, as well as any planned or proposed actions needed to bring the discharge into full compliance with the waste discharge requirements;
4. A discussion of any data gaps and potential deficiencies/redundancies in the monitoring system or reporting program;
5. A copy of the certification for each certified wastewater treatment plant operator working at the facility and a statement about whether the Discharger is in compliance with Title 23, CCR, Division 3, Chapter 26.
6. The results from annual monitoring of the groundwater wells and water supply;
7. The results from any sludge monitoring required by the disposal facility;
8. Equipment maintenance and calibration records, as described in Standard Provision No. C.4;
9. A forecast of influent flows, as described in Standard Provision No. E.4; and
10. The results to date of the Upcountry Wastewater Collection System Condition Assessment.

A letter transmitting the self-monitoring reports shall accompany each report. The letter shall include a discussion of requirement violations found during the reporting period, and actions taken or planned for correcting noted violations, such as operation or facility modifications. If the Discharger has previously submitted a report describing corrective actions and/or a time

schedule for implementing the corrective actions, reference to the previous correspondence will be satisfactory. The transmittal letter shall contain the penalty of perjury statement by the Discharger, or the Discharger's authorized agent, as described in the Standard Provisions General Reporting Requirements Section B.3.

The Discharger shall implement the above monitoring program on the first day of the month following issuance of this revised MRP.

Ordered by:

PAMELA C. CREEDON, Executive Officer

(Date)



Linda S. Adams
Acting Secretary for
Environmental Protection

California Regional Water Quality Control Board
Central Valley Region
Katherine Hart, Chair

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Edmund G. Brown Jr.
Governor

26 April 2011

RCO - Received

MAY 02 2011

Mr. John Schroeter, Manager,
East Bay Municipal Utility District
375 Eleventh Street
Oakland, CA 94607-4240

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**REVISED MONITORING AND REPORTING PROGRAM NO. 5-01-270, EAST BAY
MUNICIPAL UTILITY DISTRICT PARDEE RESERVOIR RECREATION AREA, AMADOR
COUNTY**

Central Valley Regional Water Quality Control Board (Central Valley Water Board) staff has revised the Monitoring and Reporting Program (MRP) Order No. 5-01-270 as requested by East Bay Municipal Utility District for the Pardee Reservoir Recreation Area in Amador County. The draft MRP was transmitted on 3 February 2011; the comment period ended on 1 April 2011.

Please note that the Revised MRP must be implemented on the first day of the month following issuance. Therefore, the May 2011 monitoring report shall conform to the requirements of this Revised MRP. It is also necessary that Lysimeters L1, L2 and L3 be properly destroyed. Therefore, please submit a work plan for the lysimeter destruction by **31 July 2011**.

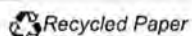
Please contact Ms. Lixin Fu at (916) 464-4689 or lfu@waterboards.ca.gov if you have any questions regarding this Revised MRP. All MRP reports and compliance and enforcement questions should be directed to Ms. Mary Boyd. Ms. Boyd can be reached at (916) 464-4676 or mboyd@waterboards.ca.gov.

Robert Busby
Supervising Engineering Geologist
Permitting Title 27 & Confined Animals Section

Enclosure: Revised Monitoring and Reporting Program No. 5-01-270

cc: Michael Israel, Amador County Environmental Health Department, Jackson

California Environmental Protection Agency



CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

REVISED MONITORING AND REPORTING PROGRAM NO. 5-01-270

FOR
EAST BAY MUNICIPAL UTILITY DISTRICT
PARDEE RESERVOIR RECREATION AREA
AMADOR COUNTY

This Revised Monitoring and Reporting Program (Revised MRP) describes requirements for monitoring influent, lagoons, effluent, land application area, groundwater, sludge and water supply. This Revised MRP is issued pursuant to Water Code Section 13267. The East Bay Municipal Utility District (Discharger) shall not implement any changes to this Revised MRP unless and until another revision is issued by the Executive Officer. Section 13267 of the California Water Code states, in part:

"In conducting an investigation specified in subdivision (a), the regional board may require that any person who has discharged, discharges, or is suspected of having discharged or discharging, or who proposes to discharge waste within its region, or any citizen or domiciliary, or political agency or entity of this state who has discharged, discharges, or is suspected of having discharged or discharging, or who proposes to discharge, waste outside of its region that could affect the quality of waters within its region shall furnish, under penalty of perjury, technical or monitoring program reports which the regional board requires. The burden, including costs, of these reports shall bear a reasonable relationship to the need for the report and the benefits to be obtained from the reports. In requiring those reports, the regional board shall provide the person with a written explanation with regard to the need for the reports, and shall identify the evidence that supports requiring that person to provide the reports."

Section 13268 of the California Water Code states, in part:

"(a) Any person failing or refusing to furnish technical or monitoring program reports as required by subdivision (b) of Section 13267, or failing or refusing to furnish a statement of compliance as required by subdivision (b) of Section 13399.2, or falsifying and information provided therein, is guilty of a misdemeanor and may be liable civilly in accordance with subdivision (b).

(b)(1) Civil liability may be administratively imposed by a regional board in accordance with Article 2.5 (commencing with section 13323) of Chapter 5 for a violation of subdivision (a) in an amount which shall not exceed one thousand dollars (\$1,000) for each day in which the violation occurs."

The Discharger owns and operates the facility that is subject to Waste Discharge Requirements (WDRs) Order No. 5-01-270, and the reports are necessary to ensure that the Discharger complies with the WDRs.

All samples should be representative of the volume and nature of the discharge or matrix of material sampled. The time, date, and location of each grab sample shall be recorded on the sample chain of custody form.

Field test instruments (such as those used to test pH and dissolved oxygen) may be used provided that:

1. The operator is trained in proper use and maintenance of the instruments;
2. The instruments are calibrated prior to each monitoring event;
3. Instruments are serviced and/or calibrated by the manufacturer at the recommended frequency; and
4. Field calibration reports are submitted as described in the "Reporting" section of this Revised MRP.

INFLUENT MONITORING

Influent monitoring shall be performed at the headworks. Influent monitoring shall include the following:

<u>Constituent</u>	<u>Units</u>	<u>Type of Sample</u>	<u>Sampling Frequency</u>	<u>Reporting Frequency</u>
Flow	gpd	Meter	Daily	Monthly
20°C BOD ₅ ¹	mg/L	Grab	Monthly	Monthly

¹ 5-day Biochemical Oxygen Demand.

LAGOON MONITORING

Samples shall be collected from an established sampling station. Freeboard shall be measured vertically from the surface of the water to the lowest elevation of the surrounding berm and shall be measured to the nearest 0.1 feet. Monitoring of each lagoon shall include, at a minimum, the following:

<u>Constituent</u>	<u>Units</u>	<u>Type of Sample</u>	<u>Sampling Frequency</u>	<u>Reporting Frequency</u>
Dissolved Oxygen ^{1, 2}	mg/ L	Grab	Weekly	Monthly
pH ^{1, 2}	Standard units	Grab	Weekly	Monthly
Freeboard	0.1 feet	Measurement	Weekly	Monthly
Odors	--	Observation	Weekly	Monthly

¹ Samples shall be collected at a depth of one foot from each pond in use, opposite the inlet. If the water depth is less than one foot, surface sampling is acceptable. Samples shall be collected between 0700 and 0900 hours.

² Record any conditions that could effect the monitoring interpretation, such as less than one foot of wastewater in the lagoon.

EFFLUENT MONITORING

Effluent samples shall be collected from April through October. The time, date, and location of each grab sample shall be recorded on the sample chain of custody form. Effluent monitoring shall include the following:

<u>Constituent</u>	<u>Units</u>	<u>Type of Sample</u>	<u>Sampling Frequency</u> ¹	<u>Reporting Frequency</u>
Biological Oxygen Demand ₅	mg/L	Grab	Weekly	Monthly
Total Coliform Organisms	MPN /100 mL	Grab	Weekly	Monthly
Settleable Solids	mL/L	Grab	Monthly	Monthly
Total Dissolved Solids	mg/L	Grab	Monthly	Monthly
Nitrate as Nitrogen	mg/L	Grab	Monthly	Monthly
Total Kjeldahl Nitrogen	mg/L	Grab	Monthly	Monthly
pH	Std units	Grab	Monthly	Monthly
Formaldehyde	mg/L	Grab	Monthly, May-Sept.	Monthly, May-Sept.
Zinc	mg/L	Grab	Monthly, May-Sept.	Monthly, May-Sept.
Phenol	mg/L	Grab	Monthly, May-Sept.	Monthly, May-Sept.
Standard Minerals ²	mg/L	Grab	Annually	Annually

¹ Samples shall be collected between the months of April and October, unless described otherwise.

² Standard Minerals shall include, at a minimum, the following elements/compounds: boron, iron, manganese, calcium, magnesium, potassium, sodium, chloride, sulfate, total alkalinity (including alkalinity series), and hardness.

LAND APPLICATION AREA MONITORING

Monitoring of the land application area shall be conducted daily when wastewater is applied (April through October), and the results shall be included in the monthly monitoring report. Evidence of erosion, field saturation, runoff, or the presence of nuisance conditions shall be noted in the report. The tailwater collection ditch and valves shall be checked for leaks and overflows. Effluent monitoring results shall be used to calculate loading rates at the application area. Monitoring of the land application area shall include the following:

<u>Constituent</u>	<u>Units</u>	<u>Type of Sample</u>	<u>Sampling Frequency</u>	<u>Reporting Frequency</u>
Flow	Gallons	Continuous	Daily	Monthly
Rainfall	Inches	Measurement	Daily	Monthly
Acreage Applied	Acres	Calculated	Daily	Monthly
Application Rate	gal/acre•day	Calculated	Daily	Monthly
BOD Loading Rate	lbs/acre•day	Calculated	Monthly	Monthly
TN Loading Rate	lbs/ac/month	Calculated	Monthly	Monthly
TDS Loading Rate	lbs/ac/month	Calculated	Monthly	Monthly

BOD denotes Biological Oxygen Demand. TN denotes Total Nitrogen. TDS denotes Total Dissolved Solids.

GROUNDWATER MONITORING

Groundwater samples shall be collected from each groundwater monitoring well in accordance with an approved groundwater monitoring workplan. Prior to sampling, depth to groundwater shall be measured to the nearest 0.01 feet. Water table elevations shall be calculated and used to determine groundwater gradient and flow direction. Samples shall be collected and analyzed using approved EPA methods or other methods approved by the

Central Valley Water Board. Groundwater monitoring shall include, at a minimum, the following:

<u>Constituents</u>	<u>Units</u>	<u>Type of Sample</u>	<u>Sampling Frequency</u>	<u>Reporting Frequency</u>
Depth to Groundwater	± 0.01 feet	Measurement	Quarterly	Semi-annually
Groundwater Elevation	± 0.01 feet	Calculated	Quarterly	Semi-annually
Gradient	feet/feet	Calculated	Quarterly	Semi-annually
Gradient Direction	degrees	Calculated	Quarterly	Semi-annually
pH	pH units	Grab	Semi-annually	Semi-annually
Chloride	mg/L	Grab	Semi-annually	Semi-annually
Sodium	mg/L	Grab	Semi-annually	Semi-annually
Total Coliform Organisms	MPN/100 mL	Grab	Semi-annually	Semi-annually
Total Dissolved Solids	mg/L	Grab	Semi-annually	Semi-annually
Nitrate-N	mg/L	Grab	Semi-annually	Semi-annually
Total Trihalomethanes	µg/L	Grab	Semi-annually	Semi-annually
Zinc	mg/L	Grab	Semi-annually	Semi-annually
Total Phenols	mg/L	Grab	Semi-annually	Semi-annually
Formaldehyde	mg/L	Grab	Semi-annually	Semi-annually
Standard Minerals ¹	mg/L	Grab	Annually	Annually

¹ Standard Minerals shall include the following compounds: boron, iron, manganese, calcium, magnesium, potassium, sulfate, total alkalinity (including alkalinity series), and hardness.

SLUDGE MONITORING

A composite sample of sludge shall be collected when removed from the lagoons in accordance with EPA's POTW Sludge Sampling and Analysis Guidance Document, August 1989, and tested for the following metals:

Cadmium	Copper	Nickel
Chromium	Lead	Zinc

Sampling records shall be retained for a minimum of five years. A log shall be kept of sludge quantities generated and of handling and disposal activities. The frequency of entries is discretionary; however, the log should be complete enough to serve as a basis for part of the annual report.

WATER SUPPLY MONITORING

A sampling station shall be established where a representative sample of the municipal water supply can be obtained. Water supply monitoring shall include at least the following:

<u>Constituents</u>	<u>Units</u>	<u>Sampling Frequency</u>
Total Dissolved Solids	mg/L	Annually
pH	pH units	Annually
Standard Minerals ¹	mg/L	Annually

¹ Standard Minerals shall include, at a minimum, the following constituents: boron, iron, manganese, calcium, magnesium, potassium, sulfate, chloride, sodium, total alkalinity (including alkalinity series), and hardness.

REPORTING

In reporting monitoring data, the Discharger shall arrange the data in tabular form so that the date, sample type (e.g., effluent, pond, etc.), and reported analytical result for each sample are readily discernible. The data shall be summarized in such a manner to clearly illustrate compliance with waste discharge requirements and spatial or temporal trends, as applicable. The results of any monitoring done more frequently than required at the locations specified in the Revised MRP shall be reported to the Central Valley Water Board.

A. Monthly Monitoring Reports

Daily, weekly, and monthly monitoring data shall be reported in monthly monitoring reports. Monthly reports shall be submitted to the Regional Board on the **1st day of the second month following sampling** (i.e. the January Report is due by 1 March). At a minimum, the reports shall include:

1. Results of influent, lagoon, effluent, and land application area monitoring;
2. A comparison of monitoring data to the discharge specifications and an explanation of any violation of those requirements. Data shall be presented in tabular format; and
3. If requested by staff, copies of laboratory analytical report(s).

B. Semi-annual Monitoring Reports

In addition to the monthly monitoring reports, the Discharger shall establish quarterly and semi-annual sampling schedules for groundwater monitoring such that samples are obtained approximately every three and six months. Semi-annual monitoring reports shall be submitted to the Board by the **1st day of February and August**. The semi-annual reports shall include the following:

1. Results of groundwater monitoring;
2. A narrative description of all preparatory, monitoring, sampling, and analytical testing activities for groundwater monitoring. The narrative shall be sufficiently detailed to verify compliance with the WDR, this Revised MRP, and the Standard Provisions and Reporting Requirements. The narrative shall be supported by field logs for each well documenting depth to groundwater and method of sampling;

3. Calculation of groundwater elevations, an assessment of the groundwater flow direction and gradient on the date of measurement, comparison to previous flow direction and gradient data, and discussion of seasonal trends, if any;
4. A narrative discussion of the analytical results for all media and locations monitored, including spatial and temporal trends, with reference to summary data tables, graphs, and appended analytical reports (as applicable);
5. Summary data tables of historical and current groundwater table elevations and analytical results;
6. A comparison of monitoring data to the groundwater limitations and an explanation of any violation of those requirements; and
7. Copies of laboratory analytical report(s) for groundwater monitoring.

C. Annual Report

In addition to the monthly and semi-annual monitoring reports, an Annual Report shall be prepared. The Annual Report shall be submitted to the Regional Board by **1 February** each year. The Annual Report shall include the following:

1. If requested by staff, tabular and graphical summaries of all data collected during the year;
2. A discussion of compliance and the corrective actions taken, as well as any planned or proposed actions needed to bring the discharge into full compliance with the waste discharge requirements;
3. A discussion of any data gaps and potential deficiencies/redundancies in the monitoring system or reporting program;
4. A copy of the certification for each certified wastewater treatment plant operator working at the facility and a statement about whether the Discharger is in compliance with Title 23, CCR, Division 3, Chapter 26;
5. Summary of information on the disposal of sludge and/or solid waste;
6. The results from any sludge monitoring required by the disposal facility; and
7. The results from annual monitoring of the effluent, groundwater and water supply.

A letter transmitting the self-monitoring reports shall accompany each report. Such a letter shall include a discussion of requirement violations found during the reporting period, and actions taken or planned for correcting noted violations, such as operation or facility modifications. If the Discharger has previously submitted a report describing corrective actions and/or a time schedule for implementing the corrective actions, reference to the previous correspondence will be satisfactory. The transmittal letter shall contain the penalty

of perjury statement by the Discharger, or the Discharger's authorized agent, as described in the Standard Provisions General Reporting Requirements Section B.3.

The Discharger shall implement the above monitoring program on the first day of the month following issuance of this Revised MRP.

Ordered by: 
for PAMELA C. CREEDON, Executive Officer
26 April 2011
(Date)



Matthew Rodriguez
Secretary for
Environmental Protection

California Regional Water Quality Control Board
Central Valley Region
Katherine Hart, Chair

11020 Sun Center Drive, #200, Rancho Cordova, California 95670-6114
(916) 464-3291 • FAX (916) 464-4645
<http://www.waterboards.ca.gov/centralvalley>



Edmund G. Brown Jr.
Governor

ECS - Received

NOV 10 2011

8 November 2011

Mr. John Schroeter
East Bay Municipal Utility District
375 Eleventh Street
Oakland, CA 94607-4240

CERTIFIED MAIL
7010 1670 0002 0652 1190

REVISED MONITORING AND REPORTING PROGRAM, EAST BAY MUNICIPAL UTILITY DISTRICT CAMANCHE NORTH SHORE WASTEWATER TREATMENT PLANT, AMADOR COUNTY

Central Valley Regional Water Quality Control Board staff has reviewed the East Bay Municipal Utility District's 5 February 2009 request to modify the requirements of Monitoring and Reporting Program (MRP) No. 95-175. In addition, we have reviewed the self-monitoring data submitted in monthly, quarterly, and annual reports.

Our review of the data indicates that a revision of the MRP is acceptable. As indicated in the attached revised MRP, the groundwater monitoring frequency will be changed from quarterly to semi-annually.

Please note that the Revised MRP must be implemented on the first day of the month following issuance. Therefore, the December 2011 monitoring report is to conform to the requirements of this Revised MRP.

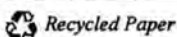
Please contact Ms. Lixin Fu at (916) 464-4689 or lfu@waterboards.ca.gov if you have any questions regarding this revised MRP. All monitoring reports and compliance and enforcement questions should be directed to Ms. Mary Boyd at (916) 464-4676 or mboyd@waterboards.ca.gov.

ANNE OLSON, P.E.
Senior Water Resource Control Engineer

Enclosed: Revised MRP No. 95-175

cc: Mike Israel, Amador County Environmental Health Department, Jackson

California Environmental Protection Agency



CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION
REVISED MONITORING AND REPORTING PROGRAM NO. 95-175 (REV. 2)

FOR
EAST BAY MUNICIPAL UTILITY DISTRICT
CAMANCHE NORTH SHORE WASTEWATER TREATMENT PLANT
AMADOR COUNTY

This Revised Monitoring and Reporting Program (Revised MRP) presents requirements for monitoring of the wastewater influent, wastewater treatment and storage ponds, spray disposal area, groundwater, and water supply. This Revised MRP is issued pursuant to Water Code Section 13267. The Discharger shall not implement any changes to this Revised MRP unless and until another revised MRP is issued by the Executive Officer. Section 13267 of the California Water Code states, in part:

"In conducting an investigation specified in subdivision (a), the regional board may require that any person who has discharged, discharges, or is suspected of having discharged or discharging, or who proposes to discharge waste within its region, or any citizen or domiciliary, or political agency or entity of this state who has discharged, discharges, or is suspected of having discharged or discharging, or who proposes to discharge, waste outside of its region that could affect the quality of waters within its region shall furnish, under penalty of perjury, technical or monitoring program reports which the regional board requires. The burden, including costs, of these reports shall bear a reasonable relationship to the need for the report and the benefits to be obtained from the reports. In requiring those reports, the regional board shall provide the person with a written explanation with regard to the need for the reports, and shall identify the evidence that supports requiring that person to provide the reports."

Section 13268 of the California Water Code states, in part:

"(a) Any person failing or refusing to furnish technical or monitoring program reports as required by subdivision (b) of Section 13267, or failing or refusing to furnish a statement of compliance as required by subdivision (b) of Section 13399.2, or falsifying and information provided therein, is guilty of a misdemeanor and may be liable civilly in accordance with subdivision (b).

(b)(1) Civil liability may be administratively imposed by a regional board in accordance with Article 2.5 (commencing with section 13323) of Chapter 5 for a violation of subdivision (a) in an amount which shall not exceed one thousand dollars (\$1,000) for each day in which the violation occurs."

The Discharger owns and operates the facility that is subject to Waste Discharge Requirements (WDRs) Order No. 95-175. The monitoring reports are necessary to ensure that the Discharger complies with the WDRs.

All samples shall be representative of the volume and nature of the discharge. The time, date, and location of each grab sample shall be recorded on the sample chain of custody form.

Field testing instruments (such as those used to test pH and dissolved oxygen) may be used provided that:

1. The operator is trained in proper use and maintenance of the instruments;
2. The instruments are field calibrated prior to each monitoring event;
3. Instruments are serviced and/or calibrated by the manufacturer at the recommended frequency; and
4. Field calibration reports are submitted as described in the "Reporting" section of this Revised MRP.

INFLUENT MONITORING

Samples shall be collected at approximately the same time as effluent samples. Influent monitoring shall be conducted from the last lift station prior to discharge into the wastewater treatment ponds and shall include the following:

<u>Constituent</u>	<u>Units</u>	<u>Type of Sample</u>	<u>Sampling Frequency</u>	<u>Reporting Frequency</u>
Flow	gpd	Meter Observation	Daily	Monthly
BOD ₅ ¹	mg/L	Grab	Monthly	Monthly

¹ 5-day biochemical oxygen demand.

EFFLUENT MONITORING

Samples of effluent shall be collected from the effluent storage pond (Pond 6). At a minimum, effluent monitoring shall consist of the following:

<u>Constituent</u>	<u>Units</u>	<u>Type of Sample</u>	<u>Sampling Frequency</u>	<u>Reporting Frequency</u>
Total Coliform Organisms ¹	MPN/100 ml ²	Grab	Weekly	Monthly
pH	Standard	Grab	Monthly	Monthly
BOD ₅	mg/L	Grab	Monthly	Monthly
Total Dissolved Solids	mg/L	Grab	Quarterly	Quarterly ⁴
Sodium	mg/L	Grab	Quarterly	Quarterly ⁴
Chloride	mg/L	Grab	Quarterly	Quarterly ⁴
Nitrate as Nitrogen	mg/L	Grab	Quarterly	Quarterly ⁴
Standard Minerals ³	mg/L	Grab	Annually	Annually

¹ Monitoring for Total Coliform Organisms shall occur when the treated wastewater is discharged to the spray disposal area.

² Most probable number per 100 mL.

³ Standard Minerals shall include, at a minimum, the following elements/compounds: boron, calcium, manganese, magnesium, potassium, sulfate, total alkalinity (including alkalinity series), and hardness.

⁴ Quarterly results shall be reported in the Monthly Monitoring Report for the month during which sampling occurs.

POND MONITORING

Each wastewater treatment and storage pond shall be monitored as follows. If the pond is empty on the scheduled monitoring date, the Discharger may report the freeboard monitoring result as "dry".

<u>Constituent</u>	<u>Units</u>	<u>Type of Sample</u>	<u>Sampling Frequency</u>	<u>Reporting Frequency</u>
Dissolved Oxygen ^{1,2}	mg/L	Grab	Weekly	Monthly
Freeboard	0.1 feet	Measurement	Weekly	Monthly
Odors	—	Observation	Weekly	Monthly
Berm condition ³	—	Observation	Weekly	Monthly

¹ If the pond depth exceeds one foot, samples shall be collected at a depth of one foot from each pond in use, opposite the inlet. If the water depth is less than one foot, surface sampling is acceptable.

² Record any conditions that could affect monitoring interpretation, such as less than one foot of wastewater in pond.

³ Containment berms shall be observed for signs of seepage or surfacing water along the exterior toe of the levees. If surfacing water is found, then a sample shall be collected and tested for total coliform organisms and total dissolved solids.

SPRAY DISPOSAL AREA MONITORING

Monitoring of the spray disposal area shall be conducted daily when the wastewater is applied, and the results shall be included in the monthly monitoring report. Evidence of erosion, saturation, irrigation runoff, or the presence of nuisance conditions shall be noted in the report. Effluent monitoring results shall be used in calculations to ascertain loading rates at the spray disposal area. Monitoring of the spray disposal area shall include the following:

<u>Constituent</u>	<u>Units</u>	<u>Type of Sample</u>	<u>Sampling Frequency</u>	<u>Reporting Frequency</u>
Flow	Gallons	Meter Observation	Daily	Monthly
Rainfall	Inches	Observation	Daily	Monthly
Acreage Applied	Acres	Calculated	Daily	Monthly
Wastewater Application Rate	gal/acre/day	Calculated	Daily	Monthly

At least once per week when the spray disposal area is being used, the entire area shall be inspected to identify any equipment malfunction or other circumstances that might allow irrigation runoff to leave the irrigation area and/or create ponding conditions that violate the WDRs. A daily log of these inspections shall be kept at the facility and made available for review upon request.

GROUNDWATER MONITORING

Groundwater samples shall be collected from each groundwater monitoring well in accordance with an approved groundwater sampling plan. Prior to sampling, depth to groundwater shall be measured to the nearest 0.01 feet. Water table elevations shall be calculated and used to determine groundwater gradient and flow direction. Samples shall be collected and analyzed using EPA methods or other methods approved by the Central Valley Water Board. Groundwater monitoring shall include, at a minimum, the following:

<u>Constituent</u>	<u>Units</u>	<u>Type of Sample</u>	<u>Sampling and Reporting Frequency</u>
Depth to Groundwater	0.01 feet	Measurement	Semi-annually ³
Groundwater Elevation ¹	0.01 feet	Calculated	Semi-annually ³
Gradient	feet/feet	Calculated	Semi-annually ³
Gradient Direction	degrees	Calculated	Semi-annually ³
Total Dissolved Solids	mg/L	Grab	Semi-annually ³
Nitrate as Nitrogen	mg/L	Grab	Semi-annually ³
Iron	mg/L	Grab	Semi-annually ³
Manganese	mg/L	Grab	Semi-annually ³
pH	pH units	Grab	Semi-annually ³
Total Coliform Organisms	MPN/100 mL	Grab	Semi-annually ³
Standard Minerals ²	mg/L	Grab	Annually ⁴

¹ Groundwater elevation shall be determined based on depth-to-water measurements using a surveyed measuring point elevation on the well and a surveyed reference elevation.

² Standard Minerals shall include, at a minimum, the following elements/compounds: boron, calcium, chloride, magnesium, potassium, sodium, sulfate, total alkalinity (including alkalinity series), and hardness.

³ Semi-annual groundwater monitoring shall occur in the first and the third quarter of each calendar year.

⁴ Annual groundwater monitoring shall occur in the first quarter of each calendar year.

SLUDGE MONITORING

Prior to the removal of sludge from any pond, a composite sample shall be collected in accordance with EPA's POTW Sludge Sampling and Analysis Guidance Document (August 1989) and tested for the following metals:

Cadmium	Copper	Nickel
Chromium	Lead	Zinc

Sampling records shall be retained for a minimum of five years. A log shall be kept if solid waste (grits and screenings) and sludge quantities generated and of handling and disposal activities. The frequency of entries is discretionary; however, the log should be complete enough to serve as a basis for part of the annual report.

WATER SUPPLY MONITORING

A sampling station shall be established where a representative sample of the municipal water supply can be obtained. Water supply monitoring shall include at least the following for each water source used during the previous year:

<u>Constituents</u>	<u>Units</u>	<u>Sampling Frequency</u>
Total Dissolved Solids	mg/L	Annually
Electrical Conductivity	mg/L	Annually
pH	pH units	Annually
Standard Minerals ¹	mg/L	Annually

- ¹ Standard Minerals shall include, at a minimum, the following elements/compounds: boron, calcium, chloride, iron, manganese, magnesium, nitrogen, potassium, sodium, sulfate, total alkalinity (including alkalinity series), and hardness.

REPORTING

In reporting monitoring data, the Discharger shall arrange the data in tabular form so that the date, sample type (e.g., effluent, pond, etc.), and reported analytical result for each sample are readily discernible. The data shall be summarized in such a manner to clearly illustrate compliance with waste discharge requirements and spatial or temporal trends, as applicable. The results of any monitoring done more frequently than required at the locations specified in the Revised MRP shall be reported in the next scheduled monitoring report.

A. Monthly Monitoring Reports

Monthly reports shall be submitted to the Central Valley Water Board by the **1st day of the second month** following the end of the reporting period (i.e. the January monthly report is due by 1 March). At a minimum, the reports shall include:

1. Results of the influent, effluent, pond, sludge, and spray disposal area monitoring;
2. A comparison of the monitoring data to the discharge specifications and an explanation of any violation of those requirements;
3. If requested by staff, copies of laboratory analytical report(s);
4. A calibration log verifying calibration of all monitoring instruments and devices used to fulfill the prescribed monitoring program; and
5. Whether wastewater was discharged to the spray disposal area during that month.

B. Semi-Annual Monitoring Reports

In addition to the monthly monitoring reports, semi-annual monitoring reports shall be submitted to the Central Valley Water Board by the **1st day of May and October each year**.

As required by the California Business and Professions Code Sections 6735, 7835, and 7835.1, all Groundwater Monitoring Reports shall be prepared under the direct supervision of a Registered Engineer or Geologist and signed by the registered professional.

The semi-annual reports shall include the following:

1. Results of groundwater monitoring;
2. A narrative description of all preparatory, monitoring, sampling, and analytical testing activities for groundwater monitoring. The narrative shall be sufficiently detailed to verify compliance with the WDRs, this Revised MRP, and the Standard Provisions and Reporting Requirements. The narrative shall be supported by field logs for each well documenting depth to groundwater and method of sampling;

3. Calculation of groundwater elevations, an assessment of the groundwater flow direction and gradient on the date of measurement, comparison to previous flow direction and gradient data, and discussion of seasonal trends, if any;
4. A narrative discussion of the analytical results for all groundwater and locations monitored, including spatial and temporal trends, with reference to summary data tables, graphs, and appended analytical reports (as applicable);
5. Summary data tables of historical and current groundwater table elevations and analytical results;
6. A comparison of monitoring data to the groundwater limitations and an explanation of any violation of those requirements; and
7. A scaled map showing relevant structures and features of the facility, the locations of monitoring wells and any other sampling stations, and groundwater elevation contours referenced to mean sea level datum.
8. Copies of laboratory analytical report(s) for groundwater monitoring.

D. Annual Report

An Annual Report shall be submitted to the Central Valley Water Board by **1 February** each year. The Annual Report shall include the following:

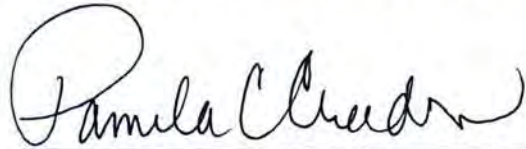
1. The results from annual monitoring of the effluent, groundwater, and water supply;
2. Tabular and graphical summaries of all data collected during the year;
3. A digital database (Microsoft Excel) containing historic groundwater data;
4. An evaluation of the groundwater quality beneath the wastewater treatment facility and spray disposal area;
5. An evaluation of the performance of the wastewater treatment plant;
6. A discussion of compliance and the corrective actions taken, as well as any planned or proposed actions needed to bring the discharge into full compliance with the waste discharge requirements;
7. A discussion of any data gaps and potential deficiencies/redundancies in the monitoring system or reporting program;
8. A copy of the certification for each certified wastewater treatment plant operator working at the facility and a statement about whether the Discharger is in compliance with Title 23, CCR, Division 3, Chapter 26.
9. The results from any sludge monitoring required by the disposal facility;

10. Equipment maintenance and calibration records, as described in Standard Provision No. C.4; and
11. A forecast of influent flows, as described in Standard Provision No. E.4.

A letter transmitting the self-monitoring reports shall accompany each report. The letter shall include a discussion of requirement violations found during the reporting period, and actions taken or planned for correcting noted violations, such as operation or facility modifications. If the Discharger has previously submitted a report describing corrective actions and/or a time schedule for implementing the corrective actions, reference to the previous correspondence will be satisfactory. The transmittal letter shall contain the penalty of perjury statement by the Discharger, or the Discharger's authorized agent, as described in the Standard Provisions General Reporting Requirements Section B.3.

The Discharger shall implement the above revised monitoring program on the first day of the month following adoption of this Order.

Ordered by:



PAMELA C. CREEDON, Executive Officer

11-8-11

(Date)

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

REVISED MONITORING AND REPORTING PROGRAM NO. R5-2002-0070

FOR
EAST BAY MUNICIPAL UTILITY DISTRICT
CAMANCHE RESERVOIR SOUTH SHORE RECREATION AREA
WASTEWATER TREATMENT PLANT
CALAVERAS COUNTY

This Revised Monitoring and Reporting Program (Revised MRP) presents requirements for monitoring of the wastewater influent, wastewater treatment and storage ponds, effluent, surface water, sludge, groundwater, and water supply. This Revised MRP is issued pursuant to Water Code Section 13267. The Discharger shall not implement any changes to this Revised MRP unless and until another revised MRP is issued by the Executive Officer.

All samples shall be representative of the volume and nature of the discharge. The time, date, and location of each grab sample shall be recorded on the sample chain of custody form.

Field testing instruments (such as those used to test pH and dissolved oxygen) may be used provided that:

1. The operator is trained in proper use and maintenance of the instruments;
2. The instruments are field calibrated prior to each monitoring event;
3. Instruments are serviced and/or calibrated by the manufacturer at the recommended frequency; and
4. Field calibration reports are submitted as described in the "Reporting" section of this Revised MRP.

INFLUENT MONITORING

Influent monitoring shall be performed at each location where influent is discharged into Pond 1. Samples shall be collected at approximately the same time as effluent samples and shall be representative of the influent. Influent monitoring shall include the following:

<u>Constituent</u>	<u>Units</u>	<u>Type of Sample</u>	<u>Sampling Frequency</u>	<u>Reporting Frequency</u>
Total Flow	gpd	Meter Observation	Daily	Monthly
20°C BOD ¹	mg/L	Grab	Quarterly	Quarterly ²

¹ 5-day Biochemical Oxygen Demand.

² Quarterly results shall be reported in the Monthly Monitoring Report for the month during which sampling occurs.

POND MONITORING

Each wastewater treatment and storage pond shall be monitored as follows. If the pond is empty on the scheduled monitoring date, the Discharger may report the freeboard monitoring result as "dry".

<u>Constituent</u>	<u>Units</u>	<u>Type of Sample</u>	<u>Sampling Frequency</u>	<u>Reporting Frequency</u>
Dissolved Oxygen ^{1, 2}	mg/L	Grab	Weekly	Monthly
pH	Standard units	Grab	Weekly	Monthly
Freeboard	0.1 feet	Measurement	Weekly	Monthly
Berm Seepage ³	NA	Observation	Weekly	Monthly
Odors	--	Observation	Weekly	Monthly

¹ If the pond depth exceeds one foot, samples shall be collected at a depth of one foot from each pond in use, opposite the inlet. If the water depth is less than one foot, surface sampling is acceptable.

² Record any conditions that could affect monitoring interpretation, such as less than one foot of wastewater in pond.

³ Containment berms shall be observed for signs of seepage or surfacing water along the exterior toe of the levees. If surfacing water is found, then a sample shall be collected and tested for total coliform organisms and total dissolved solids.

EFFLUENT MONITORING

Effluent samples shall be collected from an established sampling station located in an area that shall provide a sample representative of the water in Pond 3. Effluent monitoring shall include the following:

<u>Constituent</u>	<u>Units</u>	<u>Type of Sample</u>	<u>Sampling Frequency</u>	<u>Reporting Frequency</u>
BOD ¹	mg/L	Grab	Monthly	Monthly
Total Coliform Organisms	MPN ² /100 mL	Grab	Monthly	Monthly
pH	Standard unit	Grab	Monthly	Monthly
Total Dissolved Solids	mg/L	Grab	Monthly	Monthly
Nitrate as Nitrogen	mg/L	Grab	Monthly	Monthly
Sodium	mg/L	Grab	Monthly	Monthly
Chloride	mg/L	Grab	Monthly	Monthly
Standard Minerals ³	mg/L	Grab	Annually	Annually

¹ 5-day Biochemical Oxygen Demand.

² Using a minimum of 15 tubes or three dilutions.

³ Standard Minerals shall include, at a minimum, the following elements/compounds: Barium, Calcium, Iron, Magnesium, Manganese, Potassium, Sulfate, Total Alkalinity (including alkalinity series), and Hardness.

SURFACE WATER MONITORING

The Discharger shall monitor surface water in the two terminal freshwater ponds (the "Trout Pond" and "Western Pond", which is also known as "Beaver Pond") surrounding the wastewater ponds. Grab samples shall be collected from the terminal ponds where the pond water flows into the Camanche Reservoir. Surface water monitoring shall include following:

<u>Constituent</u>	<u>Units</u>	<u>Type of Sample</u>	<u>Sampling and Reporting Frequency</u>
Surface Water Elevation	± 0.1 feet	Measurement	Semi-annual ¹
Nitrate Nitrogen	mg/l	Grab	Semi-annual ¹
Total Alkalinity	mg/l	Grab	Semi-annual ¹
Chloride	mg/l	Grab	Semi-annual ¹
Total Dissolved Solids	mg/l	Grab	Semi-annual ¹

¹ Semi-annual monitoring shall occur in the first and the third quarter of each calendar year.

GROUNDWATER MONITORING

Prior to construction and/or sampling of any groundwater monitoring wells, the Discharger shall submit plans and specifications to the Board for review and approval. Once installed, all new wells shall be added to the MRP and shall be sampled and analyzed according to the schedule below.

Samples shall be collected in the wells MW-5 through MW-12. Prior to sampling, depth to groundwater shall be measured to the nearest 0.01 feet. Water table elevations shall be calculated and used to determine groundwater gradient and flow direction. Samples shall be collected and analyzed using approved EPA methods or other methods approved by the Central Valley Water Board. Groundwater monitoring shall include, at a minimum, the following:

<u>Constituents</u>	<u>Units</u>	<u>Type of Sample</u>	<u>Sampling and Reporting Frequency</u>
Groundwater Elevation ¹	0.01 feet	Measured	Semi-annually ³
Depth to groundwater	0.01 feet	Measured	Semi-annually ³
Gradient	feet/feet	Calculated	Semi-annually ³
Gradient Direction	degrees	Calculated	Semi-annually ³
pH	pH units	Grab	Semi-annually ³
Chloride	mg/L	Grab	Semi-annually ³
Sodium	mg/L	Grab	Semi-annually ³
Total Coliform Organisms	MPN/100 mL	Grab	Semi-annually ³
Total Dissolved Solids	mg/L	Grab	Semi-annually ³
Nitrate Nitrogen	mg/L	Grab	Semi-annually ³
Standard Minerals ²	mg/L	Grab	Annually ⁴

¹ Groundwater elevation shall be determined based on depth-to-water measurements using a surveyed measuring point elevation on the well and a surveyed reference elevation.

² Standard Minerals shall include, at a minimum, the following elements/compounds: Barium, Calcium, Iron, Manganese, Magnesium, Potassium, Sulfate, Total Alkalinity (including alkalinity series), and Hardness.

³ Semi-annual groundwater monitoring shall occur in the first and the third quarter of each calendar year.

⁴ Annual groundwater monitoring shall occur in the first quarter of each calendar year.

SLUDGE MONITORING

A composite sample of sludge shall be collected when removed from the treatment and storage/disposal ponds in accordance with EPA's POTW Sludge Sampling and Analysis Guidance Document, August 1989, and tested for the following metals:

Cadmium	Copper	Nickel
Chromium	Lead	Zinc

Sampling and analytical records shall be retained for a minimum of five years. A log shall be kept of sludge quantities generated and of handling and disposal activities. The frequency of entries is discretionary; however, the log shall be complete enough to serve as a basis for part of the annual report.

WATER SUPPLY MONITORING

A sampling station shall be established where a representative sample of the public water supply can be obtained. Water supply monitoring shall include at least the following:

<u>Constituents</u>	<u>Units</u>	<u>Sampling Frequency</u>
Electrical Conductivity ¹	µmhos/cm	Annually
pH	pH units	Annually
Standard Minerals ²	mg/L	Annually

¹ If the source water is from more than one well, the EC shall be reported as a weighted average and include copies of supporting calculations.

² Standard Minerals shall include, at a minimum, the following elements/compounds: Barium, Calcium, Chloride, Manganese, Magnesium, Iron, Sodium, Potassium, Nitrate, Sulfate, Total Alkalinity (including alkalinity series), and Hardness.

REPORTING

In reporting monitoring data, the Discharger shall arrange the data in tabular form so that the date, sample type (e.g., effluent, pond, etc.), and reported analytical result for each sample are readily discernible. The data shall be summarized in such a manner to clearly illustrate compliance with waste discharge requirements and spatial or temporal trends, as applicable. The results of any monitoring done more frequently than required at the locations specified in the Revised MRP shall be reported in the next scheduled monitoring report.

A. Monthly Monitoring Reports

Monthly reports shall be submitted to the Central Valley Water Board by the **1st day of the second month** following the end of the reporting period (i.e. the January monthly report is due by 1 March). At a minimum, the reports shall include:

1. Results of influent, pond, and effluent monitoring;

2. A comparison of monitoring data to the discharge specifications and effluent limitations and an explanation of any violation of those requirements. Data shall be presented in tabular format;
3. If requested by staff, copies of laboratory analytical report(s);
4. A calibration log verifying calibration of all hand-held monitoring instruments and devices used to comply with the prescribed monitoring program; and
5. A discussion on whether the wastewater contingency plan has been implemented.

B. Semi-Annual Monitoring Reports

Semi-annual monitoring reports shall be submitted to the Central Valley Water Board by the **1st day of August** (for the period of January through June) and **February** (for the period of July through December).

As required by the California Business and Professions Code Sections 6735, 7835, and 7835.1, all Groundwater Monitoring Reports shall be prepared under the direct supervision of a Registered Engineer or Geologist and signed by the registered professional.

The semi-annual reports shall include the following:

1. Results of groundwater monitoring;
2. Results of surface water monitoring;
3. A narrative description of all preparatory, monitoring, sampling, and analytical testing activities for groundwater monitoring. The narrative shall be sufficiently detailed to verify compliance with the WDR, this MRP, and the Standard Provisions and Reporting Requirements. The narrative shall be supported by field logs for each well documenting depth to groundwater; parameters measured before, during, and after purging; method of purging; calculation of the casing volume; and total volume of water purged;
4. Calculation of groundwater elevations, an assessment of the groundwater flow direction and gradient on the date of measurement, comparison to previous flow direction and gradient data, and discussion of seasonal trends, if any;
5. A narrative discussion of the analytical results for all media and locations monitored, including spatial and temporal trends, with reference to summary data tables, graphs, and appended analytical reports (as applicable);
6. Summary data tables of historical and current groundwater table elevations and analytical results;
7. A comparison of monitoring data to the groundwater limitations and an explanation of any violation of those requirements;

8. A scaled map showing relevant structures and features of the facility, the locations of monitoring wells and any other sampling stations, and groundwater elevation contours referenced to mean sea level datum; and
9. Copies of laboratory analytical report(s) for groundwater monitoring.

C. Annual Report

An Annual Report shall be submitted to the Central Valley Water Board by **1 February** each year. The Annual Report shall include the following:

1. The results from annual monitoring of the effluent, groundwater, and water supply;
2. Tabular and graphical summaries of all data collected during the year;
3. A digital database (Microsoft Excel) containing historic groundwater data;
4. An evaluation of the groundwater quality beneath the wastewater treatment facility and land application area;
5. A discussion of compliance and the corrective actions taken, as well as any planned or proposed actions needed to bring the discharge into full compliance with the waste discharge requirements;
6. A discussion of any data gaps and potential deficiencies/redundancies in the monitoring system or reporting program;
7. A copy of the certification for each certified wastewater treatment plant operator working at the facility and a statement about whether the Discharger is in compliance with Title 23, CCR, Division 3, Chapter 26;
8. The results from any sludge monitoring required by the disposal facility;
9. Equipment maintenance and calibration records, as described in Standard Provision No. C.4; and
10. A forecast of influent flows, as described in Standard Provision No. E.4.

A letter transmitting the self-monitoring reports shall accompany each report. The letter shall include a discussion of requirement violations found during the reporting period, and actions taken or planned for correcting noted violations, such as operation or facility modifications. If the Discharger has previously submitted a report describing corrective actions and/or a time schedule for implementing the corrective actions, reference to the previous correspondence will be satisfactory. The transmittal letter shall contain the penalty of perjury statement by the Discharger, or the Discharger's authorized agent, as described in the Standard Provisions General Reporting Requirements Section B.3.

The Discharger shall implement the above monitoring program on the first day of the month following adoption of this Order.

Ordered by:

Original signed by

PAMELA C. CREEDON, Executive Officer

14 December 2011

(Date)

LF: 12/14/2011

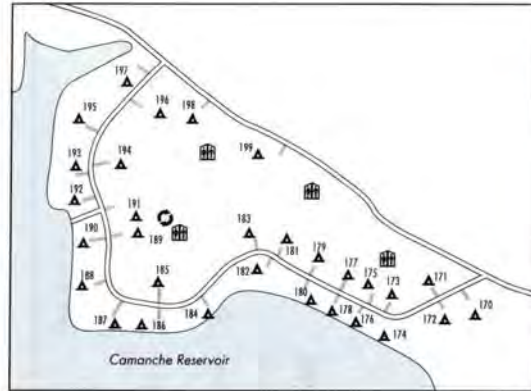
All FSCC Job Numbers

PROGRAM NO.	PROGRAM NAME	OP JOB #	OP JOB NAME
4421	Operate Aqueducts & Raw Wtr Lin	1011218 1011219 1011220 1011221 1011222 1011223 1014124 1013821 1013822 1013823 1013824 1013825 1013826 1013914 1013917	FSCC Pipeline Operation FSCC Pipeline Startup/Shutdown Brandt Flow Control Facility Startup/Shutdown Gerber Pipeline FSCC Operation Gerber Pipeline Startup/Shutdown Mok/Laf Aqueducts for FSCC Startup/Shutdown Mok/Laf Aqueducts for FSCC Operations Bixler FSCC CO2 System Startup/Shutdown Bixler FSCC CO2 System Operation Bixler FSCC CO2 System Maint/Repairs Walnut Creek FSCC CO2 Startup/Shutdown Walnut Creek FSCC CO2 System Operation Walnut Creek FSCC CO2 System Maint/Repairs PCWA Water Purchases CVP Water Purchases
4423	Operate Raw Wtr Pumping Plants	1011224 1011737 1011225 1011226 1011736 1011227 1011228 1011229 1011244 1014025 1014026	FSCC System-wide Operation Clay Station RWPP Stdbby Energy Clay Station RWPP FSCC Operation Clay Station RWPP Startup/Shutdown Camanche RWPP Stdbby Energy Camanche RWPP FSCC Operation Camanche RWPP Startup/Shutdown Walnut Creek RWPP Operations FRWA Intake & Pipeline Operations Moraga RWPP FSCC Operations Briones RWPP FSCC Operations
4427	Corrosion Control Rwrtr Transmn	1011230 1011232	FSCC Pipeline Cathodic Systems Gerber Pipeline Cathodic Systems
4439	Maintain Other Aqueduct Structures	1011233 1011235	FSCC Pipeline Fac Maint/Repairs Gerber Pipeline Fac Maint/Repairs
4441	FSCC R-O-W Encroachments		
4442	Gerber R-O-W Encroachments		
4451	Maint Aqued & Raw Water Lines	1011234 1011236 1011237	FSCC Pipeline Routine Maint/Reprs Gerber Pipeline Routine Maint/Rpr Brandt Flow Control Facility Routine Maint/Rpr
4453	Maint Raw Water Pumping Plants	1011238 1011239 1011240 1011215 1011241 1011242 1011243 1011216 1013820	Clay Station RWPP Switchyard Rout Mnt/Rpr Clay Station RWPP Structure & Grounds Clay Station RWPP Pumps & Motors Clay Station RWPP Systems Camanche RWPP Switchyard Camanche RWPP Structure & Grounds Camanche RWPP Pumps & Motors Camanche RWPP Systems FRWA Intake & Pipeline Maintenance
4455	Grndskpng Aqdcst & Rw Water Pmp Plts	1011245 1011246 1011247 1011248 1011249	FSCC Pipeline GrndsRoutMntImpRpr Gerber Pipeline GrndsRoutMntImpRpr Brandt Flow Control Facility GrdsRouMntImpRpr Clay Station RWPP GrdsRoutMntImpRpr Camanche RWPP GrdsRoutMntImpRpr

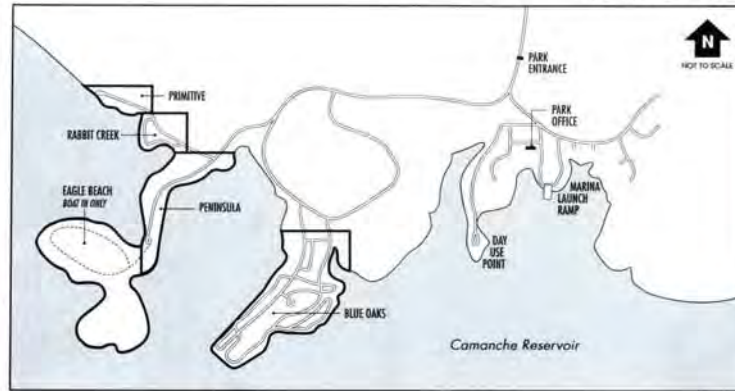
Appendix 5-3. Camanche North Shore and South Shore Campground Maps (4 pages)

RABBIT CREEK

170-199



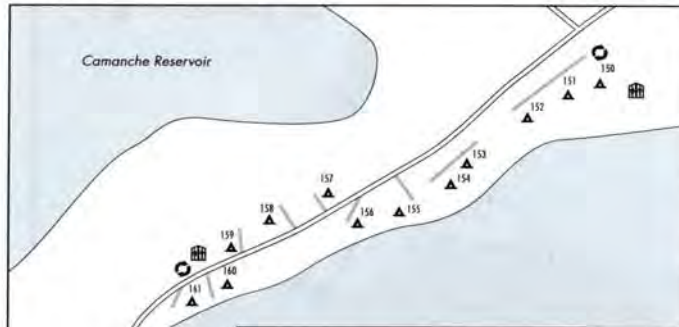
LOCATION MAP - NORTH



CAMANCHE NORTH SHORE CAMPGROUNDS

PENINSULA

150-169



LEGEND

CAMPSITES

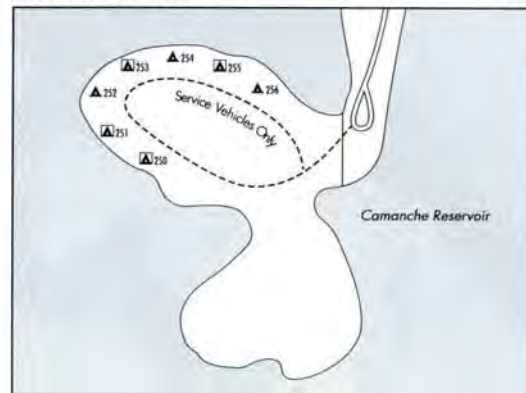
- ▲ SINGLE
- ▴ DOUBLE
- ▴ TRIPLE
- ▴ QUAD
- ▴ GROUP
- ♿ DISABLED

AMENITIES

- RESTROOMS
- SHOWERS
- WATER
- RV DUMP STATION
- RECYCLING STATION
- PLAYGROUND
- PORTABLE TOILET
- LAUNDRY

EAGLE BEACH BOAT IN ONLY

250-256



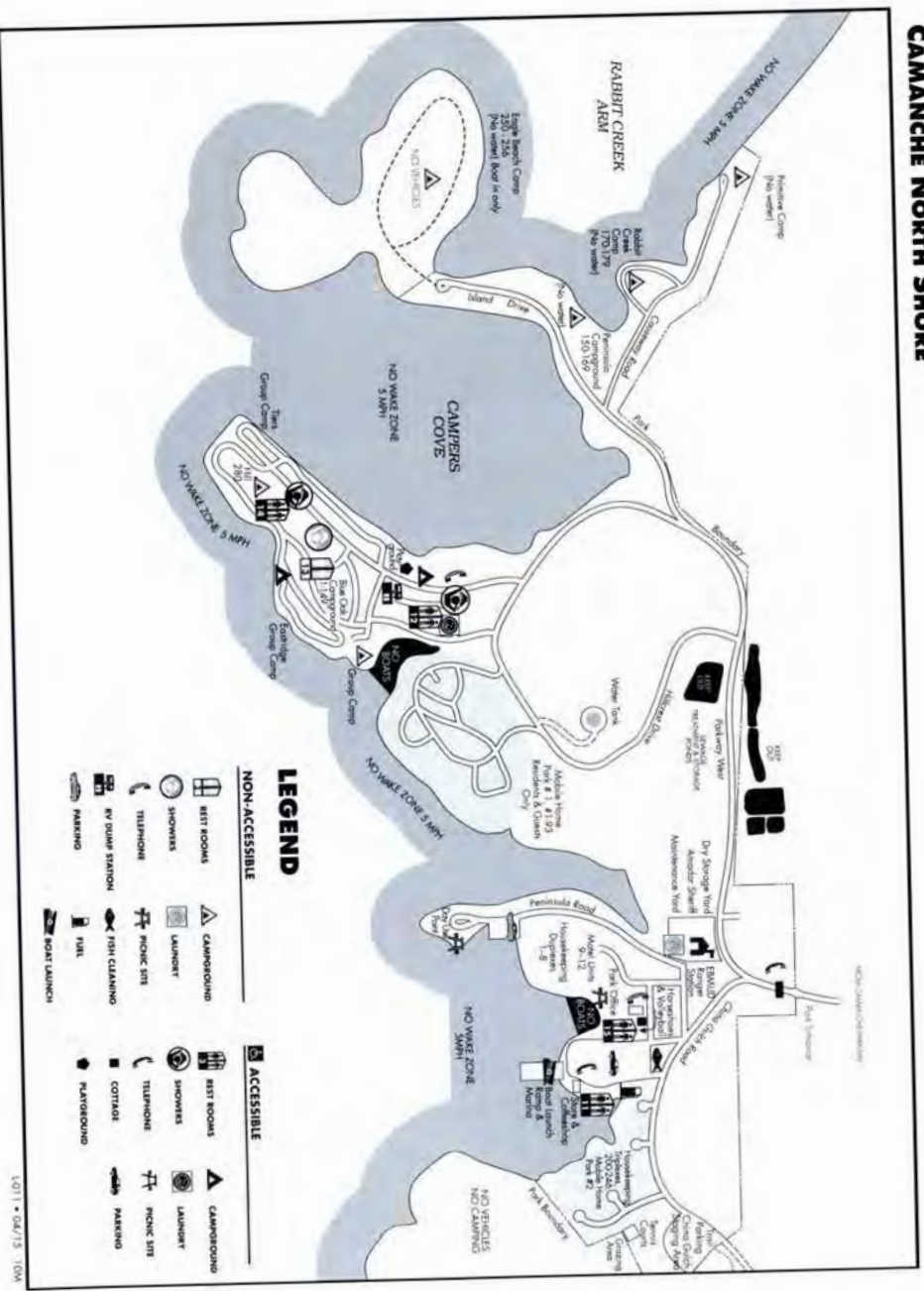
BLUE OAKS

1-149



A detailed map of Camanche Reservoir. The reservoir is divided into North Shore and South Shore by a narrow channel. Various islands are labeled, including Rabbit Creek Island, Hawk Island, and Little Boat Island. The map shows surrounding roads such as North Camanche Parkway, East Camanche Parkway, and Highway 12. A north arrow is located in the bottom left corner. Several areas are marked with "RESTRICTED AREA KEEP OUT". Other labels include "NO SWIMMING AT THIS LOCATION", "NO WADING DEEPER THAN 3 FEET", and "FISHING RESTRICTED".

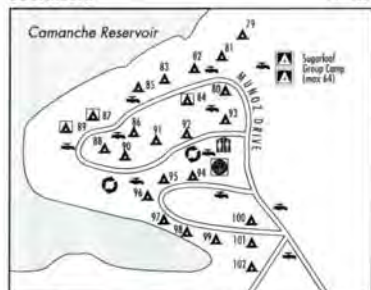
CAMANCHE NORTH SHORE



CAMANCHE SOUTH SHORE CAMPGROUNDS

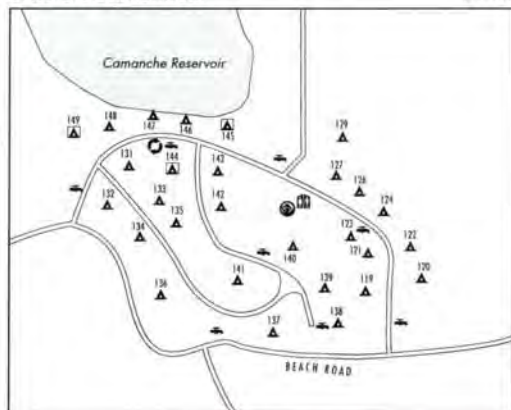
SUGARLOAF

79-102



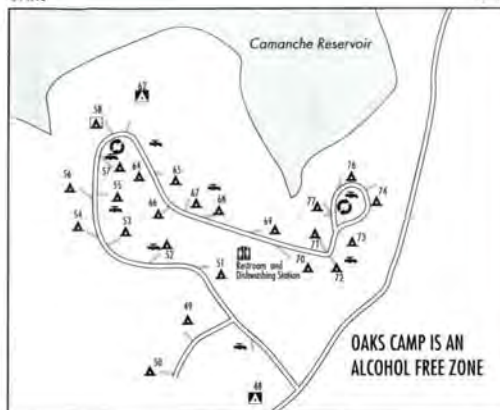
CAMANCHE & ARROWHEAD

119-149



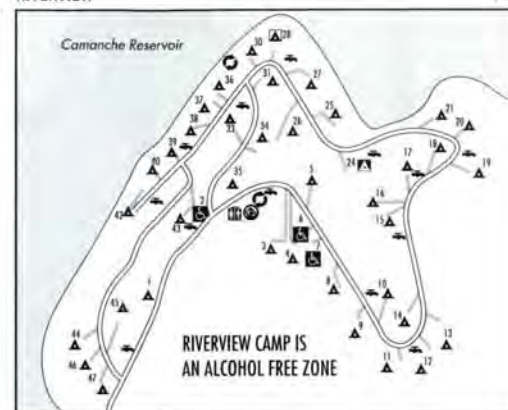
OAKS

48-77



RIVERVIEW

1-47



LEGEND

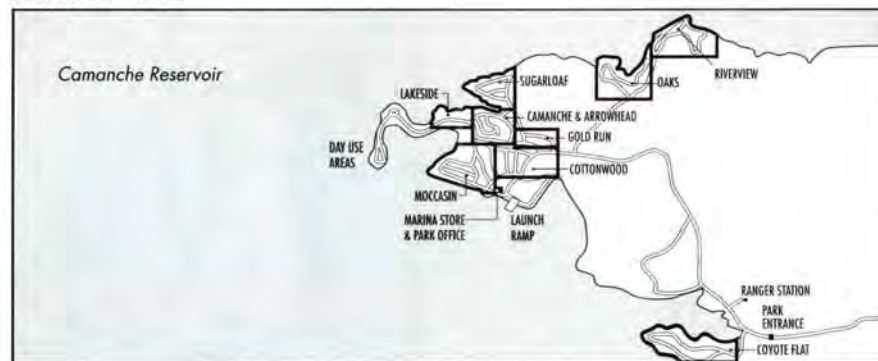
CAMPSITES

- SINGLE
- DOUBLE
- TRIPLE
- QUAD
- GROUP
- DISABLED

AMENITIES

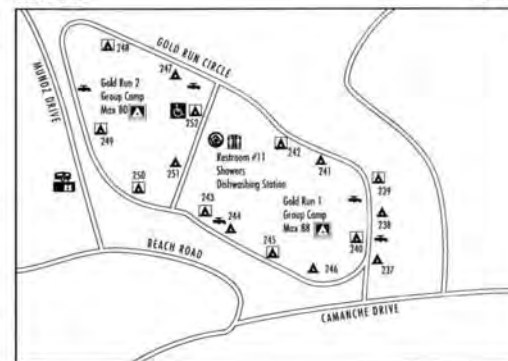
- RESTROOMS
- PORTABLE TOILET
- SHOWERS
- LAUNDRY
- WATER
- RV DUMP STATION
- RECYCLING STATION
- PLAYGROUND

LOCATION MAP - SOUTH



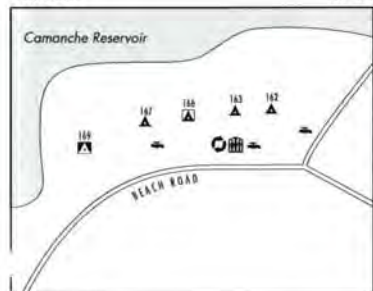
GOLD RUN

237-251



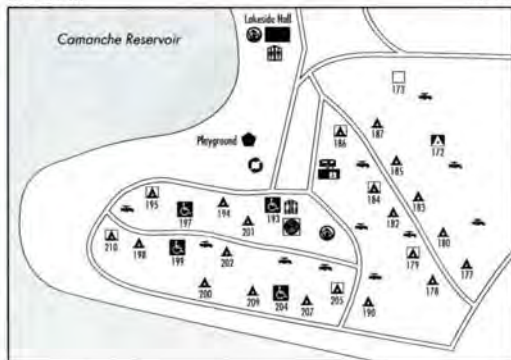
LAKESIDE

162-169



MOCCASIN

172-210



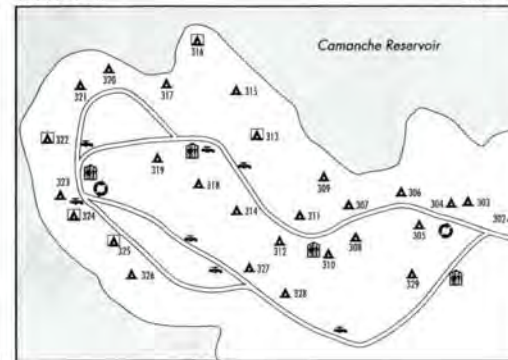
COTTONWOOD

211-236



COYOTE FLAT

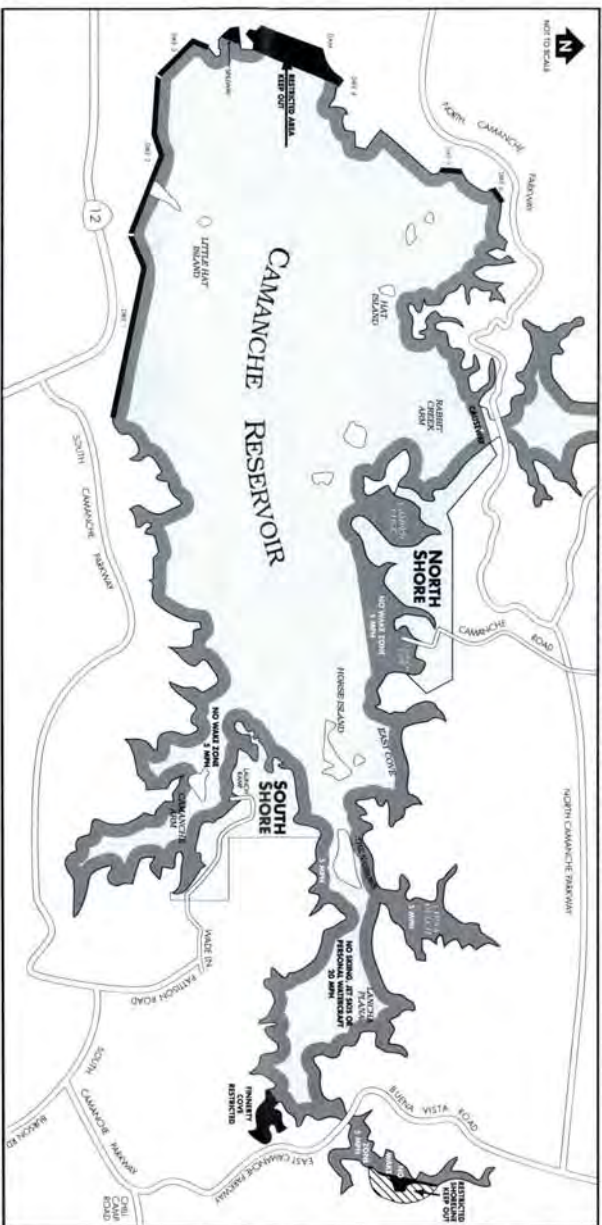
302-329



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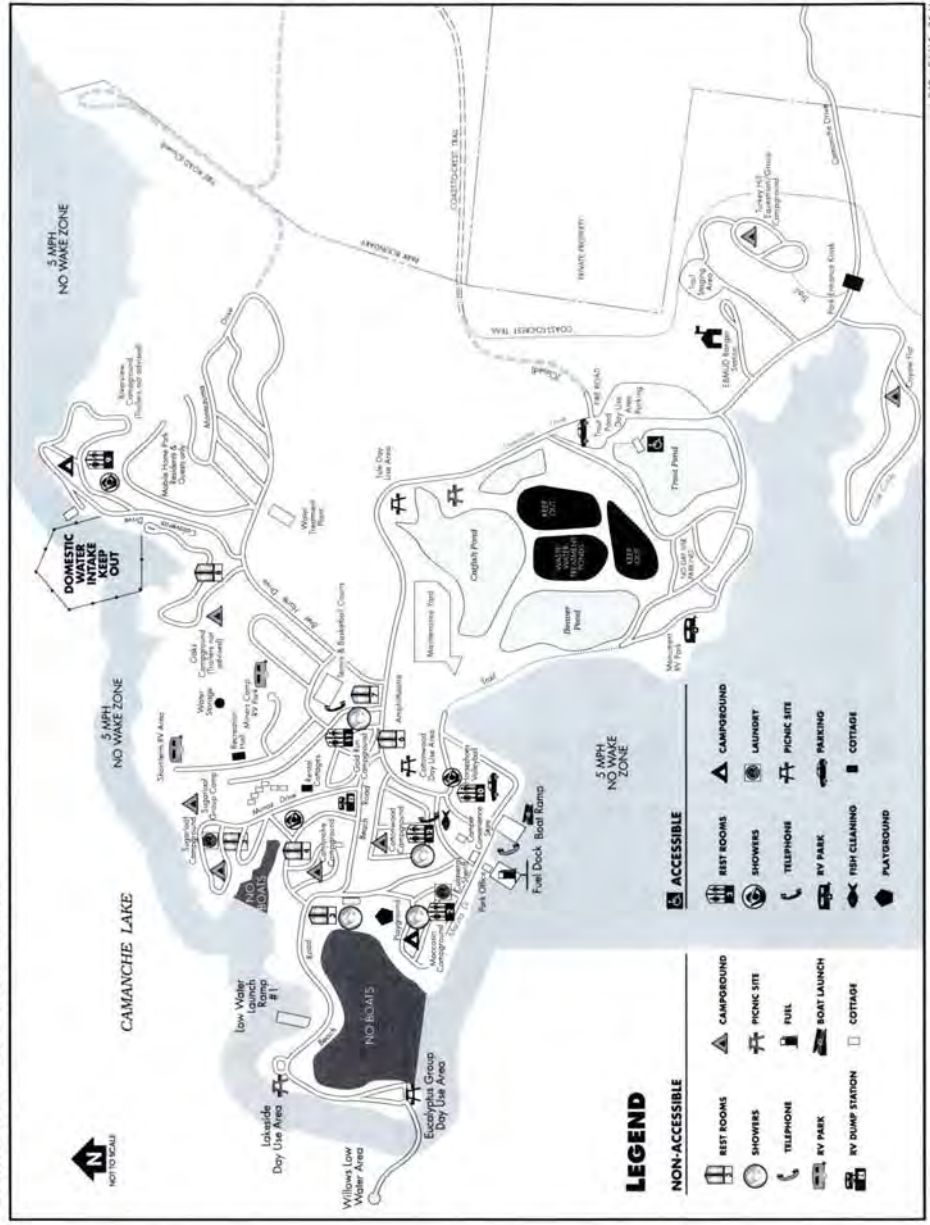


SPEED ZONES MAY FLUCTUATE WITH LAKE ELEVATION • SPEED LIMIT IS 30MPH - NO WAKE WITHIN 200' OF ALL SHORTLINES



CAMANCHE RESERVOIR RECREATION AREAS

CAMANCHE SOUTH SHORE

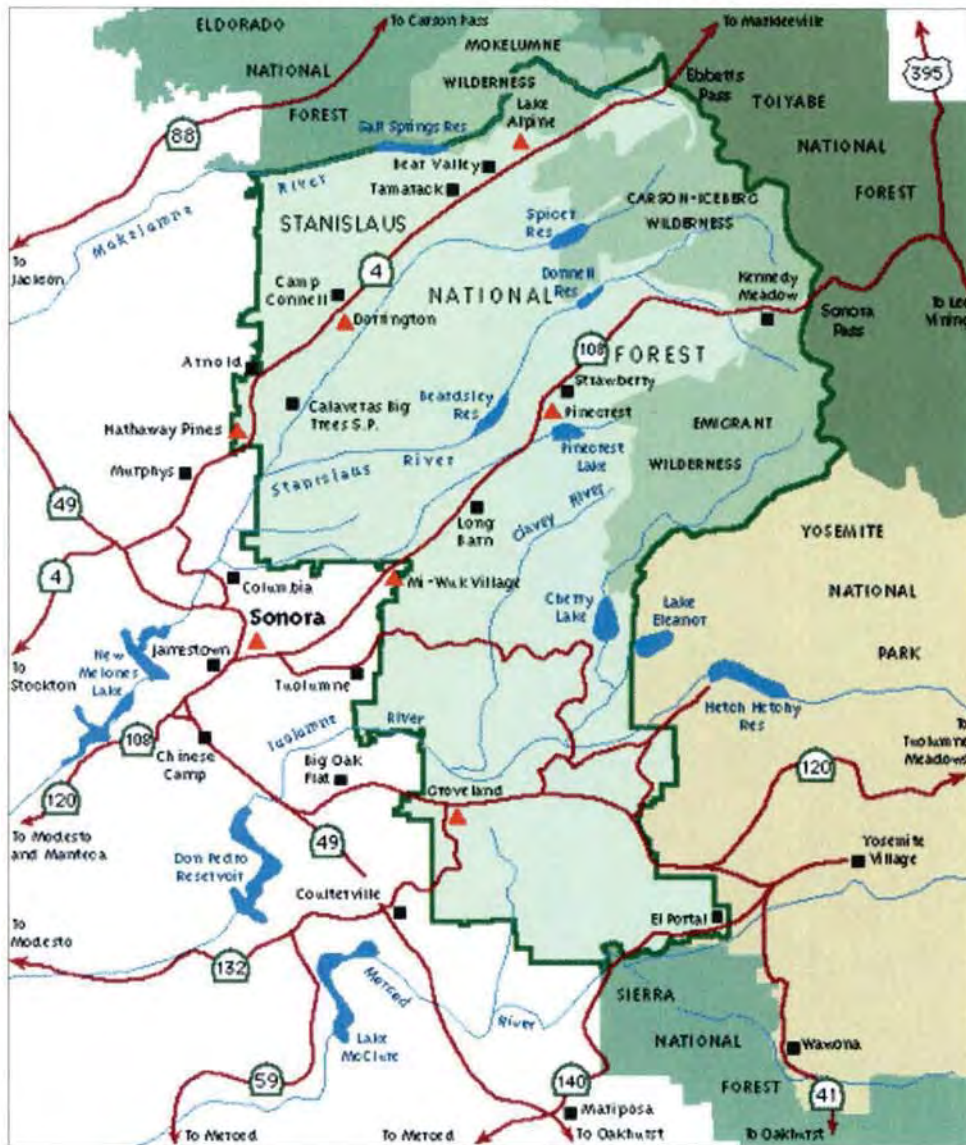


Appendix 6-1. National Forest and Wilderness Map (1 page)

Source: <http://www.3forests.us/stanislaus.html>

Three-Forests Interpretive Association (3-FIA) is a non-profit educational organization that helps visitors and users of the Stanislaus, Sequoia and Sierra National Forests.

National Forest and Wilderness Map



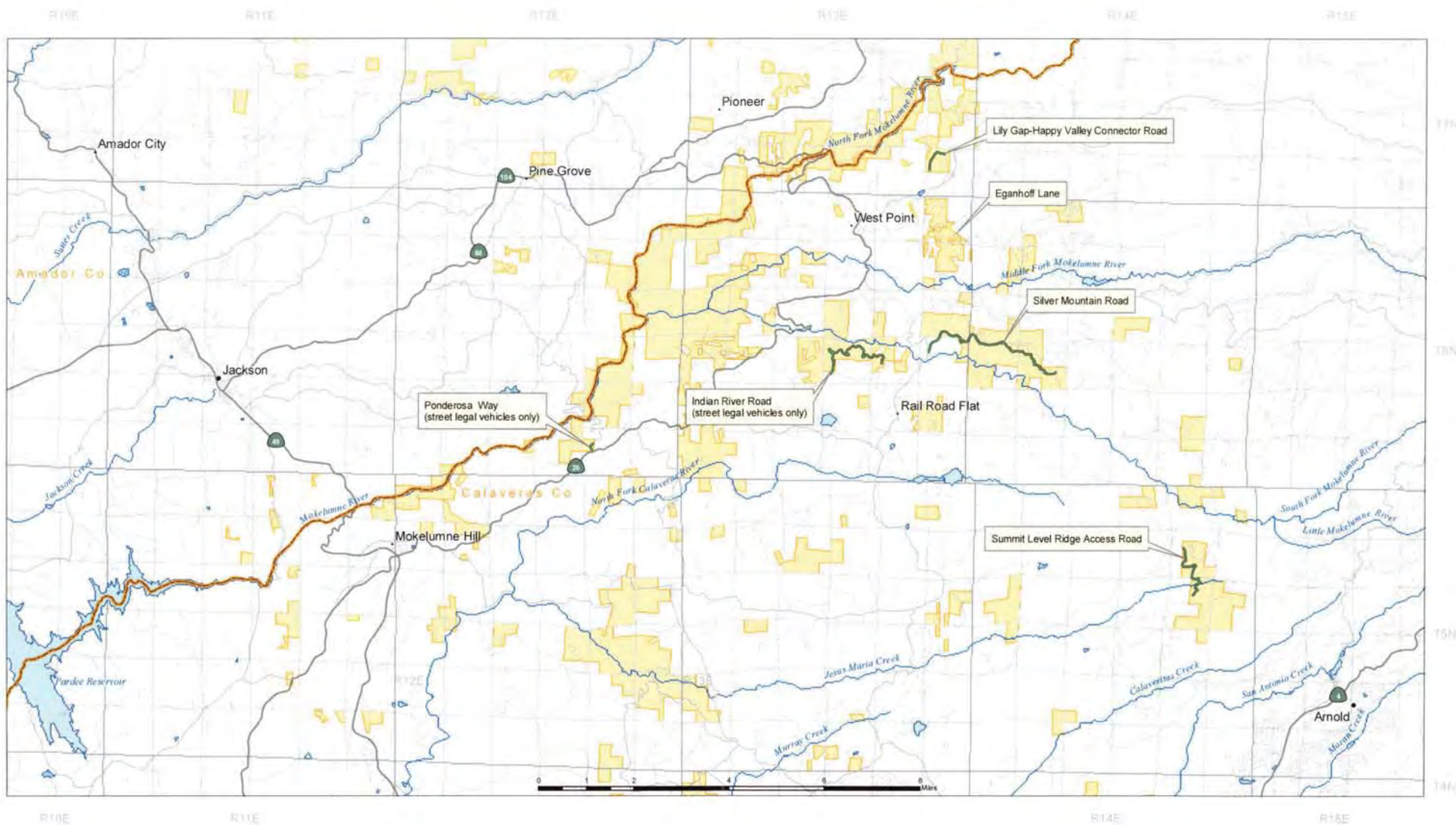
Appendix 6-2. BLM Maps, Sierra Resource Management Plan

- Mokelumne River Motorized Vehicle Route Designations**
- Recommended Wild & Scenic River**



Source:

http://www.blm.gov/style/media1ib/blm/ca/pdf/folsom/ohv.Par.65438.File.daUroutes_11x17_roadmap6e.pdf



- Bureau of Land Management
- Designated Interim Route
- Designated Open Route

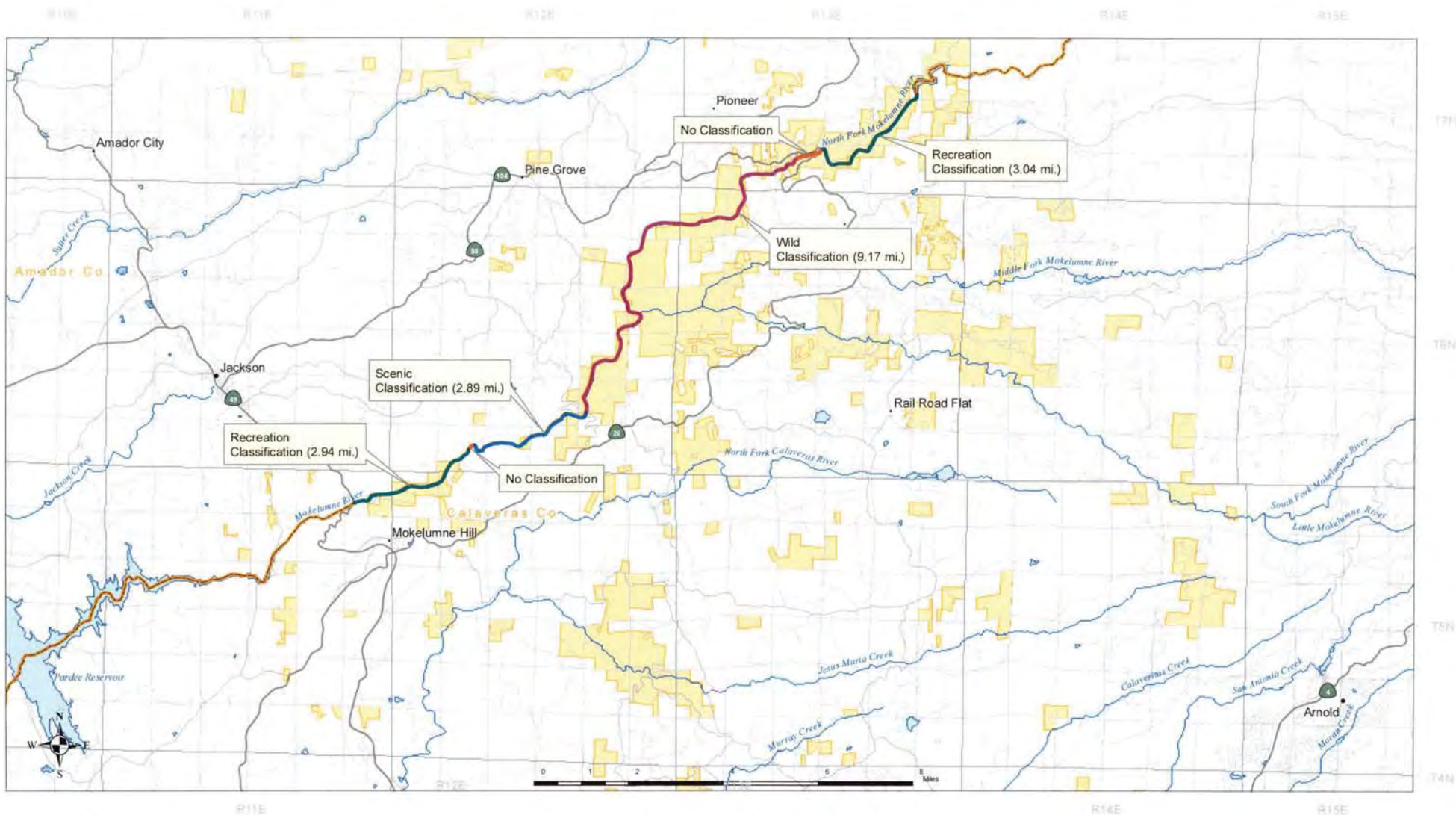
Sierra Resource Management Plan

Motorized Vehicle Route Designations

Mokelumne River Area
BLM Sierra RMP



US Department of the Interior
BUREAU OF LAND MANAGEMENT
Folsom Field Office
Folsom, California
(916) 985-4474
www.ca.blm.gov/folsom
Date Prepared: 12/12/2007
Project: routes_11x17_roadmap6e.mxd



**Sierra Resource Management Plan
Recommended Wild & Scenic River
Main and North Fork Mokelumne
BLM Sierra RMP**

- Bureau of Land Management
- County Line
- River Segment Classification**
- No Classification
- Recreation
- Scenic
- Wild



US Department of the Interior
BUREAU OF LAND MANAGEMENT
 Folsom Field Office
 Folsom, California
 (916) 985-4474
www.ca.blm.gov/folsom
 Date Prepared: 11/8/2007
 Project: wsr_recommended_11x17_roadmap8b.mxd

Appendix 6-3. Stewardship Council Final Land Conservation and Conveyance Plan (LCCP) excerpts

- North Fork Mokelumne River Planning Unit, Maps (3 pages)
- Lower Bear Area Planning Unit, Map (1 page)
- Blue Lakes Planning Unit, Map (1 page)

Exhibit 1. Map of the Property

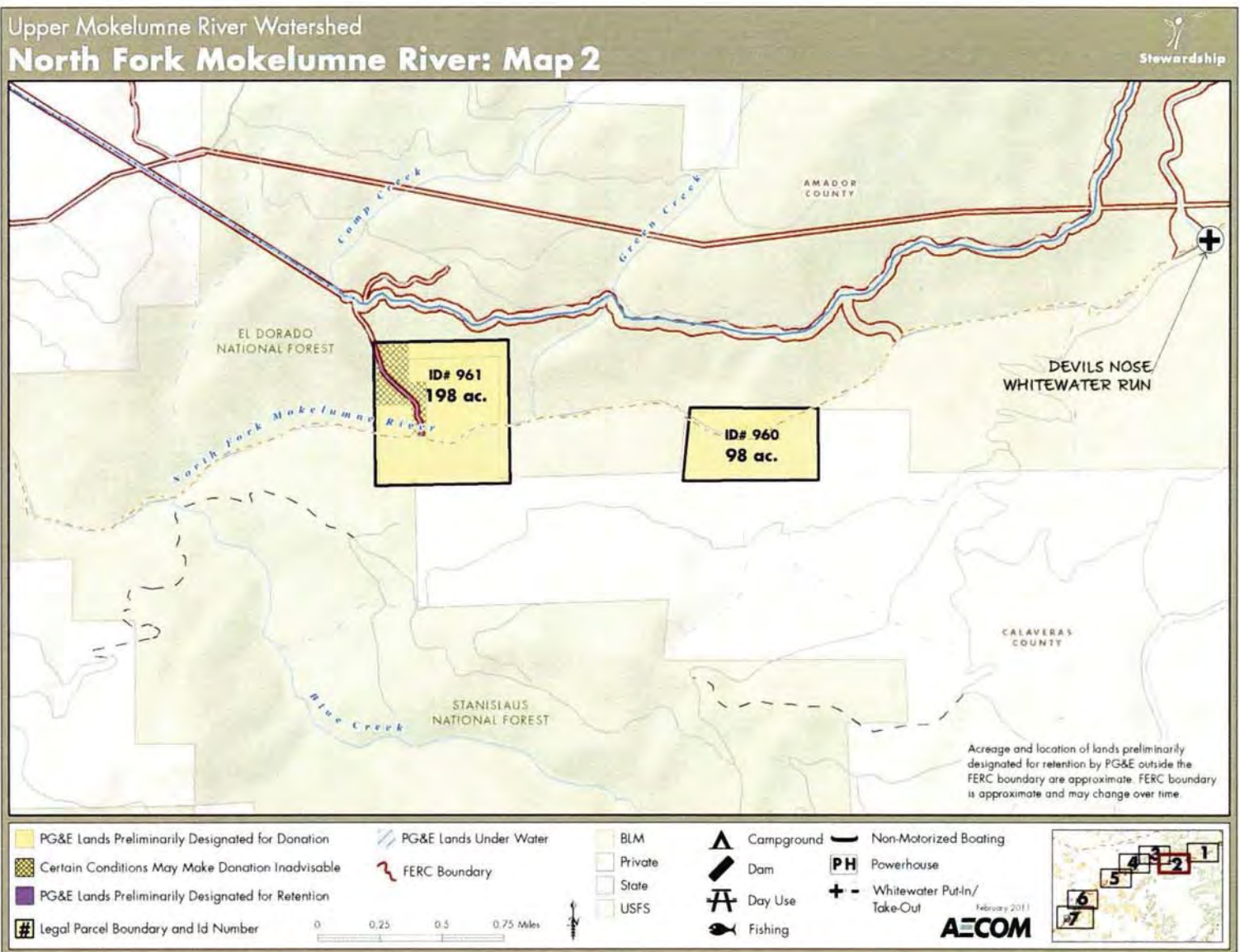
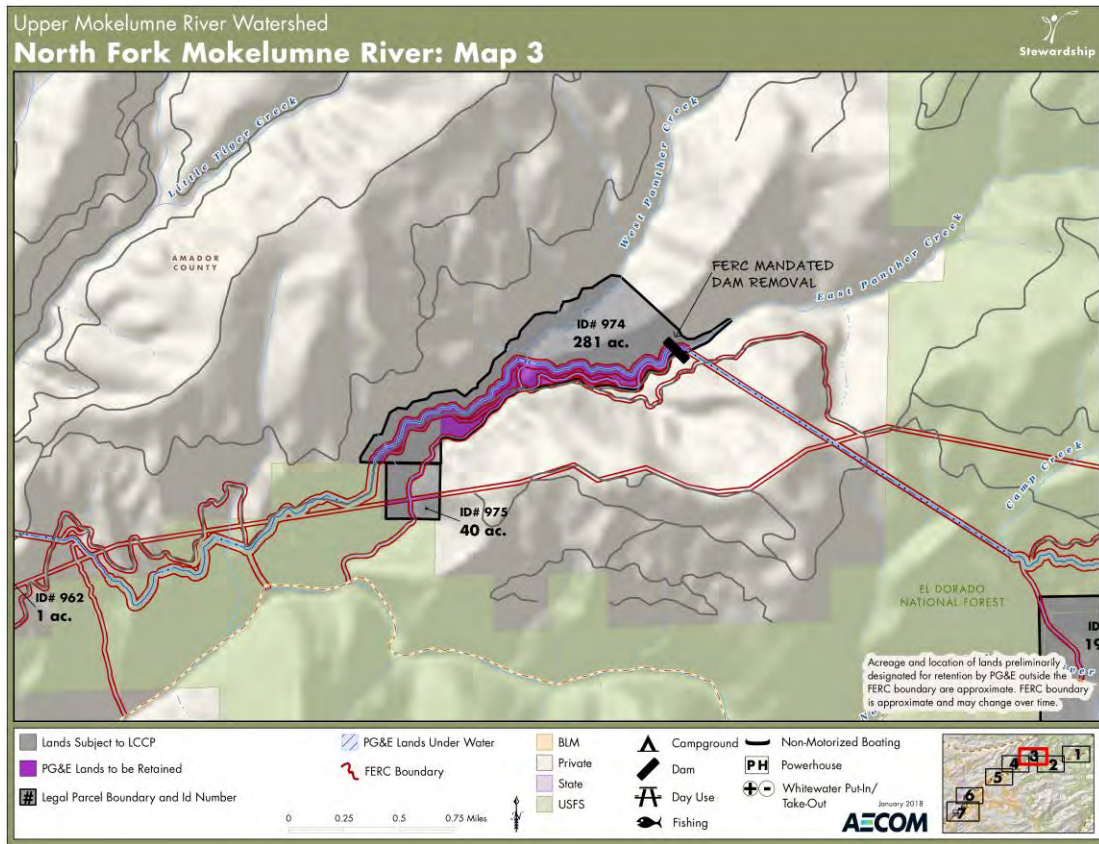


Exhibit 1. Map of the Property



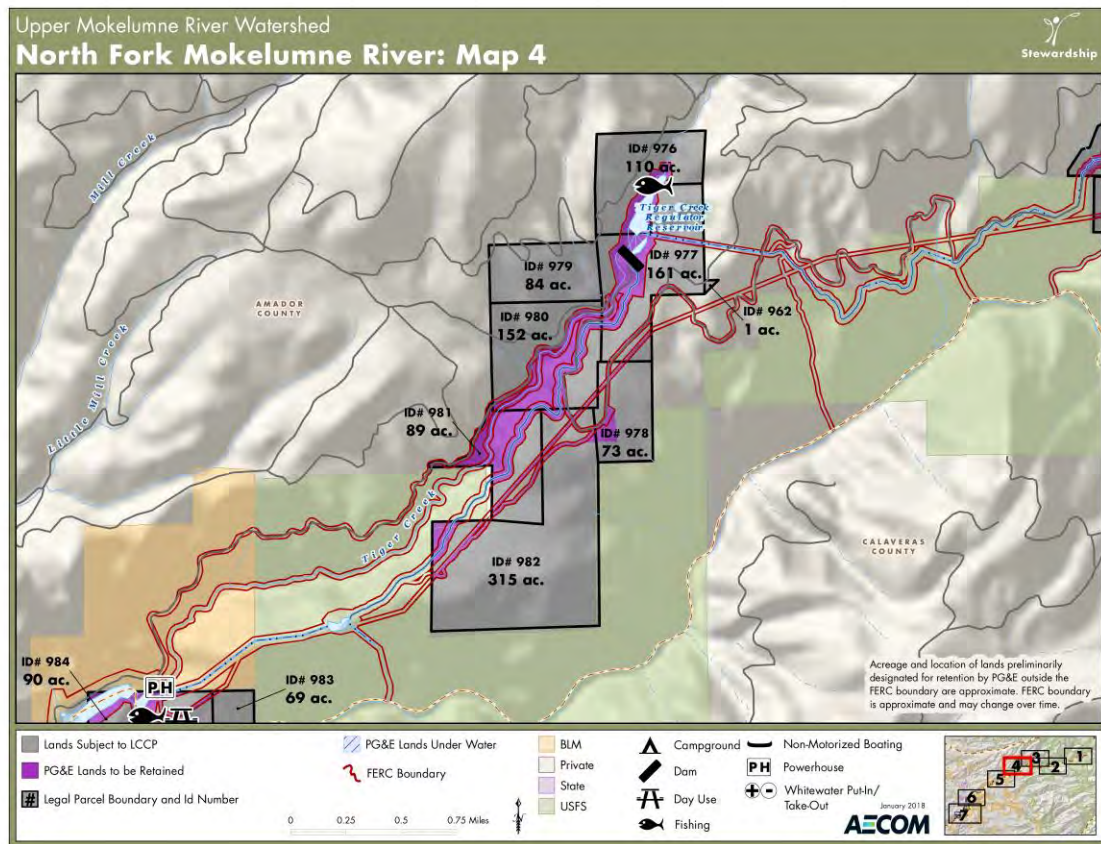
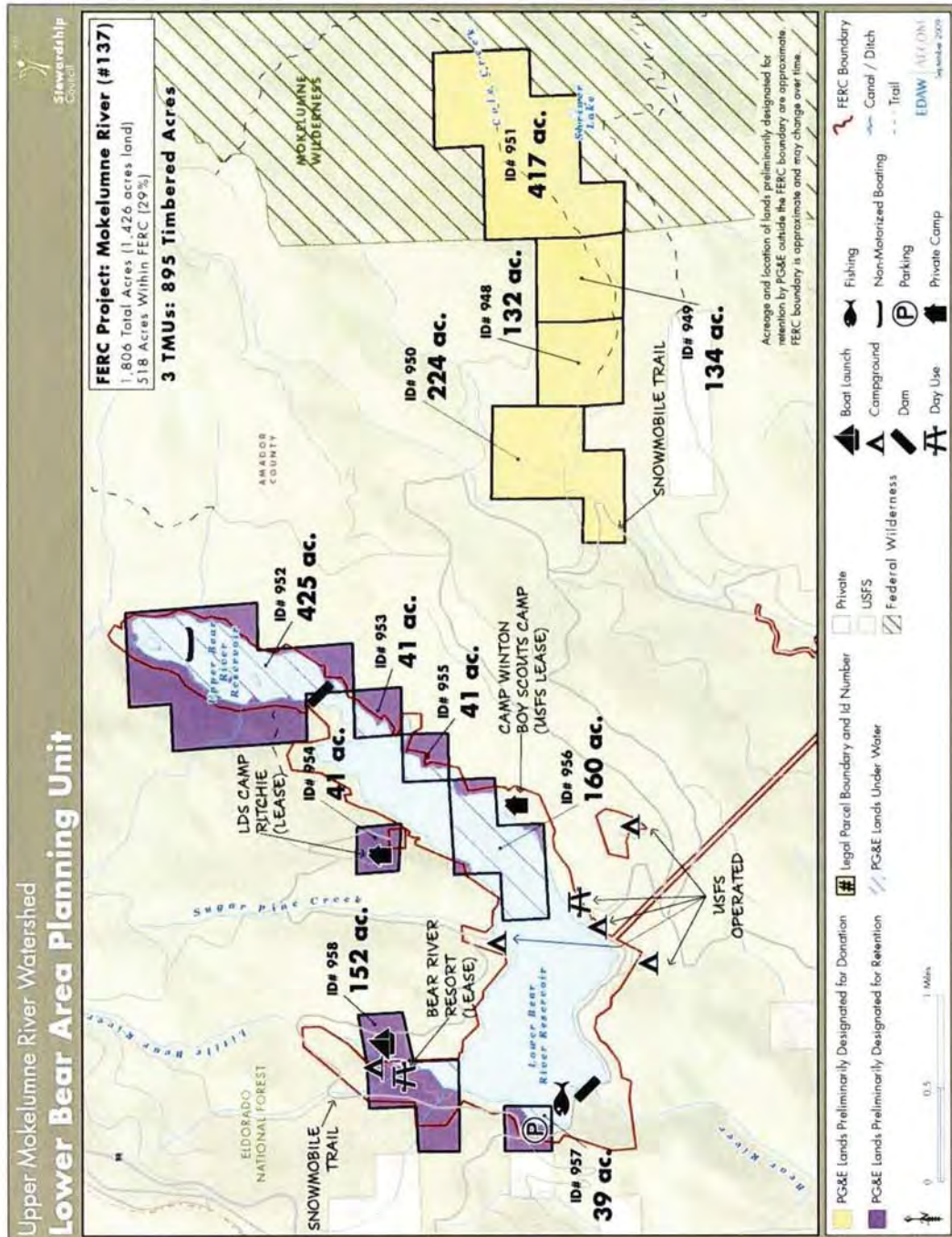


Exhibit 1. Map of the Property



Appendix 6-4. EBMUD Trail Permit Requirements and Signs (4 pages)

EBMUD Trail Permit Requirements

TRAIL USER SHALL

1. Sign in on Trail Register form (at Staging Area) prior to using EBMUD trails.
2. Have in their possession at all times a valid Trail Use Permit or be accompanied by a valid permit holder.
3. Exhibit and/or surrender permit upon request of an EBMUD Ranger, County/Local Law Enforcement Officer, or any other person duly authorized by EBMUD.
4. Stay on designated trails.
5. Use trails between sunrise and sunset only.
6. Close all gates after passing through them.
7. Use only designated restroom facilities.
8. Carry out and properly dispose of all litter.
9. Remove and dispose of all animal waste products (generated from trail user's animal) from staging area.
10. Report unsafe conditions or other hazards to EBMUD.
11. Keep dogs adequately leashed and controlled at all times when hiking on designated dog trails and in staging areas.

TRAIL USER SHALL NOT

1. Smoke while on the trails.
2. Build or light any fire on EBMUD property.
3. Make body contact with the waters of any reservoir or tributary stream on EBMUD property, except at Camanche Reservoir and the Mokelumne River Day Use Area.
4. Fish from any reservoir or tributary stream on EBMUD property.
5. Disturb livestock, wildlife, or vegetation on EBMUD property.
6. Bring pets, firearms, motorized vehicles, stallions or colts onto EBMUD trails.
7. Damage or destroy any EBMUD property; including (but not limited to) gates, fences, signs, locks, structures, buildings, etc.
8. Ride or lead any saddle or pack animal in a manner that might endanger any person or animal, or allow any such animal to stand unattended or untethered on EBMUD property.
9. Permit any saddle or pack animal to swim or wade in any reservoir or tributary stream on EBMUD property.
10. Ride a bicycle on any portion of the watershed closed to bicycle use.
11. Use any other EBMUD recreational facilities without paying applicable fees.
12. Use conveyances with wheels, tracks, or skids on unpaved roads or trails.

Appendix 6-4 Signs & EBMUD Trail Permit Requirements



Signs Posted Along Public Road, Area of Illegal Dumping

Appendix 6-4 Signs & EBMUD Trail Permit Requirements



Signs Posted on EBMUD Property, Education Recreational Users



Appendix 6-5. Waste Discharge Requirements Order & Associated Documents, Examples:

- Camanche North Shore Recreation Area, General Waste Discharge Requirements Order for Dewatering and Other Low Threat Discharges to Surface Waters
- Pardee Reservoir Recreation Area, Limited Threat General Waste Discharge Requirements Order
- Best Management Practices, Water Treatment Plant, Pardee Recreation Area
- Salinity Management Plan for Limited Threat Discharge, Pardee Recreation Area, Water Treatment Plant,



Linda S. Adams
Secretary for
Environmental
Protection

California Regional Water Quality Control Board Central Valley Region

Karl E. Longley, ScD, P.E., Chair

11020 Sun Center Drive #200, Rancho Cordova, California 95670-6114
Phone (916) 464-3291 • FAX (916) 464-4645
<http://www.waterboards.ca.gov/centralvalley>



Arnold
Schwarzenegger
Governor

15 December 2008

Mr. John H. Schroeter, P.E.
Manager of Environmental Compliance
East Bay Municipal Utility District
375 Eleventh Street
Oakland, CA 94607-4240

CERTIFIED MAIL
7008 1140 0002 8806 2405

NOTICE OF APPLICABILITY; GENERAL WASTE DISCHARGE REQUIREMENTS ORDER NO. R5-2008-0081; DEWATERING AND OTHER LOW THREAT DISCHARGES TO SURFACE WATERS; CAMANCHE NORTH SHORE RECREATION AREA, AMADOR COUNTY

Our office received a Notice of Intent (NOI) on 12 September 2008 from the East Bay Municipal Utility District (Discharger) for the Camanche North Shore Recreation Area Project. Based on the information in the submittal, we have determined that the project meets the required conditions for approval under the General Order for Dewatering and Other Low Threat Discharges to Surface Waters (General Order No. R5-2008-0081). This project is hereby assigned General Order No. R5-2008-0081-018 and National Pollutant Discharge Elimination System (NPDES) Permit No. CAG995001.

CALIFORNIA TOXIC RULE / STATE IMPLEMENTATION POLICY SAMPLING

General Order No. R5-2008-0081 (enclosed) prescribes mandatory discharge monitoring requirements. The project activities shall be operated in accordance with the requirements contained in the General Order and with the information submitted by the Discharger. This General Order incorporates the requirements of the *California Toxic Rule (CTR)* and the *State Water Resources Control Board's (State Water Board), Implementation of Toxic Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California, 2005*, also known as the *State Implementation Policy (SIP)*. The Discharger requested a categorical exception to the requirement for meeting the CTR pollutant criteria in the General Order, as authorized by Section 5.3 of the SIP. The Discharger certified that its discharges are necessary to implement drinking water control measures conducted to fulfill statutory requirements under the federal Safe Drinking Water Act and the California Health and Safety Code.

PROJECT DESCRIPTION

The Discharger operates the Camanche North Shore Recreation Area water treatment plant which currently provides potable water to a cafe, camping and recreation facilities, the marina, and two mobile home parks. The Recreation Area is located on the north shore of Camanche Reservoir in Amador County. The discharge consists of backwash water from the water treatment plant filters. The backwash water is discharged to two unlined storage ponds operated in series. Discharge to Camanche Reservoir only occurs when the storage pond overflows during wet weather conditions.

California Environmental Protection Agency

MONITORING AND REPORTING

Quarterly Reports shall be submitted to the Regional Water Board by the first day of the second month following each calendar quarter. Reporting requirements are found in Attachment E.

According to the Clean Water Act Section 303(d), Camanche Reservoir is impaired for copper and zinc. One time monitoring of the discharge for copper, zinc, and hardness is required upon initial discharge. Method detection limits shall be below the corresponding screening level in Attachment B, Section II of the General Order. If the lowest minimum level (ML) published in Appendix 4 of the SIP is not below the screening level, the detection limit shall be the lowest ML.

GENERAL INFORMATION AND REQUIREMENTS

The Discharger will be required to follow their Pollution Prevention and Monitoring and Reporting Plan. Effluent and receiving water monitoring of this dewatering/low threat discharge shall be conducted and submitted to the Regional Water Board, quarterly, until completion of the project. The Regional Water Board shall be notified immediately if any violation, nuisance or detriment to the receiving water is observed during implementation of the project.

Failure to comply with the conditions of the Effluent Limitations and Receiving Water Monitoring found in the General Order No. R5-2008-0081 could result in an enforcement action as authorized by provisions of the California Water Code. Discharge of material other than what is described in the NOI is prohibited.

The required annual fee (as specified in the annual billing you will receive from the State Water Board) shall be submitted until this NOA is officially terminated. You must notify this office in writing when the project has been completed and the discharge is no longer necessary, so we may terminate applicability of this General Order.

Effective January 2004, any NPDES effluent monitoring report received more than 30 days after its due date is subject to a \$3,000 Mandatory Minimum Penalty (MMP) [Water Code Section 13385]. An additional \$3,000 MMP is required for each additional 30 days a report is late. If you have no discharge, you must still submit a report indicating that no discharge occurred, or you will be subject to the MMP.

If you have any question or comments regarding this notification, please contact David Kirn at (916) 464-4761 or at dwkirn@waterboards.ca.gov.



PAMELA C. CREDON
Executive Officer

Enclosure: General Order No. R5-2008-0081

cc: U.S. Environmental Protection Agency, Region IX, San Francisco
U.S. Army Corps of Engineers, Sacramento
Mr. Phil Isorena, Division of Water Quality, State Water Board, Sacramento

EAST BAY MUNICIPAL UTILITY DISTRICT

BEST MANAGEMENT PRACTICES

**WATER TREATMENT PLANT
PARDEE RECREATION AREA**



July 2009

Prepared by:

Water Supply Division
and
Environmental Compliance Section
Operations and Maintenance Department

TABLE OF CONTENTS

Section	Page
1.0 FACILITY OPERATION.....	1
2.0 POTENTIAL POLLUTANTS.....	3
2.1 Chemical Use At The Facility.....	4
2.2 Discharge Associated With Operation And Maintenance Of Equipment	4
3.0 POLLUTION CONTROL AND EFFLUENT TREATMENT METHODS.....	4
4.0 SODIUM HYPOCHLORITE MANAGEMENT.....	5
5.0 RESPONSIBILITY AND TRAINING	6

Figure 1: Water Treatment Schematic

Figure 2: Filter Backwash Flow Diagram

Attachment A

Environmental Emergency Response and Release Prevention Plan

Water Treatment Plant Best Management Practices

The California Regional Water Quality Control Board, Central Valley Region, adopted the General Order No. R5-2008-0082-010, Waste Discharge Requirements for Limited Threat Discharges of Treated/Untreated Groundwater from Cleanup Sites, Wastewater from Superchlorination Projects, and Other Limited Threat Wastewaters to Surface Water on June 12, 2008. Facilities covered under this permit must develop and implement a site-specific Best Management Practices (BMPs) Plan for controlling pollutant discharges to surface waters. The purpose of the BMPs Plan is to: 1) ensure proper operations and maintenance for storage and handling of chemicals; 2) prevent additional chemicals or other substances from being introduced into the discharge; and 3) prevent the addition of pollutants from other non-permitted process waters, spills, or other sources of pollutants from being introduced into surface waters.

This is the BMPs Plan for the East Bay Municipal Utility District (EBMUD) Pardee Recreation Area Water Treatment Plant (WTP). Described below are:

- Facility Operations;
- Potential Pollutants;
- Pollution Control and Effluent Treatment Methods;
- Chlorine Management; and
- Responsibility and Training

1.0 FACILITY OPERATION

Descriptions of the raw water source, water treatment processes, filter backwashing process, chemical handling procedures, and spill response procedures are summarized in the table and discussed below.

Facility Operations Summary	
Address	4900 Stony Creek Rd, Ione, CA
Raw water source	Pardee Reservoir
Treatment capacity, average (maximum)	94 – 98 gpm (100 gpm)
Treatment processes	Prefiltration, ultrafiltration, disinfection
Number of available filters (type)	Four (4) ultrafiltration hollow fiber, cellulose derivative
Backwash water treatment method	Dechlorination, discharge to plant effluent
Types of discharges	Routine and Non-Routine (unplanned or emergency)
Receiving Water	Pardee Reservoir

Detailed operational procedures are documented in the current WTP's Operations and Maintenance Manual (March 20, 2007) which constitutes the Operations Plan required by the California Department of Public Health. In addition to the treatment plant procedures and monitoring plan, equipment preventive maintenance and record keeping procedures are provided which also supplement the intent of BMPs. The plant is normally unmanned and only staffed during daily inspections for several hours.

Raw Water Source. Raw water is pumped from Pardee Reservoir. The reservoir collects surface water drainage and Sierra Mountain snow melt throughout the 370,000 acre Mokelumne watershed. The majority of the watershed's land is undeveloped open space and its use is limited in accordance with the Mokelumne Watershed Master Plan and specific management area plans.

Water Treatment. The treatment processes consist of prefiltration, ultrafiltration, and disinfection contact. A coarse prefilter is 250 microns to remove suspended particles prior to ultrafiltration.

Under typical water quality conditions (i.e. turbidity <1.0 NTU and low algae/organic content), raw water will be filtered once through the ultrafilter ("dead-end" filtration) and the product water delivered to the finished water storage tank. However, during poor water quality conditions, the raw water is separated into two streams: the product water for filtration and the reject water for recirculation. The recirculated raw water is blended and then filtered. Under extreme water quality conditions, the reject water may be discharged directly into the backwash pond. An emergency sand pressure filter is also available for pre-filtration during extreme conditions.

Sodium hypochlorite is the disinfecting agent to maintain a minimum target free chlorine residual of 0.70 mg/L in the storage tank. The residual deactivates bacteria, viruses, and other pathogens that may cause harm to public health and removes taste and odor causing substances. Figure 1 is a flow diagram of the treatment process at the WTP and backwash flows.

Electrical power is supplied by P.G. & E. There is no backup power because the storage reservoir of treated water would be expected to last for several days and there is a plan to have potable water trucked in to supply the public.

Filter Backwashing. Filters are backwashed with produced treated water from the distribution storage tank. Sodium hypochlorite is added to the backwash water at a concentration of 3 mg/L as free chlorine to protect the membrane against biological fouling and increase backwash efficiency. Backwash water is discharged to the backwash pond which serves as an evaporation and percolation pond (see Figure 2). The pond overflow is dechlorinated with sodium sulfite prior to overland flow and contact with the reservoir. Instrument analyzer water continuously flows into the same backwash discharge system.

Chemical Handling. Hazardous materials, hazardous wastes, and spill response equipment (e.g., absorbents, sodium sulfite dechlorination tablets) are handled, stored, and disposed in accordance with guidance contained in the Material Safety Data Sheets (MSDSs), site specific Environmental Emergency Response and Release Prevention Plan, and the Pardee Area Control Center (ACC) Emergency Notification Guidelines, which are maintained at the facility and ACC.

The Treatment Plant Specialists (TPSS) transport a 5 gallon container of sodium hypochlorite from the Pardee Center Chemical Plant to the WTP as the supply in the crock on site becomes depleted. The process chemicals are stored separated from incompatible chemicals, in secondary containment. The TPSS monitor and control the water treatment processes, including process chemical tank levels and feed rates by conducting daily visual checks of the equipment. The operators also inventory the process chemicals on a daily basis and conduct visual inspections concurrently.

Spill Response. Leaks, spills, or releases are handled following the Environmental Emergency Response and Release Prevention Plan that is part of the Hazardous Materials Business Plan (HMBP) and the ACC Emergency Notification Guidelines. The HMBP identifies the chemicals stored onsite; emergency response procedures (e.g., for notifications, containment, cleanup, evacuation, re-entry, and employee exposure); and release prevention procedures (e.g., storage and handling, training, and emergency response equipment) and is reviewed annually and submitted to the county certified unified program agency (CUPA).

Should a leak, spill, or release occur, staff will act as soon as possible, if safe to enter the spill area, to secure equipment, contain the leak, spill, or release, or otherwise minimize conditions that may pose a hazard to employee health and safety, public health and safety, or the environment. They then report the leak, spill, release, or threatened release to the EBMUD Environmental Compliance Section (ECS). ECS staff will notify the appropriate agencies and prepare timely written follow-up notification to the agencies as necessary. If onsite resources are not sufficient for safely handling the response, ECS will initiate the on-call emergency response contractor to provide the required services. Once contained, the leak, spill, or release is recycled, or hauled to an offsite disposal facility as appropriate. Releases to any storm drain system or to the environment are prohibited.

2.0 POTENTIAL POLLUTANTS

The primary pollutant source is storm water runoff flowing over landscaped, unpaved, or paved areas into natural drainages and low land depressions, including the backwash discharge pond and downgradient areas. There are no sanitary sewer systems within one-half mile of the WTP. Thus, pollutants having a reasonable potential to be present in storm water discharges include: sediments and other residuals from vehicles or operations and maintenance activities.

There is not a reasonable potential for significant quantities of other pollutants to be present in storm water discharges as the WTP has implemented a combination of

engineering and design controls, as well as operational procedures, for this purpose (see next Section).

2.1 Chemical Use At The Facility

Chemicals used in the treatment process are listed below. Sodium hypochlorite is used as the disinfecting agent, and handling of this chemical is discussed in the section below.

Other chemicals used at the facility and stored in bulk are:

Type of chemical	Maximum amount and container type
Liquid sodium hypochlorite	15 gallon crock
Dry sodium sulfite tabs	40 gallon pail

2.2 Discharge Associated With Operation And Maintenance Of Equipment

There is a low risk of discharge and contamination from any routine operations and maintenance of equipment. All maintenance is conducted using BMPs to contain any hazardous materials or waste, and areas where maintenance is performed is in bermed areas. All generated waste is stored and disposed of in accordance with hazardous waste regulations. All construction activities that are performed onsite must use construction BMPs, and, a Notice of Intent (NOI) must be submitted for projects disturbing greater than 1 acre in size.

3.0 POLLUTION CONTROL AND EFFLUENT TREATMENT METHODS

All potential discharges and facility stormwater runoff discharge to the surrounding ground surface or into low depressions leading to natural drainages to the reservoir. There has been no evidence of erosion to the backwash pond at the point of discharge.

Described below are key engineering and design controls, as well as operation procedures, that have been implemented to minimize pollutants in the storm water runoff discharges.

- Chemical loading/unloading, storage, and injection feed systems are designed and constructed in accordance with applicable standards and guidelines, which includes secondary containment systems to isolate the systems from potential release into the environment;
- No hazardous waste are generated at the plant; however, if any are, they are contained in appropriate containers and are removed from the plant in a timely manner;
- The operators routinely inspect the chemical storage and injection feed systems, and hazardous waste containment areas (if any);
- The storm drains, if any, are labeled to indicate "No dumping. Drains to reservoir";

- The storm drain inlets, if any, are routinely inspected prior to the rainy season and after each storm event. Under extreme storm conditions, staff may place gravel-bags and filter fabric at the storm drain inlets as an additional protective measure against excess amounts of sediments from entering the storm drains;
- The operators control, treat, and monitor water releases to the maximum extent practicable to prevent water quality impacts and stream bank erosion;
- The WTP area is surrounded by chain-link fencing and/or by a secured entrance gate. The WTP building access is monitored by the ACC/OCC 24-hours per day, 7-days per week;
- The WTP has designated parking areas, landscaping to minimize exposed soils and limit erosion, and lighting to facilitate the discovery of leaks, spills, or releases;
- The EBMUD Regulatory Compliance Office staff conducts an audit every year to ensure hazards are eliminated and to ensure compliance with applicable environment, health and safety regulations and BMPs.

The HMBP is updated annually for the facility and identifies all chemicals stored in quantities greater than 55 gallons, 500 pounds or 200 cubic feet of compressed gas. An Environmental Emergency Response and Release Prevention Plan has been prepared for the facility, and a copy is attached. In the event of a release, staff are trained to control and stop the release, and contain the release. The District retains hazardous waste contractors to respond and clean up the spill and properly dispose of the material.

4.0 SODIUM HYPOCHLORITE MANAGEMENT

Storage and Transportation. Sodium hypochlorite (liquid chlorine or “hypo”) is used as the disinfecting agent. Sodium hypochlorite is stored indoors in 5 gallon pails. Off-loading of the sodium hypochlorite is outside the chemical storage room. Signs are posted to avoid mixing of incompatible chemicals.

Spill Or Leakage Prevention. The chemical storage room is fitted with secondary containment pads. All chemical feed piping is contained within a chase. As with all chemical storage, the pails and piping are visually inspected on a daily basis.

The attached emergency response plan describes the steps to be conducted in the event of a release of any chemical at the facility. As noted above, staff are trained to respond to chemical releases, and a contractor is available 24 hours to clean up the release if necessary.

Chlorinated Water Spill. Chlorinated water spills may be from the filters, (through filter backwash) or associated pipelines. Any discharge resulting from a filter overflow would

overflow into the floor drains, which flow into the backwash water holding pond. On rare occasions, non-routine chlorinated releases may occur that are unplanned or emergency in nature such as a broken water line or a process upset or overflow. Should those types of releases occur, the water would be automatically dechlorinated using the same sodium sulfite table feed system that dechlorinates the backwash water discharge.

In the event of a release, staff would stop the activity causing the discharge as quickly as possible. Staff would then obtain samples from a point downstream from the discharge location. Samples would be collected and analyzed for total suspended solids, pH, and total chlorine, using the field test method. The flow rate and total volume discharged would be estimated, based on review of flow data. Flow from the source of the discharge would be automatically monitored for Total Chlorine and pH by the process monitors in place. Additionally, samples could be manually collected and analyzed for constituents of concern if warranted.

5.0 RESPONSIBILITY AND TRAINING

Environmental compliance is a shared responsibility. The operators are responsible for operating and monitoring the plant including: conducting drinking water quality and WDR permit required sampling and monitoring; being aware of and responding to alarms, spills, or other unusual conditions; coordinating and overseeing chemical deliveries; coordinating equipment repairs; and conducting chemical and process inspections. The facility supervisor is responsible for operations oversight. The operators and maintenance crew are responsible for maintaining the grounds, including the storm drains inlets. ECS is responsible for environmental compliance oversight including WDR Permit compliance and reporting, BMP Plan, and annual training.

Employees who come into contact with hazardous materials or wastes as part of their job are trained annually on proper handling, storage, and disposal; incident prevention; MSDSs; personal protective equipment; and emergency response procedures. Training is documented and maintained in the employee records (with hard copies of applicable certificates), as well as in an electronic training documentation file.

WDR Compliance Responsibilities	
Operations and monitoring the plant	Operators
Operations oversight	John C. Johnson, Assistant Superintendent, Pardee Section
Operations and maintenance	Tony Boitano, Pardee Water/Wastewater Supervisor
Environmental compliance oversight	Colin Moy, EHS Specialist

Attachment A

Environmental Emergency Response and Release Prevention Plan



inda S. Adams
Secretary for
Environmental
Protection

California Regional Water Quality Control Board Central Valley Region

Karl E. Longley, ScD, P.E., Chair

11020 Sun Center Drive #200, Rancho Cordova, California 95670-6114
Phone (916) 464-3291 • FAX (916) 464-4645
<http://www.waterboards.ca.gov/centralvalley>



Arnold
Schwarzenegger
Governor

ECS - Received

APR 30 2009

28 April 2009

Mr. John H. Schroeter, P.E.
Manager of Environmental Compliance
East Bay Municipal Utility District
P.O. Box 24055, M.S. #704
Oakland, CA 94623

CERTIFIED MAIL
7008 1140 0002 8805 9726

NOTICE OF APPLICABILITY (NOA); LIMITED THREAT GENERAL WASTE DISCHARGE REQUIREMENTS ORDER NO. R5-2008-0082; EAST BAY MUNICIPAL UTILITY DISTRICT (EBMUD), AMADOR COUNTY

Our office received application forms on 19 November 2008 from the EBMUD for the Pardee Reservoir Recreation Area Water Treatment Plant (PWTP) for the management of its potable water system. Based on the application package and subsequent information submitted by the Discharger, we have determined that the project meets the required conditions for approval under the General Order for Limited Threat Discharges of Treated/Untreated Groundwater from Cleanup Sites, Wastewater from Superchlorination Projects, and Other Limited Threat Wastewaters to Surface Water (Limited Threat General Order). This project is hereby assigned Limited Threat General Order No. R5-2008-0082-010 and National Pollutant Discharge Elimination System (NPDES) Permit No. CAG995002.

The Limited Threat General Order (enclosed) may also be viewed at the following web address:

http://www.waterboards.ca.gov/centralvalley/board_decisions/adopted_orders/general_orders/r5-2008-0082.pdf. You are urged to familiarize yourself with the contents of the entire document. The Limited Threat General Order prescribes mandatory discharge monitoring requirements. The project activities shall be operated in accordance with the requirements contained in this NOA, the Limited Threat General Order, and with the information submitted by the Discharger.

CALIFORNIA TOXIC RULE / STATE IMPLEMENTATION POLICY MONITORING

The Limited Threat General Order incorporates the requirements of the California Toxic Rule (CTR) and the State Water Resources Control Board's (State Water Board), *Policy for Implementation of Toxic Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California*, 2005, also known as the State Implementation Policy (SIP). The Discharger requested a categorical exception to the requirement for meeting the CTR pollutant criteria in the Limited Threat General Order, as authorized by Section 5.3 of the SIP. The Discharger certified that its discharges are necessary to implement drinking water control measures conducted to fulfill statutory requirements under the federal Safe Drinking Water Act and the California Health and Safety Code.

California Environmental Protection Agency

The receiving waters are not listed under the Clean Water Act 303(d) List of impaired water bodies. Therefore, no additional effluent limitations or additional monitoring requirements will be added to this Limited Threat General Order.

PROJECT DESCRIPTION

The PWTP treats raw water drawn from the Mokelumne River watershed and provides potable water to the Pardee Reservoir Recreation Area which includes 107 mobile home/recreation vehicle connections and 95 campsites. There is shower, laundry, and public restroom facilities available, as well as a concessionaire operated coffee shop, marina, and swimming pool. The PWTP and Recreation Area are adjacent to Pardee Reservoir.

This NOA provides regulatory coverage for the discharge of backwash water from the PWTP. The backwash water is discharged into an unlined pond and then flows overland to Pardee Reservoir. The discharge is greatest during the summer. The PWTP has been in operation since 1958 and the discharge was previously permitted under Low Threat General Order No. 5-00-175.

MONITORING AND REPORTING

The Discharger is required to comply with all the monitoring and reporting requirements contained in the Limited Threat General Order. This includes notifying Central Valley Regional Water Quality Control Board (Regional Water Board) staff 24 hours before the start of each new discharge, notification of noncompliance or anticipated noncompliance, and quarterly reporting of monitoring results.

Effluent and receiving water monitoring shall be conducted and submitted to the Regional Water Board on a quarterly basis. You must submit quarterly reports, even if there is no discharge or receiving water flow during the reporting quarter, until Regional Water Board staff formally terminate your coverage under the Limited Threat General Order. Most reporting requirements are found in Attachment E of the Limited Threat General Order. Please reference your unique order number, R5-2008-0082-010, in your correspondence and submitted documents.

GENERAL INFORMATION AND REQUIREMENTS

The Discharger will be required to implement its Pollution Prevention and Monitoring and Reporting Plan, if applicable. Discharge of material other than what is described in the application is prohibited.

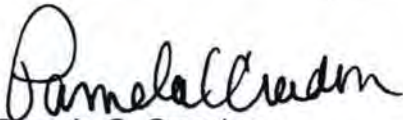
The required annual fee (as specified in the annual billing you will receive from the State Water Board) shall be submitted until this NOA is officially terminated. You must notify this office in writing if the discharge regulated by this Limited Threat General Order is no longer necessary, so we may terminate applicability of this Limited Threat General Order and avoid additional unnecessary billing.

Dischargers authorized to discharge under this Limited Threat General Order who have been granted an exception to the priority pollutant criteria and objectives in the CTR and SIP, as

allowed by Section 5.3 of the SIP, must provide certification by a qualified biologist that the beneficial uses of the receiving water have been restored upon completion of the discharge.

Failure to comply with the Limited Threat General Order may result in enforcement actions, which could include civil liability. Some late reporting and effluent limitation violations are subject to a Mandatory Minimum Penalty (MMP) of \$3,000 per violation [California Water Code Section 13385(h) and (i)]. If you have no discharge during a quarterly monitoring period, you must still submit a report indicating that no discharge occurred, or you may be subject to MMPs.

All monitoring reports submittals, discharge notifications, and any questions regarding compliance or enforcement, shall be to Oscar Biondi, who may be reached at (916) 464-4663 or at obiondi@waterboards.ca.gov. If you have any questions regarding the permitting aspects of your Limited Threat General Order coverage, please contact Anand Mamidi of our office at (916) 464-4853 or at amamidi@waterboards.ca.gov.



Pamela C. Creedon
Executive Officer

Enclosure: General Order No. R5-2008-0082 (Discharger only)

cc: U.S. Environmental Protection Agency, Region IX, San Francisco
Mr. Phil Isorena, Division of Water Quality, State Water Board, Sacramento

Salinity Management Plan
for the Limited Threat Discharge
Pardee Recreation Area Water Treatment Plant

East Bay Municipal Utility District
July 2009

Introduction

The East Bay Municipal Utility District (EBMUD) operates the Pardee Reservoir Recreation Area (PARA) water treatment plant (WTP) under the Limited Threat General Waste Discharge Order No. R5-2008-0082-010 and National Pollutant Discharge Elimination System (NPDES) Permit No. CAG995002, issued on April 28, 2009. The discharge consists of the following treatment of raw water.

- Raw water to the WTP originates from the upper Mokelumne River watershed in Amador, Calaveras, and Alpine counties. The river flow supplies the Pardee Reservoir used for drinking water transfer to the Bay Area communities of Alameda and Contra Costa counties.
- Freshwater is derived from precipitation and annual snow melts from the Sierra Mountains.
- Freshwater is treated by prefiltration, ultrafiltration, and disinfection. No chemicals are added to treat the filter backwash water except for dechlorination chemicals. Instrument analyzer water is combined with the backwash water discharges.
- The combined discharge flows directly into an unlined pond and disposed by evapotranspiration and percolation. Limited overland flow is observed before reaching the reservoir shoreline.

Filter backwash occurs automatically every two hours when the treatment plant is operating, and every four hours when the plant is not operating. Instrument analyzer water flows continuously into the discharge pipes at approximately 0.5 to 1 gpm. Each backwash cycle lasts approximately 45 seconds and uses 500 gallons of finished water. Backwash water volume ranges from 3,000 gpd (winter months) to a maximum of 6,000 gpd (summer months). The backwash water is discharged to an unlined 10,000-gallon capacity combination storage/disposal pond that contains extensive amounts of rooted aquatic plants and organic matter.

Sources of Salinity and Backwash Water Quality

Dissolution of minerals in the soils and bedrock from the watershed and Sierra Mountains are the major sources of cation species which define the level of salinity. Minor sources may be contributed from precipitation. Historical monitoring data of representative

constituents in raw water at the influent to the WTP, finished potable water, and the backwash overflow at the pond discharge is summarized in Table 1 below.

Table 1 Summary of Salinity Constituents at Pardee Recreation WTP

	Influent (Raw Water)	Finished (Potable Water)	Backwash Water At Pond Overflow
Collection Dates			
Parameter	3/3/98, 4/3/03	4/20/04, 4/19/05, 4/11/06, 4/29/09	1/12/06, 2/8/06, 3/9/06, 4/13/06, 5/11/06, 6/8/06, 7/13/06, 8/10/06, 9/14/06, 10/12/06, 11/9/06, 12/15/06, 1/17/07, 2/10/07, 3/8/07, 4/12/07, 5/10/07, 6/14/07, 7/12/07, 8/9/07, 9/13/07, 10/11/07, 11/8/07, 12/13/07, 1/10/08, 2/14/08, 4/10/08, 5/8/08, 6/12/08, 7/10/08, 8/14/08, 9/11/08, 10/9/08, 11/13/08, 12/11/08, 1/22/09, 2/5/09, 4/9/09, 5/14/09, 7/9/09
Calcium, mg/L	4.65, 3.27	3.44, 4.2, 4.0, 3.3	--
Chloride, mg/L	--, 1.7	4.0, 4.2, 3.9, 4.0	--
Conductivity, µmhos/cm	--, 35.7	45.8, 56.6, 55.2, 46.2	44, 45, 61, 59, 55, 40, 36, 59, 43, 42, 47, 66, 43, 45, 33, 58, 61, 71, 53, 56, 61, 55, 50, 48, 12, 80, 72, 67, 55, 54, 48, 55, 68, 41, 52, 80, 137, 56, 46, 231
Hardness, Total, mg/L	17, 14	13, 17, 17, 14	--
Magnesium, mg/L	1.62, 0.98	1.02, 1.4, 1.4, 1.1	--
Potassium, mg/L	1.43, 0.562	0.65, 0.64, 0.68, 0.62	--
Sodium, mg/L	2.26, 1.95	3.75, 4.0, 4.2, 3.7	--

Salinity Control/Reduction

The average conductivity of the backwash water effluent at the pond overflow is 60 µmhos/cm, which is within 17% of the average finished water conductivity (51 µmhos/cm) and 40% higher than the raw water. Other salinity constituents in the backwash water would be expected to be in the same concentration ranges as in the raw and finished levels and below water quality objectives. The USEPA primary drinking water maximum contaminant level for conductivity is 900 µmhos/cm and for surface water agriculture use is 700 µmhos/cm. The discharge water conductivity is over 10 times lower than these objectives; hence the discharge of the backwash water into Pardee Reservoir is not expected to impact the surface water quality. No salinity control and/or reduction are required.

**Appendix 6-6. Hazardous Material Business Plan
Example: Camanche North Shore
(35 pages)**

Camanche Recreation Company - Camanche South Shore Recreation Area (CERSID: 10397716)**Facility Information Accepted Oct 8, 2020**

Submitted on 4/21/2020 10:16:22 AM by *Izzy Guerrero* of East Bay Municipal Utility District (Oakland, CA)
Submittal was **Accepted** on 10/8/2020 2:00:50 PM by Rosalee Hayes

- Business Activities
- Business Owner/Operator Identification

Hazardous Materials Inventory Accepted Oct 8, 2020

Submitted on 4/21/2020 10:16:22 AM by *Izzy Guerrero* of East Bay Municipal Utility District (Oakland, CA)
Submittal was **Accepted** on 10/8/2020 2:00:57 PM by Rosalee Hayes

- Hazardous Material Inventory (6)
- Site Map (Official Use Only)
 - *Map 1, 2, 3, 4 - Vicinity, Site, Maintenance Yard, General Store* (Adobe PDF, 1285KB)
 - *Map 7 - Maintenance Shop* (Adobe PDF, 609KB)
 - *Map 8 - Concessionaire Office* (Adobe PDF, 619KB)
 - *Map 10 - Snack Bar #1* (Adobe PDF, 618KB)
 - *Map 11 - Snack Bar #2* (Adobe PDF, 613KB)
 - *Map 12 - Dock and Berth* (Adobe PDF, 115KB)
 - *Map 14 - RV Park* (Adobe PDF, 689KB)
 - *Map 15 - Mobile Home Park* (Adobe PDF, 140KB)

Emergency Response and Training Plans Accepted Oct 8, 2020

Submitted on 4/21/2020 10:16:22 AM by *Izzy Guerrero* of East Bay Municipal Utility District (Oakland, CA)
Submittal was **Accepted** on 10/8/2020 2:01:05 PM by Rosalee Hayes

- Emergency Response/Contingency Plan
 - *Emergency Response/Contingency Plan* (Adobe PDF, 417KB)
- Employee Training Plan
 - Provided In Submittal Element: Emergency Response and Training Plans

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org. Facility Name	East Bay Municipal Utility District Camanche Recreation Company - Camanche South Shore Recreation Area 11700 Wade Ln, Wallace 95225	Chemical Location	Behind Maintenance Building & W. of Store (Bldg. F)	CERS ID	10397716	Status	Submitted on 4/21/2020 10:16 AM
				Facility ID		Hazardous Components (For mixture only)	

DOT Code/Fire Haz. Class	Common Name	Unit	Max. Daily	Quantities	Avg. Daily	Annual Waste Amount	Federal Hazard Categories	Component Name	% Wt	EHS CAS No.
DOT: 3 - Flammable and Combustible Liquids	Gasoline, unleaded	Gallons	10500	8000	5500	0	- Physical Flammable	Petroleum hydrocarbons, blend	100 %	8006-61-9
	CAS No. 8006-61-9	State Liquid	Storage Container Aboveground Tank		Pressure Ambient	Waste Code	- Health			
Flammable Liquid, Class I-B	Map: 2, 3, 4 Grid: D4, E3, C3,B6-7	Type Mixture	Days on Site: 365		Temperature Ambient		Carcinogenicity			
							- Health			
							Reproductive Toxicity			
							- Health Skin			
							Corrosion			
							Irritation			
							- Health Specific			
							Target Organ			
							Toxicity			
							- Health			
							Aspiration Hazard			
							- Health Germ			
							Cell Mutagenicity			

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org.		East Bay Municipal Utility District		Chemical Location		CERS ID		10397716													
Facility Name		Camanche Recreation Company - Camanche South Shore Recreation Area		Concess. Office, General Store, Snack Shop #2, Mobile Home Park		Facility ID															
		11700 Wade Ln, Wallace 95225		Status		Submitted on 4/21/2020 10:16 AM															
		Hazardous Components (For mixture only)																			
DOT Code/Fire Haz. Class		Common Name		Unit		Max. Daily		Quantities		Annual Waste Amount		Federal Hazard Categories		Component Name		% Wt		EHS CAS No.			
DOT: 2.1 - Flammable Gases		Liquefied Petroleum Gas (lpg)		Gallons		13890		595		7750		0		- Physical		Propane		100 %		74-98-6	
		CAS No		State		Storage Container				Pressure		Waste Code		Flammable							
		74-98-6		Gas		Aboveground Tank				> Ambient				- Physical Gas							
		Map: 2, 4, 8, 11, 15		Grid: Throughout		Type		Days on Site: 365		Temperature				Under Pressure							
Flammable Gas				Pure						Ambient											

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org. Facility Name		East Bay Municipal Utility District Camanche Recreation Company - Camanche South Shore Recreation Area		Chemical Location East Maintenance Building under covered Storage Area		CERS ID Facility ID		10397716						
11700 Wade Ln, Wallace 95225		Area		Status		Submitted on 4/21/2020 10:16 AM								
DOT Code/Fire Haz. Class	Common Name	Unit	Quantities		Annual Waste Amount	Federal Hazard Categories	Component Name	Hazardous Components (For mixture only)						
			Max. Daily	Largest Cont.				% Wt	EHS CAS No.					
			Used lubricating oils					55	20	55	- Health Serious	Waste lubricating oils	100 %	221
			State	Storage Container				Pressure	Waste Code	Eye Damage				
			Liquid	Steel Drum				Ambient	221	Irritation				
CAS No		Type		Temperature										
70514-12-4		Mixture		Ambient										
Map: 2, 3 Grid: E3, C4		Days on Site: 365												

Hazardous Materials And Wastes Inventory Matrix Report

East Bay Municipal Utility District Camanche Recreation Company - Camanche South Shore Recreation Maintenance Building										
CERS Business/Org. Facility Name		Chemical Location		CERS ID		10397716		Facility ID		
Area		11700 Wade Ln, Wallace 95225		Status		Submitted on 4/21/2020 10:16 AM		Hazardous Components (For mixture only)		
DOT Code/Fire Haz. Class	Common Name	Unit	Max. Daily	Quantities Largest Cont.	Avg. Daily	Annual Waste Amount	Federal Hazard Categories	Component Name	% Wt	EHS CAS No.
DOT: 3 - Flammable and Combustible Liquids	Diesel Fuel No. 2	Gallons	300	500	300	0	- Physical Flammable	Petroleum hydrocarbons, blend	100 %	68476-34-6
	CAS No. 68476-34-6	State Liquid	Storage Container Aboveground Tank		Pressure Ambient	Waste Code	- Health Carcinogenicity			
Combustible Liquid, Class II	Map: 2, 3	Type Mixture	Days on Site: 365		Temperature Ambient		- Health Skin Corrosion			
	Grid: E3, C3-4						Irritation			
							- Health Specific Target Organ			
							Toxicity			
							- Health			
							Aspiration Hazard			
							- Health Germ			
							Cell Mutagenicity			

Hazardous Materials And Wastes Inventory Matrix Report

East Bay Municipal Utility District Camanche Recreation Company - Camanche South Shore Recreation South Shore Maintenance Yard Building Area										Chemical Location		CERS ID	10397716				
CERS Business/Org. Facility Name		11700 Wade Ln, Wallace 95225		Status		Submitted on 4/21/2020 10:16 AM											
DOT Code/Fire Haz. Class		Common Name		Unit		Quantities		Annual Waste		Federal Hazard Categories		Component Name		Hazardous Components (For mixture only)			
						Max. Daily		Largest Cont.		Avg. Daily		Amount		% Wt EHS CAS No.			
DOT: 3 - Flammable and Combustible Liquids Combustible Liquid, Class III-B	Motor Oil		Gallons		55		10		- Health		VARIOUS LUBRICATING BASE OILS		85 %		6474X-XX-X		
	CAS No		State		Storage Container		Pressure		Carcinogenicity		ADDITIVE PACKAGE, INCLUDING		15 %		MIXTURE		
			Liquid		Steel Drum		Ambient		- Health Skin		ZINC ALKYL DITHIOPHOSPHATE		2 %		68649-42-3		
			Type		Mixture		Temperature		Corrosion								
										Ambient		Irritation					
												- Health Specific Target Organ					
												Toxicity					
DOT: 3 - Flammable and Combustible Liquids Combustible Liquid, Class III-B	Motor Oil		Gallons		55		10		- Health		VARIOUS LUBRICATING BASE OILS		85 %		6474X-XX-X		
	CAS No		State		Storage Container		Pressure		Carcinogenicity		ADDITIVE PACKAGE, INCLUDING		15 %		MIXTURE		
			Liquid		Steel Drum		Ambient		- Health Skin		ZINC ALKYL DITHIOPHOSPHATE		2 %		68649-42-3		
			Type		Mixture		Temperature		Corrosion								
										Ambient		Irritation					
												- Health Specific Target Organ					
												Toxicity					

EAST BAY MUNICIPAL UTILITY DISTRICT



Pardee

Pardee Area Control Center Emergency Notification Guidelines

July 2013

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Pardee Area Control Center Emergency Notification Guidelines

PURPOSE:

*These guidelines are for **determining who to notify** under various emergency conditions.*

- *The assumption is that notification of an emergency or potential emergency is received by phone, radio, alarm or other means to the Pardee Area Control Center (ACC) Operator or the Oakland Control Center (OCC) Operator.*
- Staff within each department, division or section that is designated as the “facility owner” of the EBMUD owned facility is ultimately responsible for ensuring that emergency notifications, emergency response and incident follow-up are carried out to the extent necessary regardless of the origin of the incident.
- For EBMUD owned facilities operated under contract or agreements to EBMUD, the designated manager(s) shall ensure that EBMUD “Initial Contact” person(s) are notified immediately. These include private concessionaire companies at the four recreation areas (Camanche North / South Shores, Pardee, and Camanche Hills Hunting Preserve) and the California Department of Fish and Wildlife at the fish installation in the counties of Amador, Calaveras, and San Joaquin.

INSTRUCTIONS:

1. Record all pertinent information on the Emergency Event Report (Appendix #2)
2. Determine and look up type of emergency in the attached tables.
 - a. If there is more than one type of emergency happening simultaneously, treat each event as a separate emergency, following the instructions for each type of emergency.
2. Call the appropriate people listed in the “Initial Contact” column.
 - a. The role of the initial contact is to verify and/or assess the emergency as necessary to determine what further resources are needed to respond.
 - b. If there is not already a person at the scene of the emergency, the initial contact will be the incident commander until relieved by other District personnel or responders from outside agencies.
 - c. If there is already a District employee onsite in communication with ACC / OCC, this person is the Incident Commander until relieved by the initial contact or others.
 - d. **Keep the Incident Commander informed as to what notifications have been/are being made.**
3. Fully explain the situation to the initial contact, conveying all known information:
 - a. Identity of caller (if known)
 - b. Location, date and time of spill, release or threatened release
 - c. Substance and quantity involved
 - d. Chemical name (if known, it should be reported if the chemical is extremely hazardous)
 - e. Description of what happened
4. Maintain contact with the Incident Commander and communicate any requests of the Incident Commander for support or resources to the appropriate District personnel or

outside agencies or contractors who can fulfill such requests. To the extent of your authority, make every effort to fulfill the expressed needs of the Incident Commander. If you feel fulfilling the request would exceed your authority or conflict with procedures, as you understand them, COMMUNICATE the request up the chain of command immediately until it is resolved. **DO NOT DELAY THIS PROCESS.**

5. As soon as the emergency is confirmed, by either the first report from the observer or from information provided by the initial contact, and the initial emergency contact has been made, begin making further notifications to secondary field (response) personnel, management and the Regulatory Compliance Office as prescribed in the Post-Assessment Notification column.
 - **If the emergency is serious**, requiring continual efforts of the ACC / OCC operator, or staffing is inadequate and there isn't time to make further notifications, call the Oakland Emergency Dispatch Center 1-866-403-2683. Direct the Emergency Dispatch Center to make Post-Assessment Notifications as necessary. The Emergency Dispatch Center has been provided with a copy of PACC Emergency Notification Guidelines.
 - **If time is not exceptionally critical**, call down the appropriate management list, in the listed order, until you reach someone. Then, if necessary, notify one person on the Regulatory Compliance Office list.
 - It is the responsibility of whomever you reach on either list to notify others on that list as necessary. When the ACC / OCC operator's available time is limited, the ACC / OCC operator may request that the first person contacted on either list contact others on both lists as necessary.
 - Fully explain the situation to the Emergency Dispatch Center, management contact and/or Regulatory Compliance contact, conveying all known information. To the extent possible and practical, take the time to answer the contact's questions to avoid unnecessary callbacks. If there are any outstanding requests of the Incident Commander requiring authorization from District management, be sure to make these issues known. Similarly, if you have had requests that specific District staff be notified from either the Incident Commander, your supervisor, or others involved in the emergency, convey this information to your contact.
6. Record date, time, name of all persons contacted, information transmitted and actions taken in the Pardee or Oakland Operator Journals.

Type of Emergency	Initial (Field) Contact(s)	Post-Assessment Notification (Secondary Field, Management, Emergency Preparedness & Regulatory Compliance Office)
1. CHEMICAL RELEASE Possible scenarios: • Chemical spill during chemical delivery • Highway accident involving District vehicle carrying chemicals • Leak from propane tank • Leaking container at District facility • Hazardous material release on or along a District maintained roadway or on the watershed • Chemical spill by concessionaire or visitor at recreation area to water or ground • Highway 49 accident that releases chemicals into the Mokelumne River.	If source of spill is equipment or facilities owned, operated or maintained by the District, call Pardee Maintenance Supervisors. Working Hours: For power plant-related events contact: Dave Oldham, Power & Treatment Plant Maintenance Supervisor Office: 209-772-8213 Nextel: 209-684-5036 Radio: 7018, channel 4 For non-power plant-related events contact: Todd Cearley, Power & Treatment Plant Maintenance Supervisor Office: 209-772-8212 Cell: 209-601-5298 Radio: 7013, channel 4 Off Hours: Refer to Standby On-Call Supervisor List If Operations assistance needed contact: For power plant-related events contact: Pat Lydon, Superintendent Office: 209-772-8201 Cell: 916-835-1699 Radio: 7010, channel 4 Steve Rowan, Assist Superintendent Office: 209-772-8202 Cell: 209-217-4401 Radio: 7012, channel 4 For non-power plant-related events contact: John C. Johnson, Assistant Superintendent Office: 209-772-8267 Cell: 209-601-5193 Radio: 7011, channel 4	SECONDARY FIELD CONTACTS (Per Incident Commander) PLEASE NOTE: If release is to the environment (not fully contained within a building) incident commander should request notification of: Water Quality Unit to assess water quality impacts • John C. Johnson, Assistant Superintendent Office: 209-772-8267 Cell: 209-601-5193 Radio: 7011, channel 4 AND: Fisheries & Wildlife to assess impacts to fish and wildlife. • Jose Setka, Supervising F/W Biologist Office: 209-365-1467 Cell: 510-517-2169 Radio: 3820, channel 4 Home: 707-678-2612 MANAGEMENT CONTACTS Notify Pardee Section management first if spill involves a District facility that is not a recreation area. Notify Watershed & Recreation management first if spill is at a recreation area. The first management contact notified will be responsible for notifying other management personnel as necessary. See attached Emergency Notification Flowchart for numbers. REGULATORY COMPLIANCE/ EMERGENCY PREPAREDNESS OFFICE CONTACTS • 24 hour emergency pager 510-437-7363 Notify Environmental Compliance immediately so that regulatory agency notifications can be made within the required time. • If emergency assessment; containment; and/or cleanup resources are beyond those available contact Environmental Compliance so that post-emergency cleanup activities arrangements can be made. • Environmental Compliance will be responsible for notifying Workplace Health & Safety and Emergency Preparedness unless the ACC / OCC operator requires specific information from these units in which case they may be contacted directly. In any case, both Workplace Health & Safety and Emergency Preparedness should <u>always</u> be notified.

Type of Emergency	Initial (Field) Contact(s)	Post-Assessment Notification (Secondary Field, Management, Emergency Preparedness & Regulatory Compliance Office)
	If release is at any of the recreation areas or impacting watershed lands call Watershed & Recreation Division. All Hours: Call Resource Patrol Unit (RPU) RPU Supervisor, Tim Cox Office: 209-772-8256 Cell: 209-610-0898 Radio: 3830, channel 4 Home: 209-754-0604 -OR- RPU Senior Ranger, Greg Persons Office: 209-772-8307 Cell: 209-202-1627 Radio: 3831, channel 4	See attached Emergency Notification Flowchart for contact numbers.
2. FUEL OR OIL SPILL Possible sources: - Release from power house due to system failure - Boat sunk in Pardee or Camanche Reservoirs - Vehicle enters Pardee or Camanche Reservoir at boat ramp. - Motor vehicle accident on or nearby recreation areas - Airplane crash into Pardee or Camanche Reservoir Reporting and response guidelines for fuel and oil spills to water: Legally, fuel/oil spill to water that causes sheen must be reported. Practically, anything "beyond normal operations" that causes a sheen should be responded to and reported providing we are implementing all prescribed measures to minimize spills due to "normal operations".	If source of spill is equipment or facilities owned, operated or maintained by the District, call Pardee Maintenance Supervisors. Working Hours: For power plant-related events contact: Dave Oldham, Power & Treatment Plant Maintenance Supervisor Office: 209-772-8213 Nextel: 209-684-5036 Radio: 7018, channel 4 For non-power plant-related events contact: Todd Cearley, Power & Treatment Plant Maintenance Supervisor Office: 209-772-8212 Cell: 209-601-5298 Radio: 7013, channel 4 Off Hours: Refer to Standby On-Call Supervisor List AND: If spill is at a recreation area or impacting watershed lands, call Watershed & Recreation	<u>SECONDARY FIELD CONTACTS (Per Incident Commander)</u> PLEASE NOTE: If release is to the environment (not fully contained within a building) incident commander should request notification of: Water Quality Unit to assess water quality impacts - John C. Johnson, Assistant Superintendent Office: 209-772-8267 Cell: 209-601-5193 Radio: 7011, channel 4 AND: Fisheries & Wildlife to assess impacts to fish and wildlife. - Jose Setka, Supervising F/W Biologist Office: 209-365-1467 Cell: 510-517-2169 Radio: 3820, channel 4 Home: 707-678-2612 MANAGEMENT CONTACTS - Notify Pardee Section management (209-772-8201) first if spill involves a District facility that is not a recreation area. - Notify <u>Watershed & Recreation Manager, Kent Lambert (209-772-8203)</u> first if spill is at a recreation area. The first management contact notified will be responsible for notifying other management

Type of Emergency	Initial (Field) Contact(s)	Post-Assessment Notification (Secondary Field, Management, Emergency Preparedness & Regulatory Compliance Office)
Removal with absorbents or by mechanical means is preferred over use of surfactants. If use of surfactants is deemed necessary, approval in advance of use must be obtained from California Dept. of Fish & Game (DFG) in each instance. Call Environmental Compliance so that arrangements can be made for cleanup activities. Only surfactants licensed for use as oil spill cleanup agents by DFG may be used. Reference Attachment #4	Division. If a vehicle or plane enters either reservoir notify Watershed & Recreation contacts first and Pardee Superintendent or Standby Supervisor. All Hours: Call Resource Patrol Unit (RPU) RPU Supervisor, Tim Cox Office: 209-772-8256 Cell: 209-610-0898 Radio: 3830, channel 4 Home: 209-754-0604 -OR- RPU Senior Ranger, Greg Persons Office: 209-772-8307 Cell: 209-202-1627 Radio: 3831, channel 4	personnel as necessary. See attached Emergency Notification Flowchart for contact numbers. REGULATORY COMPLIANCE/ EMERGENCY PREPAREDNESS OFFICES CONTACTS • 24 hour emergency pager 510-437-7363 Notify Environmental Compliance immediately so that regulatory agency notifications can be made within the required time. If emergency assessment; containment; and/or cleanup resources are beyond those available contact Environmental Compliance so that post-emergency cleanup activities arrangements can be made. Environmental Compliance will be responsible for notifying Workplace Health & Safety and Emergency Preparedness unless the PACC operator requires specific information from these units in which case they may be contacted directly. In any case, both Workplace Health & Safety and Emergency Preparedness should <u>always</u> be notified. See attached Emergency Notification Flowchart for numbers.
3. MEDICAL EMERGENCY Possible sources: • Any life threatening incident on or nearby EBMUD property	Call 911 if not already called If Pardee Section personnel involved at all times notify: Pat Lydon, Superintendent Office: 209-772-8201 Cell: 916-835-1699 Radio: 7010, channel 4 If at a recreation area and if a major injury or fatality notify Watershed & Recreation Division at all times: All Hours: Call Resource Patrol Unit (RPU) RPU Supervisor, Tim Cox Office: 209-772-8256 Cell: 209-610-0898 Radio: 3830, channel 4 Home: 209-754-0604 -OR- RPU Senior Ranger, Greg Persons Office: 209-772-8307 Cell: 209-202-1627 Radio: 3831, channel 4	SECONDARY FIELD CONTACTS (Per Incident Commander) Usually none but respond as requested by Incident Commander MANAGEMENT CONTACTS If District employee(s) involved, notify employee's supervisor and/or manager. REGULATORY COMPLIANCE CONTACTS Notify Workplace Health & Safety in the event of any work related injury. See attached Emergency Notification Flowchart for numbers.

Type of Emergency	Initial (Field) Contact(s)	Post-Assessment Notification (Secondary Field, Management, Emergency Preparedness & Regulatory Compliance Office)
4. MOKELUMNE RIVER FISH INSTALLATION (MRFI) EMERGENCIES NOTE: The MRFI is operated by the California Department of Fish and Wildlife (CDFW) and the hatchery manager, or other CDFW employee in charge, would be the Incident Commander in the event of an emergency. CDFW: Darrick Baker, Manager I Cell: 916-715-0184 Bill Smith, Manager II Cell: 916-718-5078	Call 911 as necessary (if not already called) to address medical, fire, hazmat spill or other emergencies <i>AND:</i> All Hours: Call down list in order until you reach someone: 1) Jose Setka, T/C Supervising F/W Biologist Office: 209-365-1467 Cell: 510-517-2169 Radio: 3820, channel 4 Home: 707-678-2612 2) Steve Boyd, Fisheries Biologist Office: 209-365-1089 Home: 916-853-8504 Cell: 916-216-8012 Radio: 3821, channel 4 At request of Fisheries and Wildlife staff, notify MRFI staff (if not already notified): MRFI Manager Office: 209-759-3383 Call District maintenance and/or operations personnel as necessary to handle downed power lines, threats to structures from major pipeline breaks or other such events. Off Hours: Refer to Standby On-Call Supervisor List Working Hours: Maintenance Dave Oldham, Power and Treatment Plt Maint. Supervisor, Office: 209-772-8213 Nextel: 209-684-5036 Radio: 7018, channel 4 Operations Pat Lydon, Superintendent Office: 209-772-8201 Cell: 916-835-1699 Radio: 7010, channel 4	SECONDARY FIELD CONTACTS (Per Incident Commander) - Joe Miyamoto, Manager of Fisheries and Wildlife Office: 510-287-2021 Pager: 510-437-7854 Cell: 925-813-1684 Home: 925-439-8151 If directed to do so by Fisheries & Wildlife Manager or his designee, call Water Quality Unit Supervisor to assess water quality impacts: - John C. Johnson, Assistant Superintendent Office: 209-772-8267 Cell: 209-601-5193 Radio: 7011, channel 4 MANAGEMENT CONTACT Call first: - Richard Sykes, Manager of Natural Resources Office: 510-287-1629 Home: 510-652-2370 Cell: 510-390-4035 The first management contact notified will be responsible for notifying other management personnel as necessary. See attached Emergency Notification Flowchart for numbers. REGULATORY COMPLIANCE/ EMERGENCY PREPAREDNESS OFFICES CONTACTS Notify Environmental Compliance as necessary. See attached Emergency Notification Flowchart for numbers.

Type of Emergency	Initial (Field) Contact(s)	Post-Assessment Notification <i>(Secondary Field, Management, Emergency Preparedness & Regulatory Compliance Office)</i>
5. RESERVOIR SPILL/HIGH WATER OVERFLOW/ DAM FAILURE The Federal Energy Regulatory Commission (FERC) Emergency Action Plan (EAP) for the Lower Mokelumne River Project addresses these scenarios. The first EBMUD person who learns of the emergency, judges its potential severity and makes notifications as appropriate according to the EAP notification flowchart. This chart specifies that this person or other EBMUD staff as necessary and available, including the PACC operator call in order down list below and request instructions as to whether to continue with the EAP from first person reached (see EAP for current numbers).	Working Hours: The following summarizes the EAP notification contacts: Superintendent, Pardee Section – Patrick M. Lydon 209-772-8201 Assistant Superintendent, Pardee – Steve Rowan 209-772-8202 Assistant Superintendent, Pardee – John C. Johnson 209-772-8267 Manager of Water Supply – John Hurlburt 510-287-1035 Superintendent, Aqueduct Section – Andy Enos 209-946-8001 Assistant Superintendent, Aqueduct – Roberto Cortez 209-946-8009 Manager of Wtr. and Recreation – Kent Lambert 209-772-8203 Director of Ops. & Maintenance – Mike Wallis 510-287-1615 If the person contacted from the list above determines the EAP should be invoked, notify (see EAP for current numbers): STATE & FEDERAL: California Emergency Management Agency (formerly OES) State Division of Safety of Dams California Highway Patrol Federal Energy Regulatory Commission U.S. Army Corps of Engineers LOCAL AGENCIES: San Joaquin County Sheriff's Office San Joaquin County Office of Emergency Services Amador County Office of Emergency Services Amador County Sheriff's Office Calaveras County Office of Emergency Services Calaveras County Sheriff's Office Jackson Valley Irrigation District Sacramento County Office of Emergency Services City of Lodi, City Manager's Office State Flood Center P.G.&E. Tiger Creek Powerhouse Off Hours: Refer to Standby On-Call Supervisor List	The Watershed and Recreation Division staff member initially notified will immediately notify (see EAP for current numbers): Pardee Recreation Area Camanche South Shore Recreation Area Camanche North Shore Recreation Area Mokelumne River Fish Facility Camanche Hills Hunting Preserve When contacted, Mokelumne River Fish Facility personnel will immediately notify the users of the Mokelumne River Day Use Area. When contacted, Jackson Valley Irrigation District personnel will immediately notify the recreation users of Lake Amador. When notified, the Office of Emergency Services and Sheriffs' Offices for the counties of San Joaquin, Amador, Calaveras, Sacramento, and the State Flood Center will immediately notify all affected downstream agencies and the public. REGULATORY COMPLIANCE/ EMERGENCY PREPAREDNESS OFFICES CONTACTS Notify Environmental Compliance as necessary. See attached Emergency Notification Flowchart for numbers.

Type of Emergency	Initial (Field) Contact(s)	Post-Assessment Notification (Secondary Field, Management, Emergency Preparedness & Regulatory Compliance Office)
6. SEARCH AND RESCUE Possible scenarios: • Missing swimmer • Missing person • River rescue • Vessel in distress	Call 911 as necessary if not already called Call Watershed & Recreation Division in all instances: All Hours: Call Resource Patrol Unit (RPU) RPU Supervisor, Tim Cox Office: 209-772-8256 Cell: 209-610-0898 Radio: 3830, channel 4 Home: 209-754-0604 -OR- RPU Senior Ranger, Greg Persons Office: 209-772-8307 Cell: 209-202-1627 Radio: 3831, channel 4	<u>SECONDARY FIELD CONTACTS (Per Incident Commander)</u> Usually none but respond as requested by Incident Commander MANAGEMENT CONTACTS Notify Watershed & Recreation Management first. The first management contact notified will be responsible for notifying other management personnel as necessary. See attached Emergency Notification Flowchart for numbers. If District employee(s) involved, notify employee's supervisor and/or manager. REGULATORY COMPLIANCE/ EMERGENCY PREPAREDNESS OFFICE CONTACTS Always notify Emergency Preparedness Office to deal with inter-jurisdictional issues whenever search and rescue is needed. Notify Workplace Health & Safety as necessary if District employee involved. See attached Emergency Notification Flowchart for numbers.
7. SEWAGE RELEASE (TO WATER, DRAINAGE CHANNEL, OR GROUND) Possible scenarios: • Broken sewage pipe • Overflow of sewage from manhole • Release from fish cleaning or R/V dump station • Overturned and/or sinking floating outhouse • Release from sewage pond, wastewater pumping plant or spray field • Overflow from Lift Station • RV sewage hose leaking onto ground Reference Attachment #3	If source of spill is equipment or facilities owned, operated or maintained by the District, call Maintenance: Off Hours: Refer to Standby On-Call Supervisor List Working Hours: All W/W events contact: Temporary Staff, Power & Treatment Plant Maintenance Supervisor Office: 209-772-8348 Cell: 209-969-3900 Radio: 7014, channel 4 AND: For power plant-related events contact: Dave Oldham, Power & Treatment Plant Maintenance Supervisor Office: 209-772-8213 Nextel: 209-684-5036 Radio: 7018, channel 4	<u>SECONDARY FIELD CONTACTS (Per Incident Commander)</u> NOTE: If release is to the environment (not fully contained within a building) incident commander should request notification of: Water Quality Unit to assess water quality impacts • Tony Boitano, Water & Wastewater Supervisor Office: 209-772-8368 Home: 209-286-1605 Cell: 209-304-8677 Radio: 7016, channel 4 • John C. Johnson, Assistant Superintendent Office: 209-772-8267 Cell: 209-601-5193 Radio: 7011, channel 4 AND: Fisheries and Wildlife to assess fish and/or wildlife impacts • Jose Setka, Supervising F/W Biologist Office: 209-365-1467 Cell: 510-517-2169 Radio: 3820, channel 4 Home: 707-678-2612

Type of Emergency	Initial (Field) Contact(s)	Post-Assessment Notification (Secondary Field, Management, Emergency Preparedness & Regulatory Compliance Office)
	For non-power plant-related events contact: Todd Cearley, Power & Treatment Plant Maintenance Supervisor Office: 209-772-8212 Cell: 209-601-5298 Radio: 7013, channel 4 If Operations assistance needed contact: John C. Johnson, Assistant Superintendent Office: 209-772-8267 Cell: 209-601-5193 Radio: 7011, channel 4 <i>AND:</i> If release is at any of the recreation areas or impacting watershed lands, call Watershed & Recreation Division, Resource Patrol Unit (RPU). All Hours: RPU Supervisor, Tim Cox Office: 209-772-8256 Cell: 209-610-0898 Radio: 3830, channel 4 Home: 209-754-0604 -OR- RPU Senior Ranger, Greg Persons Office: 209-772-8307 Cell: 209-202-1627 Radio: 3831, channel 4	MANAGEMENT CONTACTS Notify Pardee Section management first if spill involves a District facility that is not a recreation area. Notify Watershed & Recreation management first if spill is at a recreation area. The first management contact notified will be responsible for notifying other management personnel as necessary. See attached Emergency Notification Flowchart for numbers. REGULATORY COMPLIANCE/ EMERGENCY PREPAREDNESS OFFICE CONTACTS • 24 hour emergency pager 510-437-7363 Notify Environmental Compliance immediately so that regulatory agency notifications can be made within the required time (WITHIN 2 HOURS of discovery). If emergency assessment; containment; and/or cleanup resources are beyond those available contact Environmental Compliance so that post-emergency cleanup activities arrangements can be made. Environmental Compliance will be responsible for notifying Workplace Health & Safety and Emergency Preparedness unless the PACC operator requires specific information from these units in which case they may be contacted directly. In any case, both Workplace Health & Safety and Emergency Preparedness should <u>always</u> be notified. See attached Emergency Notification Flowchart for numbers.
8. Structural Fire / Vehicle or Boat Fire (with or without hazardous materials) Possible sources: • Any incident on or nearby EBMUD property with potential to threaten life and/or property	Call 911, if not already called. If at a recreation area or impacting watershed lands, call Watershed & Recreation Division. All Hours: Call Resource Patrol Unit (RPU). RPU Supervisor, Tim Cox Office: 209-772-8256 Cell: 209-610-0898 Radio: 3830, channel 4 Home: 209-754-0604	<u>SECONDARY FIELD CONTACTS (Per Incident Commander)</u> Usually none but respond as requested by Incident Commander MANAGEMENT CONTACTS If at a recreation area, notify Watershed and Recreation management first; otherwise notify Pardee Section management first. The first management contact notified will be responsible for notifying other management personnel as necessary. See attached Emergency Notification Flowchart for numbers.

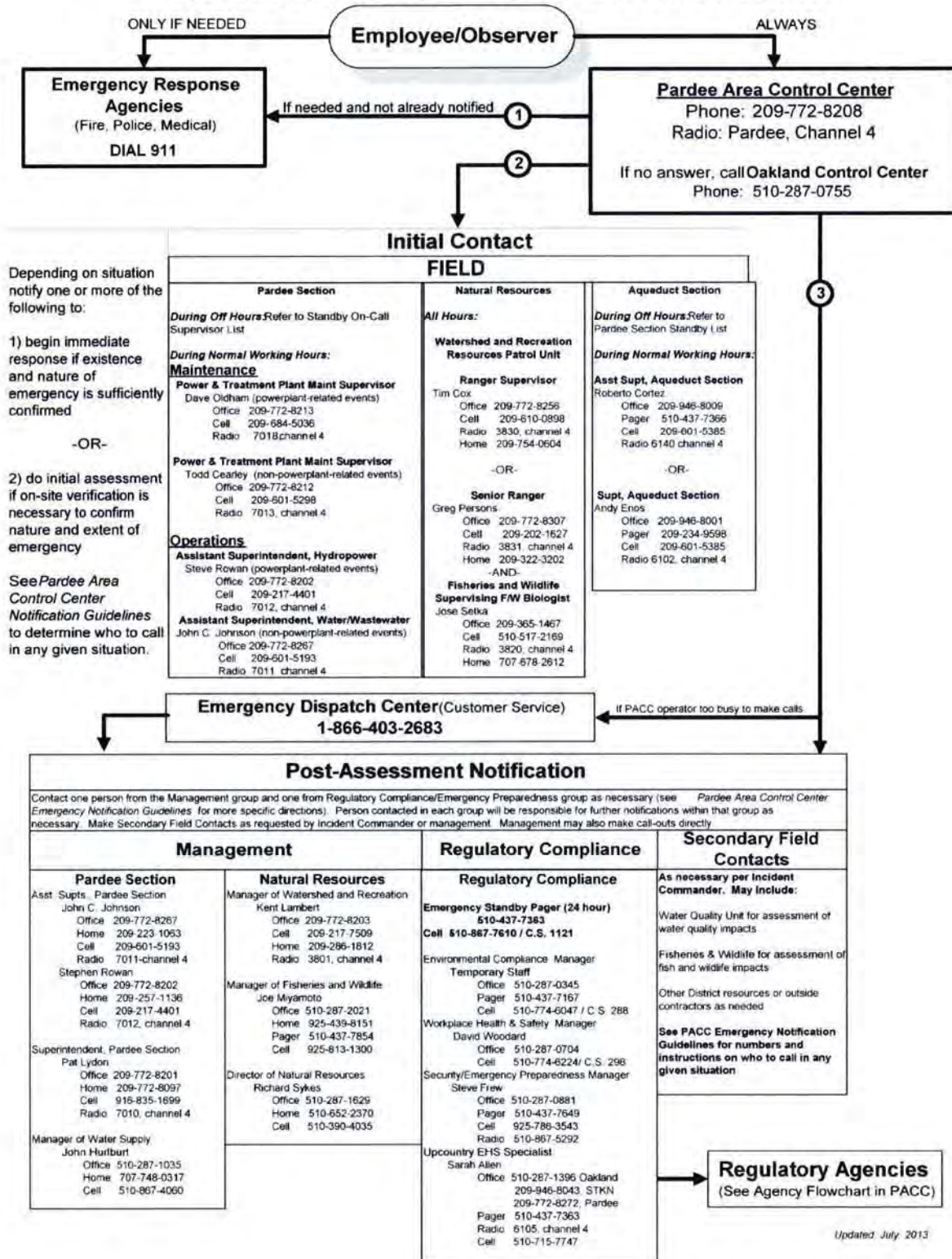
Type of Emergency	Initial (Field) Contact(s)	Post-Assessment Notification (Secondary Field, Management, Emergency Preparedness & Regulatory Compliance Office)
	-OR- RPU Senior Ranger, Greg Persons Office: 209-772-8307 Cell: 209-202-1627 Radio: 3831, channel 4	REGULATORY COMPLIANCE/ EMERGENCY PREPAREDNESS OFFICES CONTACTS Notify Regulatory Compliance and Emergency Preparedness Offices only as necessary. See attached Emergency Notification Flowchart for numbers.
9. WATER/ WASTEWATER TREATMENT PROCESS UPSET Possible scenarios: • Shutdown of water plant chlorination system • Zero chlorine residual in water distribution system • High turbidity event which results in treated water turbidity in excess of regulated limits • High flows in the wastewater collection system that result in upset of wastewater treatment process units • WW pond freeboard exceedance or potential threat of • Loss of power which results in treatment process unit upsets • Notification from District lab of either a Total Coliform Rule or a Nitrate/Nitrite Rule exceedance • Water system outage or diminished pressure caused by water supply shortage, extended power failure or catastrophic treatment/distribution system failure Reference attachments #3, #4, #5, and #6	Notify Water Quality Unit Supervisor first: Tony Boitano, Water & Wastewater Supervisor Office: 209-772-8368 Home: 209-286-1605 Cell: 209-304-8677 Radio: 7016, channel 4 John C. Johnson, Assistant Superintendent Office: 209-772-8267 Cell: 209-601-5193 Radio: 7011, channel 4 If maintenance assistance is needed call: Off Hours: Refer to Standby On-Call Supervisor List Working Hours: All water treatment events contact: Todd Cearley, Power & Treatment Plant Maintenance Supervisor Office: 209-772-8212 Cell: 209-601-5298 Radio: 7013, channel 4 All wastewater treatment events contact: Temporary Staff, Power & Treatment Plant Maintenance Supervisor Office: 209-772-8348 Cell: 209-969-3900 Radio: 7014, channel 4	<u>SECONDARY FIELD CONTACTS (Per Incident Commander)</u> NOTE: If there is a discharge from the water or wastewater treatment process to the environment (not fully contained within a building) the incident commander should request notification of: Fisheries and Wildlife to assess fish and/or wildlife impacts. • Jose Setka, Supervising F/W Biologist Office: 209-365-1467 Pager: 510-540-4048 Radio: 3820, channel 4 MANAGEMENT CONTACTS Notify Pardee Section management first. The first management contact notified will be responsible for notifying other management personnel as necessary. See attached Emergency Notification Flowchart for numbers. REGULATORY COMPLIANCE/EMERGENCY PREPAREDNESS OFFICE CONTACTS • 24 hour emergency pager 510-437-7363 Notify Environmental Compliance immediately so that regulatory agency notifications can be made within the required time (WITHIN 2 HOURS of discovery). • If emergency assessment; containment; and/or cleanup resources are beyond those available contact Environmental Compliance so that post-emergency cleanup activities arrangements can be made. • Environmental Compliance will be responsible for notifying Workplace Health & Safety and Emergency Preparedness unless the ACC operator requires specific information from these units in which case they may be contacted directly. • <u>In any case, both Workplace Health & Safety and Emergency Preparedness should always be notified.</u> See attached Emergency Notification Flowchart for numbers.

Type of Emergency	Initial (Field) Contact(s)	Post-Assessment Notification (Secondary Field, Management, Emergency Preparedness & Regulatory Compliance Office)
10. WILDLAND FIRE Possible sources: - Any incident on or nearby EBMUD property with potential to threaten life and/or property - Local/regional fire with potential to spread onto EBMUD property	Call 911, if not already notified. All Hours: Call Resource Patrol Unit (RPU) RPU Supervisor, Tim Cox Office: 209-772-8256 Cell: 209-610-0898 Radio: 3830, channel 4 Home: 209-754-0604 -or- RPU Senior Ranger, Greg Persons Office: 209-772-8307 Cell: 209-202-1627 Radio: 3831, channel 4	<u>SECONDARY FIELD CONTACTS (Per Incident Commander)</u> Usually none but respond as requested by Incident Commander MANAGEMENT CONTACTS Notify Watershed & Recreation Management first. The first management contact notified will be responsible for notifying other management personnel as necessary. See attached Emergency Notification Flowchart for numbers. REGULATORY COMPLIANCE/ EMERGENCY PREPAREDNESS OFFICE CONTACTS <u>Always</u> notify Emergency Preparedness if fire crosses county lines or involves multiple agencies (the Emergency Preparedness Officer is responsible for dealing with inter-jurisdictional issues). Notify Regulatory Compliance Office as necessary for environmental or workplace health and safety issues. See attached Emergency Notification Flowchart for numbers.

ATTACHMENT LISTING

- #1 Emergency Notification Flowchart**
- #2 EBMUD Emergency Event Report**
- #3 Spill Reporting Requirements Summary**
- #4 California Hazardous Material Spill/Release Notification Guidance**
- #5 Response Procedure for Water System Outage/Pressure Loss**
- #6 Consumer Alert During Water Outages or periods of Low Pressure**

EBMUD MOKELUMNE AREA EMERGENCY NOTIFICATION FLOWCHART



Attachment #2

EBMUD Emergency Event Report

Instructions: This form is to be used by Control Center Staff to record information reported by the observer about any emergency or potential emergency such as fire, medical emergency or release of a hazardous material at any EBMUD facility.

Record all information asked for below, if known. Ask any other questions that appear pertinent but do not delay notifying outside emergency response agencies and EBMUD staff if necessary.

1. Name of person and title (if EBMUD employee) reporting incident, date, and time:

NAME/TITLE: _____ DATE: _____ TIME: _____

2. Location or street address and phone number of person reporting incident:

3. Location of incident (address and nearest cross street to which any emergency response agencies or personnel may need to respond):

4. Type of incident:

Chemical or Waste? Yes _____ No _____ If yes, go to section 5, below.

Fire? Yes _____ No _____ If yes, go to section 6, below.

Medical Emergency? Yes _____ No _____ If yes, go to section 7, below.

Other? Yes _____ No _____ If yes, go to section 8, below.

5. **If Hazardous Chemical or Waste Release:**

a. What is the chemical or waste released (if known)? _____

b. What is the physical state (circle all that apply): Solid, Liquid, Gas, Vapor

c. Quantity of material released (overestimate rather than underestimate) _____

d. Wind speed? _____ (estimate if necessary)

e. Wind direction? Blowing from the _____ to the _____.

f. Is the material contained (circle one)? Yes No

g. Is the material entering or threatening a waterway (circle one)? Yes No

h. Is an evacuation order required (circle one)? Yes No

i. Is medical attention required for anyone (circle one)? Yes No If yes complete section 7.

j. Is a MSDS for the chemical available (circle one)? Yes No

k. What action, if any, has been taken?

- l. Any other pertinent information?

6. If Fire:

- a. Size and nature of fire (if known)?

- b. Has the fire department been notified (circle one)? Yes No Call if not notified
- c. Is the fire department on site (circle one)? Yes No
- d. Wind speed? _____ (estimate if necessary)
- e. Wind direction? Blowing from the _____ to the _____.
- f. What, if any, action has been, is being or will be taken by facility staff or EBMUD personnel?

- g. Are there any hazardous materials stored in the fire area (circle one)? Yes No
- h. What type of, if any, hazardous materials are threatened?

- i. Is an evacuation order required (circle one)? Yes No
- j. Is medical attention required for anyone (circle one)? Yes No If yes complete section 7.
- k. Any other pertinent information?

7. If Medical Emergency:

- a. Nature of injury/illness and number of individuals affected (if known)?

- b. Has emergency medical personnel been notified (circle one)? Yes No Call if not notified
- c. Is emergency medical personnel on site (circle one)? Yes No
- d. What, if any, action has been, is being or will be taken by facility staff or EBMUD personnel?

- e. Have victims been exposed to hazardous materials (circle one)? Yes No
- f. If victims have been exposed, what is the material?

- g. Is a MSDS for the material available (circle one)? Yes No If yes, provide to medical personnel.
- h. Any other pertinent information?

8. If "Other" Type of Incident:

Described in as much detail as possible and determine if notification of emergency response agencies or EBMUD management or support personnel is required. For sanitary sewer overflow(SSO), document the estimated start/end times, estimated flow rate (GPM), estimated volume released and recovered, distance to nearest manhole (upstream and downstream), and direction of flow to a surface drainage channel or receiving water body. Answer questions in other sections as appropriate:

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Attachment #3

SUMMARY OF SEWAGE SPILL REPORTING REQUIREMENTS

Direct Facility Reporting – Water Quality Enforcement Policy

California Water Code Section 13271¹ requires any person who, without regard to intent or negligence, causes or permits any hazardous substance or sewage to be discharged in or on any waters of the state, or discharged or deposited where it is, or probably will be, discharged in or on any waters of the state to notify the Office of Emergency Services of the discharge as specified in that section. The Office of Emergency Services then immediately notifies the appropriate RWQCB and the local health officer and administrator of environmental health of the discharge.

WDRs including NPDES permits, should require regulated facilities to report to the RWQCB by phone within a specified time [within 24 hours], followed by a written report [7-14 days] and/or a discussion in the next Self Monitoring Report, when certain events occur, such as:

- a) Discharges that are not in accordance with WDRs and that pose an immediate public health threat;
- b) Bypass of raw or partially treated sewage or other waste from a treatment unit or discharge of wastewater from a collection system in a manner inconsistent with WDRs;
- c) Treatment unit failure or loss of power that threatens to cause a bypass; and
- d) Any other operational problems that threaten to cause significant violations of WDRs or impacts to receiving waters or public health.

Attachment #4

California Hazardous Material Spill/Release Notification Guidance – OES

All significant spills or threatened releases of hazardous materials, including oil, must be **immediately** reported. Notification should be made by phone, followed by written reports:

- Discharges or threatened discharges of oil in marine waters
- Any spill or other release of one barrel or more of petroleum products at a tank facility
- Discharges of any hazardous substances or sewage, into or on any waters of the state
- Discharges that may threaten or impact water quality
- Discharges of oil or petroleum products, into or on any waters of the state
- Hazardous Liquid Pipeline releases and every rupture, explosion or fire involving a pipeline

¹ Title 23, Waters, Division 3, Chapter 9.2, §2250: (b) For the purposes of Section 13271, an unauthorized discharge is defined to be a discharge, not regulated by waste discharge requirements, of treated, partially treated, or untreated wastewater resulting from the intentional or unintentional diversion of wastewater from a collection, treatment or disposal system.

Attachment #5

Response Procedure for Water System Outage/Pressure Loss

Outages and diminished delivery pressure within public drinking water systems may be brought on by a number of potential causes. Included amongst the potential causes may be: Major failure of breakage of major water main or facility, reduction or loss of raw water supply from an extended drought, dam failure, catastrophic and extended power failure, major contamination of the water supply, and many other causes. All of these potential causes may be precipitated by any number of natural or man-made disaster events such as earthquakes, storms, fires, transportation accidents, acts of terrorism, etc.

If it becomes apparent that continuous delivery of properly and adequately treated and disinfected water has been, or will be, disrupted in any of the four upcountry water systems (CANS, CASS, PACT or PARA), it will be necessary to initiate action to make all required notifications to internal and external authorities and the public; and to initiate response to provide safe water for drinking and non potable use to the service area customers.

- If there is contaminated water has entered the distribution system immediate public notification is the highest priority
- If water system outage or diminished pressure caused by water supply shortage, extended power failure or catastrophic treatment/distribution system failure:
 - All affected customers must be notified as quickly as possible to curtail usage.
 - All non-essential usage should be ceased immediately, and essential usage should be reduced to an absolute minimum. Reduction of water usage and demand to an absolute minimum will greatly extend the duration that the stored treated water and back-up systems can sustain the customer needs.
 - Distribute the District's procedure for Consumer Alert During Water Outages or Periods of Low Pressure Caused by Water Supply Shortages and/or Power Outages, (Attachment #6)
 - This notice should be distributed to all water customers and consumers including: residents, campers and other guests, employees, contractors and vendors.
 - The notice should also be posted in any and all conspicuous locations, particularly near points of potential water usage such as: restrooms, stores, Laundromats, RV dump stations, District and concessionaire offices, on bulletin boards throughout campgrounds and recreation areas, and at the main entry gates. The Mokelumne Office Watershed and Rangers, and Concessionaires should be recruited to distribute and post these notices immediately as Pardee Section staff is responding to deal with the outage /shortage itself.



PUBLIC NOTICE

**CONSUMER ALERT DURING WATER OUTAGES
OR PERIODS OF LOW PRESSURE CAUSED BY WATER SUPPLY
SHORTAGES AND/OR POWER OUTAGES**

Revised October 2010

1. If you are experiencing water outages or low water pressure, immediately discontinue any and all non-essential water usage. This includes all outdoor irrigation and car washing. Minimizing usage will reduce the potential for the water system to lose pressure or completely run out of water. Please notify your water system of the outage or low pressure.
2. If the water looks cloudy or dirty, you should not drink it. Upon return of normal water service, you should flush the hot and cold water lines until the water appears clear and the water quality returns to normal.
3. If you are concerned about the water quality or are uncertain of its safety, you may add eight drops of household bleach to one gallon of water and let it sit for 30 minutes or alternatively, if you are able, water can be boiled for one minute at a rolling boil to ensure its safety.
4. Use of home treatment devices does not guarantee the water supply is safe after low-pressure situations.
5. Do not be alarmed if you experience higher than normal chlorine concentrations in your water supply. The California Department of Public Health (Department) is advising public water utilities to increase chlorine residuals in areas that may be subject to low pressure or outages.
6. The Department has also advised public water systems to increase the bacteriological water quality monitoring of the distribution system in areas subject to low pressure. You may see EBMUD personnel collecting extra samples in your area to provide confirmation that the water is safe. You will be advised if the results of the sampling reveal a water quality problem.
7. Your water system is committed to make certain that an adequate quantity of clean, wholesome, and potable water is delivered to you. We recommend that you discuss the information in this notice with members of your family to ensure that all family members are prepared should water outages or low water pressure occur.

CALIFORNIA ENVIRONMENTAL REPORTING SYSTEM (CERS)
CONSOLIDATED EMERGENCY RESPONSE / CONTINGENCY / SLUG PLAN
Prior to completing this Plan, please refer to the INSTRUCTIONS FOR COMPLETING A CONSOLIDATED CONTINGENCY PLAN

A. FACILITY IDENTIFICATION AND OPERATIONS OVERVIEW

FACILITY ID #		CERS ID	A1.	DATE OF PLAN PREPARATION/REVISION	A2
		10238980		10/3/14	
BUSINESS NAME (Same as Facility Name or DBA - Doing Business As)					3
EBMUD Camanche North Shore Recreation Area					
BUSINESS SITE ADDRESS					103
2000 Camanche Road					
BUSINESS SITE CITY			104.	ZIP CODE	105.
Ione			CA	95640	
TYPE OF BUSINESS (e.g., Painting Contractor)			A3	INCIDENTAL OPERATIONS (e.g., Fleet Maintenance)	
Water Treatment					
THIS PLAN COVERS CHEMICAL SPILLS, FIRES, AND EARTHQUAKES INVOLVING: (Check all that apply)					A5.
☒ 1. HAZARDOUS MATERIALS; ☒ 2. HAZARDOUS WASTES					

B. INTERNAL RESPONSE

INTERNAL FACILITY EMERGENCY RESPONSE WILL OCCUR VIA: (Check all that apply)	B1.
☒ 1. CALLING PUBLIC EMERGENCY RESPONDERS (i.e., 9-1-1)	
☒ 2. CALLING HAZARDOUS WASTE CONTRACTOR (NRC Environmental) or General Environmental Services on-call Contractor (URS Corporation)	
☐ 3. ACTIVATING IN-HOUSE EMERGENCY RESPONSE TEAM	

C. EMERGENCY COMMUNICATIONS, PHONE NUMBERS AND NOTIFICATIONS

Whenever there is an imminent or actual emergency situation such as an explosion, fire, or release, the Emergency Coordinator (or his/her designee when the Emergency Coordinator is on call) shall:

1. Activate internal facility alarms or communications systems, where applicable, to notify all facility personnel.
2. Notify appropriate local authorities (i.e., call 9-1-1).
3. Notify the California Emergency Management Agency at (800) 852-7550.

Before facility operations are resumed in areas of the facility affected by the incident, the emergency coordinator shall notify the California Department of Toxic Substances Control (DTSC), the local Unified Program Agency (UPA), and the local fire department's hazardous materials program that the facility is in compliance with requirements to:

1. Provide for proper storage and disposal of recovered waste, contaminated soil or surface water, or any other material that results from an explosion, fire, or release at the facility; and
2. Ensure that no material that is incompatible with the released material is transferred, stored, or disposed of in areas of the facility affected by the incident until cleanup procedures are completed.

INTERNAL FACILITY EMERGENCY COMMUNICATIONS OR ALARM NOTIFICATION WILL OCCUR VIA: (Check all that apply)	C1.	
☒ 1. VERBAL WARNINGS;	☐ 2. PUBLIC ADDRESS OR INTERCOM SYSTEM;	☒ 3. TELEPHONE;
☐ 4. PAGERS;	☐ 5. ALARM SYSTEM;	☒ 6. PORTABLE RADIO
NOTIFICATIONS TO NEIGHBORING FACILITIES THAT MAY BE AFFECTED BY AN OFF-SITE RELEASE WILL OCCUR BY: (Check all that apply)		
☒ 1. VERBAL WARNINGS;	☐ 2. PUBLIC ADDRESS OR INTERCOM SYSTEM;	☒ 3. TELEPHONE (via CUPA);
☐ 4. PAGERS;	☐ 5. ALARM SYSTEM;	☐ 6. PORTABLE RADIO
EMERGENCY RESPONSE PHONE NUMBERS:	AMBULANCE, FIRE, POLICE AND CHP	9-1-1
	CALIFORNIA EMERGENCY MANAGEMENT AGENCY (CAL/EMA)	(800) 852-7550
	NATIONAL RESPONSE CENTER (NRC)	(800) 424-8802
	POISON CONTROL CENTER	(800) 222-1222
	LOCAL UNIFIED PROGRAM AGENCY (UPA/CUPA) - Amador County OES	(209) 223-6384
OTHER (Specify):		
NEAREST MEDICAL FACILITY / HOSPITAL NAME:		
AGENCY NOTIFICATION PHONE NUMBERS:	CALIFORNIA DEPT. OF TOXIC SUBSTANCES CONTROL (DTSC)	(916) 255-3545
	REGIONAL WATER QUALITY CONTROL BOARD	(916) 464-3291
	U.S. ENVIRONMENTAL PROTECTION AGENCY (US EPA)	(800) 300-2193
	CALIFORNIA DEPT OF FISH AND GAME (DFG)	(831) 649-2817
	U.S. COAST GUARD	(202) 267-2180
	CAL/OSHA	(925) 602-6517
	STATE FIRE MARSHAL	(916) 445-8200
OTHER:		
OTHER:		

D. EMERGENCY CONTAINMENT AND CLEANUP PROCEDURES

SPILL PREVENTION, CONTAINMENT, AND CLEANUP PROCEDURES: (Check all boxes that apply to indicate your procedures for containing spills, releases, fires or explosions; and, preventing and mitigating associated harm to persons, property, and the environment.)

- ☒ 1. MONITOR FOR LEAKS, RUPTURES, PRESSURE BUILD-UP, ETC.;
- ☒ 2. PROVIDE STRUCTURAL PHYSICAL BARRIERS (e.g., Portable spill containment walls);
- ☒ 3. PROVIDE ABSORBENT PHYSICAL BARRIERS (e.g., Pads, pigs, pillows);
- ☐ 4. COVER OR BLOCK FLOOR AND/ OR STORM DRAINS;
- ☒ 5. BUILT-IN BERM IN WORK / STORAGE AREA;
- ☐ 6. AUTOMATIC FIRE SUPPRESSION SYSTEM; only in storage room (room 116)
- ☒ 7. ELIMINATE SOURCES OF IGNITION FOR FLAMMABLE HAZARDS (e.g. Flammable liquids, Propane);
- ☒ 8. STOP PROCESSES AND/OR OPERATIONS;
- ☒ 9. AUTOMATIC / ELECTRONIC EQUIPMENT SHUT-OFF SYSTEM;
- ☒ 10. SHUT-OFF WATER, GAS, ELECTRICAL UTILITIES AS APPROPRIATE;
- ☒ 11. CALL 9-1-1 FOR PUBLIC EMERGENCY RESPONDER ASSISTANCE / MEDICAL AID;
- ☒ 12. NOTIFY AND EVACUATE PERSONS IN ALL THREATENED AREAS;
- ☒ 13. ACCOUNT FOR EVACUATED PERSONS IMMEDIATELY AFTER EVACUATION CALL;
- ☒ 14. PROVIDE PROTECTIVE EQUIPMENT FOR ON-SITE RESPONSE TEAM;
- ☒ 15. REMOVE OR ISOLATE CONTAINERS / AREA AS APPROPRIATE;
- ☒ 16. HIRE LICENSED HAZARDOUS WASTE CONTRACTOR;
- ☒ 17. USE ABSORBENT MATERIAL FOR SPILLS WITH SUBSEQUENT PROPER LABELING, STORAGE, AND HAZARDOUS WASTE DISPOSAL AS APPROPRIATE;
- ☐ 18. SUCTION USING SHOP VACUUM WITH SUBSEQUENT PROPER LABELING, STORAGE, AND HAZARDOUS WASTE DISPOSAL AS APPROPRIATE;
- ☒ 19. WASH / DECONTAMINATE EQUIPMENT W/ CONTAINMENT and DISPOSAL OF EFFLUENT / RINSATE AS HAZARDOUS WASTE;
- ☒ 20. PROVIDE SAFE TEMPORARY STORAGE OF EMERGENCY-GENERATED WASTES;
- ☐ 21. OTHER (Specify):

D1.

D2.

E. FACILITY EVACUATION

THE FOLLOWING ALARM SIGNAL(S) WILL BE USED TO BEGIN EVACUATION OF THE FACILITY (CHECK ALL THAT APPLY):

E1.

- ☒ 1. BELLS / ALARMS;
- ☐ 2. HORNS / SIRENS / AUDIBLE ALARMS;
- ☒ 3. VERBAL (i.e., SHOUTING);
- ☒ 4. OTHER (Specify): radio

E2.

THE FOLLOWING LOCATION(S) IS/ARE EVACUEE EMERGENCY ASSEMBLY AREA(S) (i.e., Front parking lot, specific street corner, etc.)

E3.

See attached Evacuation Map

Note: The Emergency Coordinator must account for all on site employees and/or site visitors after evacuation.

- ☒ EVACUATION ROUTE MAP(S) POSTED AS REQUIRED

E4.

Note: The map(s) must show primary and alternate evacuation routes, emergency exits, and primary and alternate staging areas, and must be prominently posted throughout the facility in locations where it will be visible to employees and visitors.

F. ARRANGEMENTS FOR EMERGENCY SERVICES

Explanation of Requirement: Advance arrangements with local fire and police departments, hospitals, and/or emergency services contractors should be made as appropriate for your facility. You may determine that such arrangements are not necessary.

ADVANCE ARRANGEMENTS FOR LOCAL EMERGENCY SERVICES (Check one of the following)

F1.

- ☐ 1. HAVE BEEN DETERMINED NOT NECESSARY; or
- ☒ 2. THE FOLLOWING ARRANGEMENTS HAVE BEEN MADE (Specify):

F2.

The Regulatory Compliance Office maintains staff on-call 24-hours a day (pager is 510-437-7363). The standby person is authorized to activate the on-call emergency contract responder at anytime to provide response, conduct spill cleanup, and/or perform other related tasks, as needed.

G. EMERGENCY EQUIPMENT

Check all boxes that apply to list emergency response equipment available at the facility and identify the location(s) where the equipment is kept and the equipment's capability, if applicable. [e.g., ☒ CHEMICAL PROTECTIVE GLOVES | Spill response kit | One time use, Oil & solvent resistant only.]

TYPE	EQUIPMENT AVAILABLE ^{G1}	LOCATION	CAPABILITY (If applicable)
Safety and First Aid	1. ☒ CHEMICAL PROTECTIVE SUITS, APRONS, OR VESTS	Water treatment Facility	G2
	2. ☒ CHEMICAL PROTECTIVE GLOVES	Water treatment Facility	G4
	3. ☒ CHEMICAL PROTECTIVE BOOTS	Water treatment Facility	G6
	4. ☒ SAFETY GLASSES / GOGGLES / SHIELDS	Water treatment Facility	G8
	5. ☒ HARD HATS	Water treatment Facility	G10
	6. ☐ CARTRIDGE RESPIRATORS		G12
	7. ☐ SELF-CONTAINED BREATHING APPARATUS (SCBA)		G14
	8. ☒ FIRST AID KITS / STATIONS	Throughout facility	G16
	9. ☒ PLUMBED EYEWASH FOUNTAIN / SHOWER	Water treatment Facility	G18
	10. ☐ PORTABLE EYEWASH KITS		G20
	11. ☐ OTHER		G22
	12. ☐ OTHER		G24
Fire Fighting	13. ☒ PORTABLE FIRE EXTINGUISHERS	Throughout facility & in District vehicles	G26
	14. ☐ FIXED FIRE SYSTEMS / SPRINKLERS / FIRE HOSES	)	G28
	15. ☐ FIRE ALARM BOXES OR STATIONS		G30
	16. ☐ OTHER		G32
Spill Control and Clean-Up	17. ☒ ALL-IN-ONE SPILL KIT	Water treatment Facility	G34
	18. ☐ ABSORBENT MATERIAL		G36
	19. ☐ CONTAINER FOR USED ABSORBENT		G38
	20. ☐ BERMING / DIKING EQUIPMENT		G40
	21. ☒ BROOM		G42
	22. ☒ SHOVEL		G44
	23. ☐ SHOP VAC		G46
	24. ☐ EXHAUST HOOD		G48
	25. ☒ EMERGENCY SUMP / HOLDING TANK	Water Treatment Facility	G50
	26. ☐ CHEMICAL NEUTRALIZERS		G52
	27. ☐ GAS CYLINDER LEAK REPAIR KIT		G54
	28. ☐ SPILL OVERPACK DRUMS		G56
Communications and Alarm Systems	29. ☒ OTHER – Hazardous Waste Storage Locker	See Facility Diagram	G58
	30. ☒ TELEPHONES (Includes cellular)	Throughout facility	G60
	31. ☐ INTERCOM / PA SYSTEM		G62
	32. ☒ PORTABLE RADIOS		G64
	33. ☒ AUTOMATIC ALARM CHEMICAL MONITORING EQUIPMENT		G66
	34. ☐ OTHER – Emergency generator		G68
	35. ☐ OTHER – Emergency lighting		G70

H. EARTHQUAKE VULNERABILITY

Identify areas of the facility that are vulnerable to hazardous materials releases / spills due to earthquake-related motion. These areas require immediate isolation and inspection.

VULNERABLE AREAS: (Check all that apply)

- ☒ 1. HAZARDOUS MATERIALS / WASTE STORAGE AREA
☒ 2. PROCESS LINES / PIPING
☐ 3. LABORATORY
☐ 4. WASTE TREATMENT AREA

H1. LOCATIONS (e.g., shop, outdoor shed, forensic lab)

H2.

H3.

H4.

H5.

Identify mechanical systems vulnerable to releases / spills due to earthquake-related motion. These systems require immediate isolation and inspection.

VULNERABLE SYSTEMS: (Check all that apply)

- ☒ 1. SHELVES, CABINETS AND RACKS
☒ 2. TANKS (EMERGENCY SHUTOFF)
☐ 3. PORTABLE GAS CYLINDERS
☐ 4. EMERGENCY SHUTOFF AND/OR UTILITY VALVES
☐ 5. SPRINKLER SYSTEMS
☐ 6. STATIONARY PRESSURIZED CONTAINERS (e.g., Propane dispensing tank)

H6. LOCATIONS

H7.

H8.

H9.

H10.

H11.

H12.

I. EMPLOYEE TRAINING

Explanation of Requirement: Employee training is required for all employees handling hazardous materials and hazardous wastes in day-to-day or clean-up operations including volunteers and/or contractors. Training must be:

- Provided within 6 months for new hires;
- Amended as necessary prior to change in process or work assignment;
- Given upon modification to the Emergency Response / Contingency Plan, and updated/refreshed annually for all employees.

Required content includes all of the following:

- Material Safety Data Sheets;
- Hazard communication related to health and safety;
- Methods for safe handling of hazardous substances;
- Fire hazards of materials / processes;
- Conditions likely to worsen emergencies;
- Coordination of emergency response;
- Notification procedures;
- Applicable laws and regulations;
- Communication and alarm systems;
- Personal protective equipment;
- Use of emergency response equipment (e.g. Fire extinguishers, respirators, etc.);
- Decontamination procedures;
- Evacuation procedures;
- Control and containment procedures;
- UST monitoring system equipment and procedures (if applicable).

INDICATE HOW EMPLOYEE TRAINING PROGRAM IS ADMINISTERED (Check all that apply)

I1.

- ☒ 1. FORMAL CLASSROOM; ☐ 2. VIDEOS; ☒ 3. SAFETY / TAILGATE MEETINGS;
☐ 4. STUDY GUIDES / MANUALS (Specify): _____
☐ 5. OTHER (Specify): _____
☐ 6. NOT APPLICABLE BECAUSE FACILITY HAS NO EMPLOYEES

I2.

I3.

Large Quantity Generator (LQG) Training Records: Large quantity hazardous waste generators (i.e., who generate more than 270 gallons/1,000 kilograms of hazardous waste per month) must retain written documentation of employee hazardous waste management training sessions which includes:

- A written outline/agenda of the type and amount of both introductory and continuing training that will be given to persons filling each job position having responsibility for the management of hazardous waste (e.g., labeling, manifesting, compliance with accumulation time limits, etc.).
- The name, job title, and date of training for each hazardous waste management training session given to an employee filling such a job position; and
- A written job description for each of the above job positions that describes job duties and the skills, education, or other qualifications required of personnel assigned to the position.
- Current employee training records must be retained until closure of the facility.
- Former employee training records must be retained at least three years after termination of employment.

J. LIST OF ATTACHMENTS

(Check one of the following)

- ☒ 1. NO ATTACHMENTS ARE REQUIRED; or
☐ 2. THE FOLLOWING DOCUMENTS ARE ATTACHED:

J1.

J2.

K. SIGNATURE / CERTIFICATION

Certification: Based on my inquiry of those individuals responsible for obtaining the information, I certify under penalty of law that I have personally examined and am familiar with the information submitted and believe the information is true, accurate, and complete, and that a copy is available on site.

SIGNATURE OF OWNER/OPERATOR

DATE SIGNED

K1.

NAME OF SIGNER (print)

K2.

TITLE OF SIGNER

K3.

Robert Newman

Sr. Environmental H&S Specialist

CALIFORNIA ENVIRONMENTAL REPORTING SYSTEM (CERS)
CONSOLIDATED EMERGENCY RESPONSE / CONTINGENCY / SLUG PLAN
Prior to completing this Plan, please refer to the INSTRUCTIONS FOR COMPLETING A CONSOLIDATED CONTINGENCY PLAN

A. FACILITY IDENTIFICATION AND OPERATIONS OVERVIEW

FACILITY ID #		CERS ID	A1.	DATE OF PLAN PREPARATION/REVISION	A2.
		10238980		10/3/14	
BUSINESS NAME (Same as Facility Name or DBA - Doing Business As)					3.
EBMUD Camanche North Shore Recreation Area					
BUSINESS SITE ADDRESS					103.
2000 Camanche Road					
BUSINESS SITE CITY			104.	ZIP CODE	105.
lone			CA	95640	
TYPE OF BUSINESS (e.g., Painting Contractor)			A3.	INCIDENTAL OPERATIONS (e.g., Fleet Maintenance)	
Water Treatment					
THIS PLAN COVERS CHEMICAL SPILLS, FIRES, AND EARTHQUAKES INVOLVING: (Check all that apply)					A5.
☒ 1. HAZARDOUS MATERIALS; ☒ 2. HAZARDOUS WASTES					

B. INTERNAL RESPONSE

INTERNAL FACILITY EMERGENCY RESPONSE WILL OCCUR VIA: (Check all that apply)	B1.
☒ 1. CALLING PUBLIC EMERGENCY RESPONDERS (i.e., 9-1-1)	
☒ 2. CALLING HAZARDOUS WASTE CONTRACTOR (NRC Environmental) or General Environmental Services on-call Contractor (URS Corporation)	
☐ 3. ACTIVATING IN-HOUSE EMERGENCY RESPONSE TEAM	

C. EMERGENCY COMMUNICATIONS, PHONE NUMBERS AND NOTIFICATIONS

Whenever there is an imminent or actual emergency situation such as an explosion, fire, or release, the Emergency Coordinator (or his/her designee when the Emergency Coordinator is on call) shall:

1. Activate internal facility alarms or communications systems, where applicable, to notify all facility personnel.
2. Notify appropriate local authorities (i.e., call 9-1-1).
3. Notify the California Emergency Management Agency at (800) 852-7550.

Before facility operations are resumed in areas of the facility affected by the incident, the emergency coordinator shall notify the California Department of Toxic Substances Control (DTSC), the local Unified Program Agency (UPA), and the local fire department's hazardous materials program that the facility is in compliance with requirements to:

1. Provide for proper storage and disposal of recovered waste, contaminated soil or surface water, or any other material that results from an explosion, fire, or release at the facility; and
2. Ensure that no material that is incompatible with the released material is transferred, stored, or disposed of in areas of the facility affected by the incident until cleanup procedures are completed.

INTERNAL FACILITY EMERGENCY COMMUNICATIONS OR ALARM NOTIFICATION WILL OCCUR VIA: (Check all that apply)	C1.	
☒ 1. VERBAL WARNINGS;	☐ 2. PUBLIC ADDRESS OR INTERCOM SYSTEM;	☒ 3. TELEPHONE;
☐ 4. PAGERS;	☐ 5. ALARM SYSTEM;	☒ 6. PORTABLE RADIO
NOTIFICATIONS TO NEIGHBORING FACILITIES THAT MAY BE AFFECTED BY AN OFF-SITE RELEASE WILL OCCUR BY: (Check all that apply)		
☒ 1. VERBAL WARNINGS;	☐ 2. PUBLIC ADDRESS OR INTERCOM SYSTEM;	☒ 3. TELEPHONE (via CUPA);
☐ 4. PAGERS;	☐ 5. ALARM SYSTEM;	☐ 6. PORTABLE RADIO
EMERGENCY RESPONSE PHONE NUMBERS:	AMBULANCE, FIRE, POLICE AND CHP	9-1-1
	CALIFORNIA EMERGENCY MANAGEMENT AGENCY (CAL/EMA)	(800) 852-7550
	NATIONAL RESPONSE CENTER (NRC)	(800) 424-8802
	POISON CONTROL CENTER	(800) 222-1222
	LOCAL UNIFIED PROGRAM AGENCY (UPA/CUPA) - Amador County OES.	(209) 223-6384
OTHER (Specify):		
NEAREST MEDICAL FACILITY / HOSPITAL NAME:		
AGENCY NOTIFICATION PHONE NUMBERS:	CALIFORNIA DEPT. OF TOXIC SUBSTANCES CONTROL (DTSC)	(916) 255-3545
	REGIONAL WATER QUALITY CONTROL BOARD	(916) 464-3291
	U.S. ENVIRONMENTAL PROTECTION AGENCY (US EPA)	(800) 300-2193
	CALIFORNIA DEPT OF FISH AND GAME (DFG)	(831) 649-2817
	U.S. COAST GUARD	(202) 267-2180
	CAL/OSHA	(925) 602-6517
	STATE FIRE MARSHAL	(916) 445-8200
OTHER:		
OTHER:		

D. EMERGENCY CONTAINMENT AND CLEANUP PROCEDURES

SPILL PREVENTION, CONTAINMENT, AND CLEANUP PROCEDURES: (Check all boxes that apply to indicate your procedures for containing spills, releases, fires or explosions; and, preventing and mitigating associated harm to persons, property, and the environment.)

- ☒ 1. MONITOR FOR LEAKS, RUPTURES, PRESSURE BUILD-UP, ETC.;
- ☒ 2. PROVIDE STRUCTURAL PHYSICAL BARRIERS (e.g., Portable spill containment walls);
- ☒ 3. PROVIDE ABSORBENT PHYSICAL BARRIERS (e.g., Pads, pigs, pillows);
- ☐ 4. COVER OR BLOCK FLOOR AND/ OR STORM DRAINS;
- ☒ 5. BUILT-IN BERM IN WORK / STORAGE AREA;
- ☐ 6. AUTOMATIC FIRE SUPPRESSION SYSTEM; only in storage room (room 116)
- ☒ 7. ELIMINATE SOURCES OF IGNITION FOR FLAMMABLE HAZARDS (e.g. Flammable liquids, Propane);
- ☒ 8. STOP PROCESSES AND/OR OPERATIONS;
- ☒ 9. AUTOMATIC / ELECTRONIC EQUIPMENT SHUT-OFF SYSTEM;
- ☒ 10. SHUT-OFF WATER, GAS, ELECTRICAL UTILITIES AS APPROPRIATE;
- ☒ 11. CALL 9-1-1 FOR PUBLIC EMERGENCY RESPONDER ASSISTANCE / MEDICAL AID;
- ☒ 12. NOTIFY AND EVACUATE PERSONS IN ALL THREATENED AREAS;
- ☒ 13. ACCOUNT FOR EVACUATED PERSONS IMMEDIATELY AFTER EVACUATION CALL;
- ☒ 14. PROVIDE PROTECTIVE EQUIPMENT FOR ON-SITE RESPONSE TEAM;
- ☒ 15. REMOVE OR ISOLATE CONTAINERS / AREA AS APPROPRIATE;
- ☒ 16. HIRE LICENSED HAZARDOUS WASTE CONTRACTOR;
- ☒ 17. USE ABSORBENT MATERIAL FOR SPILLS WITH SUBSEQUENT PROPER LABELING, STORAGE, AND HAZARDOUS WASTE DISPOSAL AS APPROPRIATE;
- ☐ 18. SUCTION USING SHOP VACUUM WITH SUBSEQUENT PROPER LABELING, STORAGE, AND HAZARDOUS WASTE DISPOSAL AS APPROPRIATE;
- ☒ 19. WASH / DECONTAMINATE EQUIPMENT W/ CONTAINMENT and DISPOSAL OF EFFLUENT / RINSATE AS HAZARDOUS WASTE;
- ☒ 20. PROVIDE SAFE TEMPORARY STORAGE OF EMERGENCY-GENERATED WASTES;
- ☐ 21. OTHER (Specify):

D1.

D2.

E. FACILITY EVACUATION

THE FOLLOWING ALARM SIGNAL(S) WILL BE USED TO BEGIN EVACUATION OF THE FACILITY (CHECK ALL THAT APPLY):

E1.

- ☒ 1. BELLS / ALARMS;
- ☐ 2. HORNS / SIRENS / AUDIBLE ALARMS;
- ☒ 3. VERBAL (i.e., SHOUTING);
- ☒ 4. OTHER (Specify): radio

E2.

THE FOLLOWING LOCATION(S) IS/ARE EVACUEE EMERGENCY ASSEMBLY AREA(S) (i.e., Front parking lot, specific street corner, etc.)

E3.

See attached Evacuation Map

Note: The Emergency Coordinator must account for all on site employees and/or site visitors after evacuation.

- ☒ EVACUATION ROUTE MAP(S) POSTED AS REQUIRED

E4.

Note: The map(s) must show primary and alternate evacuation routes, emergency exits, and primary and alternate staging areas, and must be prominently posted throughout the facility in locations where it will be visible to employees and visitors.

F. ARRANGEMENTS FOR EMERGENCY SERVICES

Explanation of Requirement: Advance arrangements with local fire and police departments, hospitals, and/or emergency services contractors should be made as appropriate for your facility. You may determine that such arrangements are not necessary.

ADVANCE ARRANGEMENTS FOR LOCAL EMERGENCY SERVICES (Check one of the following)

F1.

- ☐ 1. HAVE BEEN DETERMINED NOT NECESSARY; or
- ☒ 2. THE FOLLOWING ARRANGEMENTS HAVE BEEN MADE (Specify):

F2.

The Regulatory Compliance Office maintains staff on-call 24-hours a day (pager is 510-437-7363). The standby person is authorized to activate the on-call emergency contract responder at anytime to provide response, conduct spill cleanup, and/or perform other related tasks, as needed.

G. EMERGENCY EQUIPMENT

Check all boxes that apply to list emergency response equipment available at the facility and identify the location(s) where the equipment is kept and the equipment's capability, if applicable. [e.g., ☒ CHEMICAL PROTECTIVE GLOVES | Spill response kit | One time use, Oil & solvent resistant only.]

TYPE	EQUIPMENT AVAILABLE ^{G1}	LOCATION	CAPABILITY (If applicable)
Safety and First Aid	1. ☒ CHEMICAL PROTECTIVE SUITS, APRONS, OR VESTS	Water treatment Facility ^{G2}	^{G3}
	2. ☒ CHEMICAL PROTECTIVE GLOVES	Water treatment Facility ^{G4}	^{G5}
	3. ☒ CHEMICAL PROTECTIVE BOOTS	Water treatment Facility ^{G6}	^{G7}
	4. ☒ SAFETY GLASSES / GOGGLES / SHIELDS	Water treatment Facility ^{G8}	^{G9}
	5. ☒ HARD HATS	Water treatment Facility ^{G10}	^{G11}
	6. ☐ CARTRIDGE RESPIRATORS	^{G12}	^{G13}
	7. ☐ SELF-CONTAINED BREATHING APPARATUS (SCBA)	^{G14}	^{G15}
	8. ☒ FIRST AID KITS / STATIONS	Throughout facility ^{G16}	^{G17}
	9. ☒ PLUMBED EYEWASH FOUNTAIN / SHOWER	Water treatment Facility ^{G18}	^{G19}
	10. ☐ PORTABLE EYEWASH KITS	^{G20}	^{G21}
	11. ☐ OTHER	^{G22}	^{G23}
	12. ☐ OTHER	^{G24}	^{G25}
Fire Fighting	13. ☒ PORTABLE FIRE EXTINGUISHERS	Throughout facility & in District vehicles ^{G26}	^{G27}
	14. ☐ FIXED FIRE SYSTEMS / SPRINKLERS / FIRE HOSES	) ^{G28}	^{G29}
	15. ☐ FIRE ALARM BOXES OR STATIONS	^{G30}	^{G31}
	16. ☐ OTHER	^{G32}	^{G33}
Spill Control and Clean-Up	17. ☒ ALL-IN-ONE SPILL KIT	Water treatment Facility ^{G34}	^{G35}
	18. ☐ ABSORBENT MATERIAL	^{G36}	^{G37}
	19. ☐ CONTAINER FOR USED ABSORBENT	^{G38}	^{G39}
	20. ☐ BERMING / DIKING EQUIPMENT	^{G40}	^{G41}
	21. ☒ BROOM	^{G42}	^{G43}
	22. ☒ SHOVEL	^{G44}	^{G45}
	23. ☐ SHOP VAC	^{G46}	^{G47}
	24. ☐ EXHAUST HOOD	^{G48}	^{G49}
	25. ☒ EMERGENCY SUMP / HOLDING TANK	Water Treatment Facility ^{G50}	^{G51}
	26. ☐ CHEMICAL NEUTRALIZERS	^{G52}	^{G53}
	27. ☐ GAS CYLINDER LEAK REPAIR KIT	^{G54}	^{G55}
	28. ☐ SPILL OVERPACK DRUMS	^{G56}	^{G57}
Communications and Alarm Systems	29. ☒ OTHER – Hazardous Waste Storage Locker	See Facility Diagram ^{G58}	^{G59}
	30. ☒ TELEPHONES (Includes cellular)	Throughout facility ^{G60}	^{G61}
	31. ☐ INTERCOM / PA SYSTEM	^{G62}	^{G63}
	32. ☒ PORTABLE RADIOS	^{G64}	^{G65}
	33. ☒ AUTOMATIC ALARM CHEMICAL MONITORING EQUIPMENT	^{G66}	^{G67}
	34. ☐ OTHER – Emergency generator	^{G68}	^{G69}
	35. ☐ OTHER – Emergency lighting	^{G70}	^{G71}

H. EARTHQUAKE VULNERABILITY

Identify areas of the facility that are vulnerable to hazardous materials releases / spills due to earthquake-related motion. These areas require immediate isolation and inspection.

VULNERABLE AREAS: (Check all that apply)

- ☒ 1. HAZARDOUS MATERIALS / WASTE STORAGE AREA
☒ 2. PROCESS LINES / PIPING
☐ 3. LABORATORY
☐ 4. WASTE TREATMENT AREA

H1. LOCATIONS (e.g., shop, outdoor shed, forensic lab)

H2

H3

H4

H5

Identify mechanical systems vulnerable to releases / spills due to earthquake-related motion. These systems require immediate isolation and inspection.

VULNERABLE SYSTEMS: (Check all that apply)

- ☒ 1. SHELVES, CABINETS AND RACKS
☒ 2. TANKS (EMERGENCY SHUTOFF)
☐ 3. PORTABLE GAS CYLINDERS
☐ 4. EMERGENCY SHUTOFF AND/OR UTILITY VALVES
☐ 5. SPRINKLER SYSTEMS
☐ 6. STATIONARY PRESSURIZED CONTAINERS (e.g., Propane dispensing tank)

H6. LOCATIONS

H7

H8

H9

H10

H11

H12

I. EMPLOYEE TRAINING

Explanation of Requirement: Employee training is required for all employees handling hazardous materials and hazardous wastes in day-to-day or clean-up operations including volunteers and/or contractors. Training must be:

- Provided within 6 months for new hires;
- Amended as necessary prior to change in process or work assignment;
- Given upon modification to the Emergency Response / Contingency Plan, and updated/refreshed annually for all employees.

Required content includes all of the following:

- Material Safety Data Sheets;
- Hazard communication related to health and safety;
- Methods for safe handling of hazardous substances;
- Fire hazards of materials / processes;
- Conditions likely to worsen emergencies;
- Coordination of emergency response;
- Notification procedures;
- Applicable laws and regulations;
- Communication and alarm systems;
- Personal protective equipment;
- Use of emergency response equipment (e.g. Fire extinguishers, respirators, etc.);
- Decontamination procedures;
- Evacuation procedures;
- Control and containment procedures;
- UST monitoring system equipment and procedures (if applicable).

INDICATE HOW EMPLOYEE TRAINING PROGRAM IS ADMINISTERED (Check all that apply)

- ☒ 1. FORMAL CLASSROOM; ☐ 2. VIDEOS; ☒ 3. SAFETY / TAILGATE MEETINGS;
☐ 4. STUDY GUIDES / MANUALS (Specify): _____
☐ 5. OTHER (Specify): _____
☐ 6. NOT APPLICABLE BECAUSE FACILITY HAS NO EMPLOYEES

I1

I2

I3

Large Quantity Generator (LQG) Training Records: Large quantity hazardous waste generators (i.e., who generate more than 270 gallons/1,000 kilograms of hazardous waste per month) must retain written documentation of employee hazardous waste management training sessions which includes:

- A written outline/agenda of the type and amount of both introductory and continuing training that will be given to persons filling each job position having responsibility for the management of hazardous waste (e.g., labeling, manifesting, compliance with accumulation time limits, etc.);
- The name, job title, and date of training for each hazardous waste management training session given to an employee filling such a job position; and
- A written job description for each of the above job positions that describes job duties and the skills, education, or other qualifications required of personnel assigned to the position.
- Current employee training records must be retained until closure of the facility.
- Former employee training records must be retained at least three years after termination of employment.

J. LIST OF ATTACHMENTS

(Check one of the following)

- ☒ 1. NO ATTACHMENTS ARE REQUIRED; or
☐ 2. THE FOLLOWING DOCUMENTS ARE ATTACHED:

J1

J2

K. SIGNATURE / CERTIFICATION

Certification: Based on my inquiry of those individuals responsible for obtaining the information, I certify under penalty of law that I have personally examined and am familiar with the information submitted and believe the information is true, accurate, and complete, and that a copy is available on site.

SIGNATURE OF OWNER/OPERATOR

DATE SIGNED

K1

NAME OF SIGNER (print)

K2

TITLE OF SIGNER

K3

Robert Newman

Sr. Environmental H&S Specialist

**Appendix 6-7. Caltrans Stormwater Management
Program, District 10 Work Plan
Excerpts, 2019-2020 (5 pages)**

- Drinking Water Reservoirs and Recharge
- Facilities Slopes Prone to Erosion

California Department of Transportation
Stormwater Management Program
District 10 Work Plan

Fiscal Year

2019-2020

CTSW-RT-18-379.06.2



California Department of Transportation
Division of Environmental Analysis
Stormwater Management Program
1976 E. Dr. Martin Luther King, Jr. Blvd.
Stockton, CA 95206
<http://www.dot.ca.gov/hq/env/stormwater>

October 1, 2018



4 Drinking Water Reservoirs and Recharge Facilities

Section 4 of the DWP describes and identifies the high-risk areas, which are locations where spills or other releases from District-owned rights-of-way, roadways, or facilities may discharge directly to municipal or domestic water supply reservoirs or ground water percolation facilities. Projects that potentially drain to these high-risk areas consider project features that enhance spill response.

Drinking water reservoirs and recharge facilities are areas such as locations where spills from District-owned ROWs or facilities can discharge directly to municipal or domestic water supply reservoirs or ground water percolation facilities. To generate the list of municipal, domestic water supply reservoirs, and ground water percolation facilities, the District first contacted known public and private water supply providers. From the information received, the District determined which facilities were susceptible to a direct spill from a District activity or facility. This determination was based on proximity between the water body and the District's facility, use characteristics of the facility, and the probable spill response time.

When planning projects within these defined areas, District 10 considers project design features for aiding in the prevention of accidental spills that could impact the area; these features are typically commensurate with safety improvements for reducing vehicle accidents. Examples of these features may include, but are not limited to, median barrier, guardrail, signalization, and vehicle restrictions. Features considered for improving spill response time typically include elongated drainage paths, call boxes, signage, or video surveillance.

A list of drinking water reservoirs and recharge facilities within District 10 is presented in Table 4-1.

Table 4-1: District 10 Drinking Water Reservoirs and Recharge Facilities

Road Segment/ Facility	County	Regional Board	Drinking Water Reservoir or Recharge Facility Area	Description	Comments
Route 152 PM 2.5/ 11.0	Merced	5	San Luis Reservoir/O'Neill Forebay	The San Luis Reservoir/O'Neill Forebay provides a domestic water supply source for approximately 3,000 residents of the municipalities of Santa Nella and Dos Palos. The road segment is a heavily used trucking route and accidental spills have the potential to immediately impact the drinking water resource before response actions could be initiated.	No projects are planned within these facilities in the upcoming year.

Road Segment/ Facility	County	Regional Board	Drinking Water Reservoir or Recharge Facility Area	Description	Comments
Route 49 AMA – PM R0.142 CAL – PM 30.820/ 30.865	Amador, Calaveras	5	Pardee Reservoir	Pardee Reservoir is the main water supply reservoir, fed entirely by the Mokelumne River. Pardee Reservoir is located in Amador and Calaveras counties, just west of Highway 49. The Pardee Reservoir spillway is at elevation 568 feet. At high water, the reservoir begins approximately 1 mile downstream from the Highway 49 bridge.	East Bay Municipal Utility District (EBMUD) serves 1.3 million people in Alameda and Contra Costa counties. EBMUD is concerned with the possibility of an accidental spill near the Highway 49 Mokelumne River Bridge that would discharge into the Mokelumne River, which would flow directly and rapidly into Pardee Reservoir.
Route 26 PM 30.000/ 30.23	Calaveras	5	Pardee Reservoir	Pardee Reservoir begins approximately 13 miles downstream from the Highway 26 bridge.	EBMUD is concerned with the possibility of an accidental spill near the Highway 26 South Fork Mokelumne River Bridge that would discharge into the Mokelumne River, which would flow into Pardee Reservoir.
Route 26 PM 33.601/ 33.627	Calaveras	5	Pardee Reservoir	Pardee Reservoir begins approximately 17 miles downstream from the Highway 26 bridge.	EBMUD is concerned with the possibility of an accidental spill near the Highway 26 Middle Fork Mokelumne River Bridge that would discharge into the Mokelumne River, which would flow into Pardee Reservoir.

5 Slopes Prone to Erosion

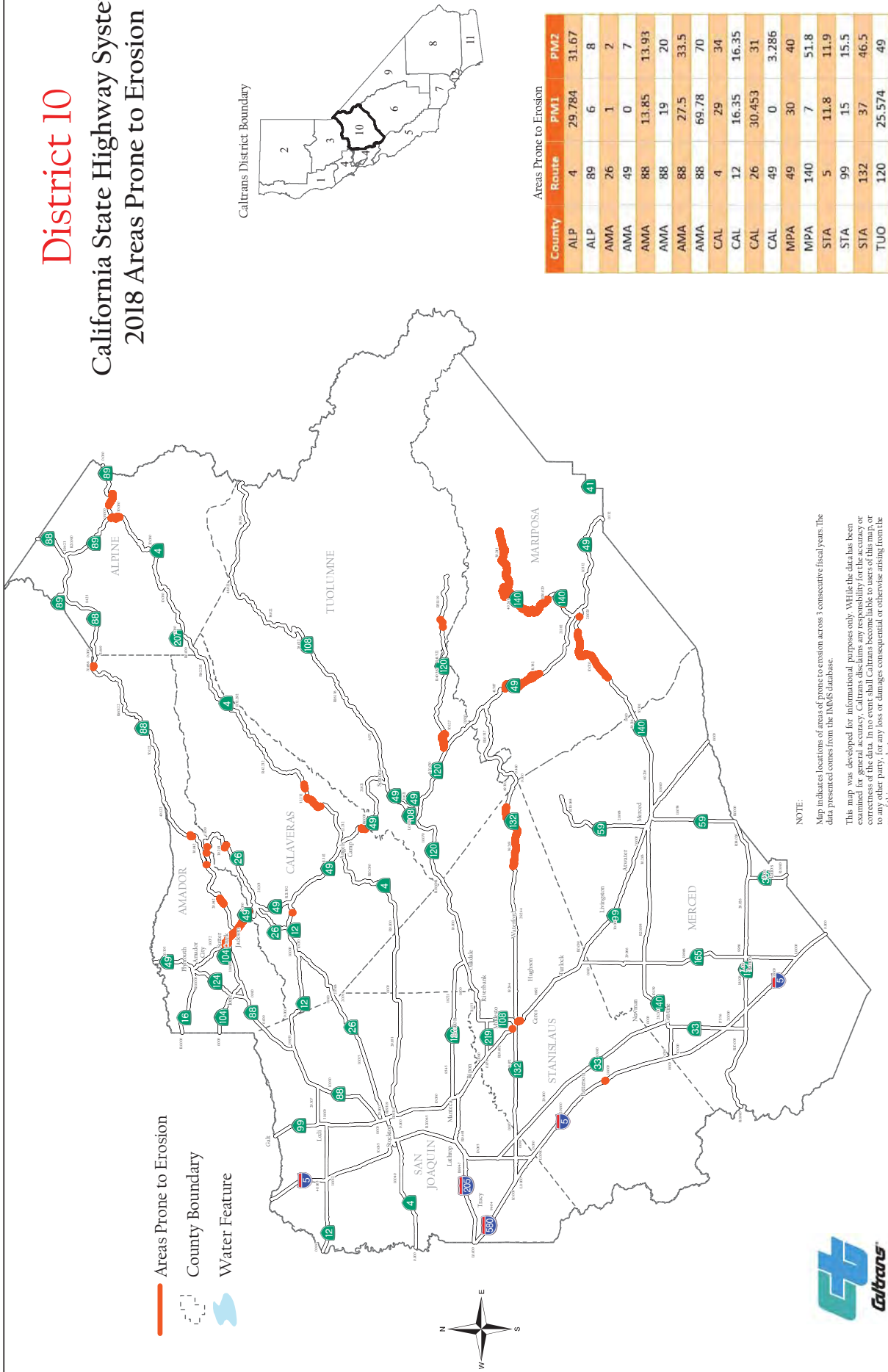
Section 5 of the DWP identifies the road segments within District 10 that have slopes which are prone to erosion and sediment discharge. The road segments that are located in sensitive watersheds, or where there is an existing or potential threat to water quality, will be prioritized for implementing appropriate controls to the maximum extent practicable. In each Annual Report, the status of stabilization activities where applicable will be reported. Table 5-1 is District 10's inventory of vulnerable road segments where erosion occurs and stabilization may be required, or where rock cut slopes are located and rock falls have occurred.

Table 5-1: District 10 Inventory of Road Segments Prone to Erosion

Road Segment	County	Regional Board	Watershed	Scheduled Stabilization Date
Route 26 Post Mile (PM) 0.5	Amador	Central Valley Region 5	Mill Creek-North Fork Mokelumne River	TBD
Route 26 PM 0.9 – 2.5	Amador	Central Valley Region 5	Mill Creek-North Fork Mokelumne River	TBD
Route 12 PM 14.25 – 14.75	Calaveras	Central Valley Region 5	New Hogan Reservoir-Calaveras River	TBD
Route 12 PM 15.97 – 16.97	Calaveras	Central Valley Region 5	New Hogan Reservoir-Calaveras River, Cedar Creek-North Fork Calaveras River	TBD
Route 26A PM 10.8 – 38	Calaveras	Central Valley Region 5	New Hogan Reservoir-Calaveras River, Cosgrove Creek, Pardee Reservoir-Mokelumne River, Cedar Creek-North Fork Calaveras River, Hunt Gulch-Mokelumne River, Rich Gulch-North Fork Calaveras River, Lower South Fork Mokelumne River, Mill Creek-North Fork Mokelumne River	TBD
Route 49 PM 29.934	Calaveras	Central Valley Region 5	Hunt Gulch-Mokelumne River	TBD
Route 49 PM 0 – 0.25	Calaveras	Central Valley Region 5	Mormon Creek-Stanislaus River	TBD
Route 140 PM 29.3 – 51.8	Mariposa	Central Valley Region 5	Bear Creek, Saxon Creek-Merced River, Ned Gulch-Merced River, Moss Creek-Merced River, Crane Creek-Merced River, Indian Creek-Merced River	TBD
Route 99 PM 15.662	Stanislaus	Central Valley Region 5	Town of Riverdale Park-Tuolumne River	TBD
Route 99 PM 16.825	Stanislaus	Central Valley Region 5	Riley Slough	TBD
Route 132 PM 38 – 39	Stanislaus	Central Valley Region 5	Salter Gulch-Tuolumne River	TBD

District 10

California State Highway System 2018 Areas Prone to Erosion



Areas Prone to Erosion

County	Route	PM1	PM2
ALP	4	29,784	31.67
ALP	89	6	8
AMA	26	1	2
AMA	49	0	7
AMA	88	13.85	13.93
AMA	88	19	20
AMA	88	27.5	33.5
AMA	88	69.78	70
CAL	4	29	34
CAL	12	16.35	16.35
CAL	26	30.453	31
CAL	49	0	3,286
MPA	49	30	40
MPA	140	7	51.8
STA	5	11.8	11.9
STA	99	15	15.5
STA	132	37	46.5
TUO	120	25,574	49

NOTE:

Map indicates locations of areas prone to erosion across 3 consecutive fiscal years. The data presented comes from the IAMS database.

This map was developed for informational purposes only. While the data has been examined for general accuracy, Caltrans disclaims any responsibility for the accuracy or correctness of the data. In no event shall Caltrans become liable to users of this map or any other product for any loss or damages consequential or otherwise arising from the use of this map product.



Figure 5-1



State of California
Department of Transportation
Division of Maintenance GIS
July 19, 2018

H:\GIS\Erosion\MXD\Slope-Prone_2018_2018_District10.mxd

**Appendix 6-8. Marijuana Cultivation in the Central Valley :
RWQCB Fact Sheet and Best
Management Practices (5 pages)**



Fact Sheet

Marijuana Cultivation in the Central Valley Threatens Water Quality and Wildlife

Cultivation of marijuana in the Central Valley Region has grown exponentially in recent years, both in the number of grows and the size of grow operations. The growing operations are appearing on both private and public land.

The Central Valley Regional Water Quality Control Board (Central Valley Water Board) is not interested in entering the debate over the legality of growing marijuana in California, other than to note that any growing operation on public land is illegal regardless of the crop. The Central Valley Water Board has jurisdiction over discharges of waste that could affect waters of the State, regardless of what activity is generating the waste. The Central Valley Water Board does not in any way authorize, endorse, sanction, permit or approve the cultivation, use, or sale of marijuana or any other illegal activity.

The Central Valley Water Board has serious concerns about the water quality impacts from the dramatic increase in growing activity on both public and private land.

The Problem

Growers have engaged in a variety of activities that can threaten or damage riparian and aquatic habitat and groundwater, including:

- grading, terracing, dam, and road construction without permits, leading to the filling of streams through erosion and sediment deposition;
- deforestation and habitat fragmentation;
- illegal use of rodenticides, fungicides, herbicides and insecticides;
- use of soil amendments and fertilizers in situations where run off to surface waters may occur;
- discarding of trash and haphazard management of human waste;
- substandard storage of hazardous materials such as diesel and gasoline; and
- unauthorized diversion of water from streams.

These activities impair beneficial uses of waters of the state, from municipal drinking water to swimming, and from agriculture to preserving habitat for endangered fish and wildlife.

Isn't Marijuana Cultivation a Big Economic Boost to the Region?

That may be true, but marijuana growers cannot be allowed to circumvent environmental regulations that other industries must follow. Water quality, fish, and wildlife are public trust assets that shouldn't be sacrificed for private economic gain.



How Big is The Problem?

No one knows the true scope of the increased growing activity and the related quantity of water being diverted from local streams, because most growers do not register or apply for permits from the various agencies involved in protecting water quality, existing water rights, and wildlife.

A Department of Fish and Wildlife study of two small watersheds in Humboldt County that used aerial imagery indicated that the number of acres devoted to marijuana growing almost doubled from 2009 to 2012, with an estimated 550 individual growing operations and 19,000 plants in each watershed. Similar numbers have been reported in watersheds throughout the Central Valley Region.

What's Being Done About It?

Just like any other person who develops their property, marijuana cultivators must first obtain all the appropriate permits to ensure that their site development activities are done in a manner that is consistent with federal, state, and local laws and regulations. The attached information sheet identifies several types of permits that marijuana cultivators may need to obtain before developing their property, and explains some of the steps that marijuana cultivators must take to comply with site development requirements and the state regulations that apply to reporting diversions of water. These permits and requirements apply to *any* site preparation work, regardless of crop.

In addition to these existing laws and regulations, the Central Valley Water Board is also developing a regulatory program designed to ensure that marijuana cultivation activities do not result in adverse water quality impacts. Medicinal marijuana cultivation may eventually become part of the Board's existing Irrigated Lands Regulatory Program, or the Board may develop a different regulatory approach for dealing with marijuana cultivation activities.

The Central Valley Water Board is also increasing the resources that it will devote to investigating and prosecuting marijuana cultivation activities that threaten to impact water quality, aquatic life, or wildlife habitat. Furthermore, it is also worth noting that the Board's regulatory activities can only provide permit coverage for growing operations on private lands; marijuana cultivation on public lands will not be authorized.

The State and Regional Boards, including the North Coast Water Board and the Central Valley Water Board, are committed to helping educate both the public and the cultivators about proper permitting and growing practices in their respective water board regions. Additionally, local, state and federal agencies, including the State and Regional Boards, are working together in task forces to find illegal growing operations and enforce applicable laws.

What Can the Public Do to Help?

The public can help in two ways: making friends and neighbors aware of the issues; and reporting water quality violations they see to the Central Valley Regional Water Quality Control Board.



Fact Sheet

To file an environmental complaint, contact the Central Valley Water Board at the appropriate office listed below:

Sacramento Office

11020 Sun Center Drive, Suite 200
Rancho Cordova, CA 95670-6114
Phone: (916) 464-3291
Fax: (916) 464-4645

Fresno Office

1685 "E" Street
Fresno, CA 93706-2007
Phone: (559) 445-5116
Fax: (559) 445-5910

Redding Office

364 Knollcrest Drive, Suite 205
Redding, CA 96002
Phone: (530) 224-4845
Fax: (530) 224-4857

Or, you can submit an environmental complaint to Cal/EPA via the following web link:

http://www.dtsc.ca.gov/database/CalEPA_Complaint/index.cfm (This site can also be used for water right complaints)

Following is an informational sheet on how to comply with necessary permitting requirements:

To: Interested parties and agencies

SUBJECT: 215 Grow-Related Activities Which May Need a Regional Water Board Permit or Special Planning for Water Quality Protection

The cultivation of marijuana can harm our State's waters if it is not carried out in a responsible manner. If you are planning to develop land to grow marijuana in compliance with State law and local ordinances, there are several agencies you should contact BEFORE you get started. The Central Valley Regional Water Quality Control Board (Central Valley Water Board) is one of the agencies that may need to review and permit the activities associated with your project. The State Water Resources Control Board's Division of Water Rights is another. Before you start developing your property to conduct your growing project, here is a series of questions you should ask yourself to see whether your activities may need a permit from the Central Valley Water Board.

- 1) Will I be doing any work that involves digging or heavy equipment work in a watercourse/wetland or in a location where rain could wash dirt into a year-round or seasonal creek, river, wetland, or wet feature?
- 2) Will I be placing any type of material or structure in a stream, either year-round or seasonal (e.g., stream crossing, culvert, water intake, dam, etc.)?
- 3) Will I be diverting water from a stream?
- 4) Will I be building any roads, landings, terraces or other features that involve placement of earthen fill material on my land?
- 5) Will I be grading, excavating, or otherwise moving earth on my property?
- 6) Will I be using and/or storing pesticides, herbicides, fertilizers, fuel, or other chemicals on my property?
- 7) Will I be generating and/or storing solid waste (e.g., amendment bags, boxes, containers, dead plant material, waste soil, etc.) on my property?

If you have answered yes to questions 1, 2, or 3, you will probably need a permit from the State or Regional Water Board, and we suggest that you contact us at one of the three offices listed above to get further information about how to apply for the appropriate permits. Note that any person who discharges waste to waters of the State without a permit may be subject to enforcement and possible penalties. Information about California water rights is available on the State Water Resources Control Board's Division of Water Rights website at: <http://www.waterboards.ca.gov/waterrights/>. Any diversion and use of water without a water right, and a failure to report the diversion and use of water are also subject to enforcement and penalties.

If you have answered yes to questions 4 or 5, you may need a permit from the Water Board, and your project may harm water quality if not constructed carefully, subjecting you to enforcement and possible penalties. It would be advisable to hire a qualified professional with experience in erosion control to help you design and construct your project in a way that will avoid allowing sediment to get into waterways. We recommend that you contact the Central Valley Water Board to review your project and identify whether your project will need a water quality permit.

Finally, a yes answer to question 6 or 7 will not necessarily require that you get a permit from the Water Board if you manage these materials in such a way that they will not threaten to impact surface waters or groundwater in any way. If impacts do occur, you are subject to liability for the water quality impacts associated with these activities. We recommend that as you design your project, you consider and identify suitable location(s) on your property, possibly within a container or structure, where you can safely contain such materials away from surface and/or ground waters in a manner that eliminates the possibility of discharge.

Dumping or allowing sediment or other wastes to enter surface water, including streams or groundwater is illegal, as is discharging any of the materials noted above to surface water or groundwater. If you have any questions or would like assistance in reviewing your compliance with water quality laws and requirements and/or need for permits, please contact the Central Valley Water Board at (530) 224-4845. Information about the Central Valley Water Board can be found at our website: <http://www.waterboards.ca.gov/centralvalley/>.

Cannabis Cultivation Best Management Practices

These best management practices (BMPs) may help mitigate water pollution from cannabis cultivation activities. We recommend that you consult a professional engineer/contractor before starting an advanced BMP.

LIABLE PARTIES:
Property Owner
Site Caretaker
Property Resident
Construction Contractors

Erosion & Sediments

ISSUE: Poorly maintained or badly constructed roads and excavation sites are a major source of sediment pollution.

BMP SOLUTIONS:

- Minimize disturbed area and protect natural soil.
- Provide temporary cover for disturbed areas that are not being worked on.
- Divert runoff away from unprotected slopes or loose soils.
- Use mats, geotextiles, and erosion control blankets to protect slopes.
- Control the perimeter with silt fences and fiber rolls.
- Install a sediment basin, check dams, or vegetative buffer strips.
- Roughen the surface of a road with gravel.
- Protect ditches and inlet/outlet from erosion with rock armour.
- Plan and design new roads away from watercourses.
- Design roads to allow for sheet flow and use water bars and rolling dips to break up slope length.
- Inspect roads, slopes, and culverts regularly.



Potting Soil, Amendments, Fertilizers, and Pesticides

ISSUE: Potting soil, soil amendments, fertilizers, and pesticides can be mobilized by runoff and be discharged into surface waters.

BMP SOLUTIONS:

- Plant cover crop to boost soil fertility and protect from storm events.
- Follow the manufacturer's suggested application rates.
- Install buffer strips, bio-swales, or vegetation downslope of grow site to filter runoff of chemicals from irrigation.
- Do not apply pesticides. Instead, use safe pesticide alternatives recommended by Department of Pesticide Regulation.
- Implement Integrated Pest Management practices to avoid the need for pest control.
- Store all products that impact water quality in a manner that does not allow for runoff to surface waters.



Housekeeping and Trash

ISSUE: Waste byproduct may impact the environment and water quality.

BMP SOLUTIONS:

- Dispose of solid waste properly.
- Store paint, antifreeze, oil filters, fuels and other miscellaneous items indoors.
- Store other products that may affect water quality indoors.

Water Supply

ISSUE: Diverting stream flow in a manner that negatively impacts beneficial uses and/or senior water rights holders.

BMP SOLUTIONS:

- Obtain appropriate water right permit by filing a water right application with the State Water Resources Control Board, Division of Water Rights to ensure valid basis of water right.
- Install water storage system on site only after you obtain the appropriate permit or registration for water storage from the Division of Water Rights.
- Install rainwater catchment system to reduce demand on streams.
- Implement drip irrigation, mulch, and vegetate around cultivated areas.
- Regularly inspect your water delivery system for leaks.
- Install float valves on tanks to prevent tanks from overflowing.
- Notify the Department of Fish and Wildlife by submitting a Lake and Streambed Alteration (LSA) notification package if the activity involves substantial diversion from, or alteration of a stream or other water body.



Your responsibilities do not stop after BMPs are installed. You should routinely inspect your site.

More Information: State Water Resources Control Board

(916) 341-5272 Erin.Mustain@waterboards.ca.gov

www.waterboards.ca.gov/water_issues/programs/enforcement/cannabis_enforcement.shtml