2025 DENNISTON AND SAN VICENTE WATERSHED SANITARY SURVEY

Prepared for Coastside County Water District

Half Moon Bay, CA

September 2025

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List of Acronyms

CA DDW	California Department of Drinking Water
CCWD	Coastside County Water District
DBP	Disinfection byproduct
EPA	Environmental Protection Agency
GGNRA	Golden Gate National Recreation Area
HAA	Haloacetic acid
LT1ESWTR	Long Term 1 Enhanced Surface Water Treatment Rule
LT2ESWTR	Long Term 2 Enhanced Surface Water Treatment Rule
MCL	Maximum contaminant level
MCLG	Maximum contaminant level goal
mgd	Million gallons per day
mg/L	Milligram per liter
µg/L	Micrograms per liter
mL	Milliliter
MPN/100mL	Most probable number per 100 milliliters
MRDL	Maximum residual disinfection levels
ng/L	Nanograms per liter
NL	Notification level
NOM	Natural organic matter
NPDES	National Pollutant Discharge Elimination System
NTU	Nephelometric turbidity unit
PWS	Public water system
SDWA	Safe drinking water act
SVOC	Semi-volatile organic compound
SWRCB DDW	State Water Resources Control Board Department of Drinking Water
SWTR	Surface Water Treatment Rule
TDS	Total dissolved solids
THM	Trihalomethane

TMDL	Total maximum daily load
TOC	Total organic carbon
USEPA	U.S. Environmental Protection Agency
VOCs	Volatile organic compounds
WSS	Watershed Sanitary Survey
WTP	Water treatment plant

Executive Summary

This 2025 Watershed Sanitary Survey (WSS) of the Denniston and San Vicente Watersheds is prepared for Coastside County Water District (CCWD). The Coastside County Water District (CCWD) serves the City of Half Moon Bay and a part of the unincorporated area of San Mateo County including Miramar, Princeton By The Sea and El Granada. The District's service territory encompasses approximately 14 square miles and 20,000 people. Predominant land use is residential surrounded by agricultural or light ranching activities.

Scope of the Study

The survey evaluates the water quality and potential contaminant sources impacting the Denniston and San Vicente watersheds. The primary water supply systems include the Denniston Water Treatment Plant (WTP) and a proposed diversion from San Vicente Creek, which would convey SV water to the Denniston pump station wet well and then directly delivers the water to the WTP. This survey provides updates on watershed characteristics, land use, and potential environmental risks since the last report, ensuring compliance with state and federal water quality standards.

Background and Watershed Study Areas

The California Surface Water Treatment Rule (SWTR) requires that all domestic water suppliers using surface water conduct a watershed sanitary survey (WSS) of their watersheds, and to update the WSS every five years thereafter. The survey is required to evaluate potential contaminant sources within the watershed that may impact drinking water quality.

The first WSS on the Denniston and San Vicente Watersheds was conducted in 1996 and has been updated every five years since then; however, CCWD was not diverting water from the San Vicente Watershed at the time of the original survey. Therefore, five-year WSS updates were only conducted on the Denniston Watershed. In the near future, CCWD plans to bring a diversion from the San Vicente Creek online. Therefore, both watersheds will be evaluated in this WSS.

The Denniston and San Vicente Watersheds, located in unincorporated San Mateo County, provide surface water for the CCWD. Land use in the area is primarily managed by the Golden Gate National Recreation Area (GGNRA), preserving the watersheds for low-impact activities like hiking and biking. Both watersheds remain largely undeveloped, with agriculture and floriculture limited to specific areas near the lower watershed.

Key Findings:

Land Use and Ownership

Since the last update, there have been no significant changes in land use. GGNRA continues to manage much of the watershed area, while private agricultural operations such as Cabrillo

Farms remain closely monitored. Livestock presence in the San Vicente watershed has not caused any significant water quality issues, but remains a point of surveillance.

- Population: No population other than the residents at Cabrillo Farm reside within the Denniston watershed, and only a handful of residents live within the San Vicente watershed along Christine Road.
- Precipitation and Stream Flow: Annual precipitation ranges between 11 and 25 inches across the watershed, with no major hydrological changes reported.

Potential Contaminant Sources

No significant contamination threats have been detected in either watershed, although continuous monitoring is necessary to manage occasional agricultural runoff and natural events like wildfires or erosion which as discussed below:

- **Agriculture Runoff:**

  The presence of Cabrillo Farms in the Denniston watershed, along with floriculture in the San Vicente watershed, necessitates careful monitoring of fertilizer and pesticide use. The report indicates regular inspections and collaboration with farmers to prevent runoff from contaminating water sources.
- **Wildlife and Livestock:**

  Wildlife such as raccoons, deer, and mountain lions are present but pose minimal risk to water quality. Grazing livestock, while present, are well contained in enclosed pastures downstream of water intakes.
- **Recreational and Unauthorized Activity:**

  Recreational activities remain restricted to low-impact activities (hiking and biking), with no increase in visitor numbers since the last report. Unauthorized activities like illegal dumping were not observed, thanks to secure gates and consistent monitoring.

Emergency and Contingency Planning

The Emergency Communications & Contingency Operation Plan outlines procedures for dealing with water quality problems or service interruptions. Key components include:

- **Water Quality Emergencies:** Protocols for addressing elevated turbidity, low chlorine levels, or other issues are well-defined.
- **Alternative Supply Sources:** In the event of a disruption at the Denniston WTP, alternative water supplies (e.g., Pilarcitos Lake, Crystal Springs Reservoir) are readily available.

Security measures such as locked gates and surveillance around the watershed perimeters are crucial in preventing unauthorized access, which could compromise water quality.

Water Quality Monitoring and Parameters

Monitoring of water quality at the Denniston WTP shows compliance with maximum contaminant levels (MCLs) for key parameters such as turbidity, total organic carbon (TOC), and microbial content (e.g., E.coli and Cryptosporidium). Monitoring water quality over the last five years provided a comprehensive understanding of key parameters which will be discussed briefly below:

1. **Microbiological Indicators**
   Pathogen monitoring focused on E.coli, Cryptosporidium, and Giardia. Results showed consistent compliance with standards, and pathogen levels remained within safe limits.
   - For Denniston Watershed, the monthly median total coliform levels remained within the acceptable range, with no major fluctuations noted since the previous survey.
   - For San Vicente Watershed, the total coliform level appears to be higher than the Denniston Watershed. However, it is still within the same Giardia/Virus log removal requirement category. It is recommended to continue monitoring the coliform level in the San Vicente Watershed.
   - The Cryptosporidium in the Denniston Watershed remained at a similar level since the previous survey.

2. **Disinfection Byproducts (DBPs)**
   Disinfection byproducts, primarily TTHMs and HAA5, are a byproduct of chlorine-based disinfection. DBP formation, particularly trihalomethanes (TTHMs) and haloacetic acids (HAAs), was closely monitored. The Denniston WTP managed to control DBP formation despite occasional exceedances in 2022. DBP levels have been kept within regulatory limits through more efficient chlorine boosting in the distribution system, increased flushing of old water zones, installations of mixers in all storage tanks, and installation of a blower in the Denniston storage tank.

3. **Nutrient Levels**
   Nutrients such as nitrate and phosphorus were regularly monitored, as agricultural runoff poses a potential threat. While nutrient levels stayed within acceptable ranges, the WSS recommends increased sampling during heavy rainfall or peak agricultural periods to detect potential contaminant spikes.

4. **Turbidity Control**
   Turbidity is a key indicator of water clarity and potential contamination. Both daily influent and effluent turbidity levels were well within the safe operational range. The permit requires the Denniston WTP to shut down when the raw water turbidity goes above 50 NTU. As a precaution, CCWD shuts down the plant when the raw water turbidity is beyond 40 NTU.

Recommendations and Mitigation Measures

The following recommendations are the result of the Denniston and San Vicente Watershed Sanitary Survey:

1. Continue to monitor turbidity levels and concentrations of TOC, pathogens, and pesticides in the Denniston Reservoir and San Vicente Creek diversion to determine the impact of stormwater discharges, recreation, and urban and agricultural runoff.
2. Conduct monthly sampling for nutrients like ammonia, nitrate, and phosphorus which will inform the impact of agricultural activities on the water source diversions.
3. Determine potential sources of bacterial and other contamination by:
4. Continue to monitor water quality at the water source diversions to establish baseline water quality data and identify constituents of concern. Conducting annual sampling in the summer rather than winter months to obtain information on contaminants which have summer seasonal usage. For example, pesticides and herbicides sampling should occur during periods of application in the watershed.
5. Continue to develop and maintain relationships between the private landowners in the watershed (Cabrillo Farms and floriculture farms) to better understand and predict impacts of their land use on the watersheds.
6. Continue to inspect and monitor security measures like signs and locked gates around the watershed to prevent unauthorized activity, like dumping.
7. Implement adaptive management practices by reviewing and updating watershed management strategies annually based on the latest data, ensuring that the measures remain effective against emerging threats to water quality.

Conclusions

The 2025 Watershed Sanitary Survey confirms that both the Denniston and San Vicente watersheds are in good conditions, with no major contamination risks. Continuous monitoring, strategic partnerships with landowners, and improvements in security will ensure long-term sustainability and water safety for CCWD customers.

By adhering to the outlined recommendations and reinforcing existing control measures, the Coastside County Water District will continue to meet state and federal standards for water quality, safeguarding the health and well-being of the community.

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1.0 Introduction

This 2025 Watershed Sanitary Survey of the Denniston Creek and San Vicente Creek Watersheds is prepared for CCWD, to fulfill the requirement to conduct a survey every five years, per the Surface Water Treatment Rule.

1.1 Background

The California Surface Water Treatment Rule (SWTR) requires that all domestic water suppliers using surface water conduct a watershed sanitary survey (WSS) of their watersheds, and to update the WSS every five years thereafter. The survey is required to evaluate potential contaminant sources within the watershed that may impact drinking water quality.

CCWD owns and operates the Denniston Water Treatment Plant (WTP) which serves as a critical component of the district's water supply system. The Denniston WTP is a surface water treatment facility located near the Denniston Reservoir, which is its primary raw water source. The Denniston WTP, constructed in 1974, has a current treatment capacity of 1.3 million gallons per day (MGD). Water from the Denniston Reservoir is treated via filtration, disinfection, and chemical processes to meet regulatory standards. The Denniston WTP it a vital source of treated water for the district, particularly during high-demand periods. The plant's treatment system is designed to meet both state and federal drinking water standards, including the removal of turbidity and disinfection by-products, as well as ensuring adequate pathogen removal through filtration and chlorination. A key component of the plant's operation is the daily monitoring of pH, turbidity, and other water quality parameters (such as iron and manganese) to ensure compliance with regulatory requirements. Effluent water from the Denniston WTP consistently meets MCLs for various substances such as iron, manganese, and total dissolved solids (TDS). The first WSS on the Denniston and San Vicente Watersheds was conducted in 1996; however, CCWD was not diverting water from the San Vicente Watershed at the time of the original survey. Therefore, five-year WSS updates were only conducted on the Denniston Watershed. In the near future, CCWD plans to implement a diversion conveying water from San Vicente Creek to the pump station wet well and subsequently to the Denniston WTP. Therefore, both watersheds will be evaluated in this WSS.

1.2 Objectives

The objectives of this Watershed Sanitary Survey are to:

- Meet the SWTR requirements for a watershed sanitary survey;
- Evaluate potential contaminant sources that may impact the quality of the source water;
- Consider contaminant source management in the watershed;

- Analyze available water quality data available;
- Compare trends in contaminant sources and water quality data to the most recent watershed sanitary surveys; and
- Recommend controls and management practices to protect drinking water quality within the watershed.

1.3 Conduct of the Study

HDR prepared the 2025 WSS. The literature survey consisted of collecting and reviewing reports, maps, and public agency file documents, and other available information from government agencies and other stakeholders in the watershed. Additional information was gathered by contacting government agencies and other entities regarding specific facilities and programs in person and electronic communications.

Sampling results for the Denniston Creek, Denniston Reservoir, Denniston WTP influent, Denniston WTP effluent and the San Vicente Creek are the primary data used in the water quality evaluation. HDR conducted a field survey of the Denniston and San Vicente Watersheds in February of 2024. The field surveys included visual inspection of potential impacts to water quality including erosion, runoff, unpermitted encroachments, and land uses. Representative photographs are provided in Appendix A at the end of this document.

1.4 Report Organization

The content and organization of this watershed sanitary survey is consistent with the format recommended in the American Water Works Association California-Nevada Section Watershed Sanitary Survey Guidance Manual (1993). The report is organized according to the following sections:

- Introduction.
- Watershed Study Areas and Water Supply Systems - This section provides an overview of the physical, hydrologic, and land use characteristics of the watershed.
- Potential Contaminant Sources - This section describes the contaminant sources in the watershed and assesses the water quality implications of these sources.
- Water Quality - This section evaluates the source water and finished water quality data that have been collected in the last five years, and recommended monitoring improvements.
- Conclusions and Recommendations - This section contains the key findings from this sanitary survey and recommendations.
- References- A complete list of references used in the preparation of this watershed sanitary survey is included at the end of this report.

One report was prepared for two watersheds because the watersheds are adjacent and similar. Additionally, the Denniston WTP will treat water diverted from both watersheds once the San Vicente connection is brought online.

2.0 Watershed Study Areas and Water Supply Systems

This section outlines and describes the study area for the 2025 Watershed Sanitary Survey. The focus is on the Denniston and San Vicente watersheds, both of which contribute to the Coastside County Water District's (CCWD) water supply system. This report highlights the water quality data and potential source contaminants specific to the two watersheds, with particular attention to land use, natural setting such as topography, geology, soils, landslide susceptibility, seismic information, hydrology, and the water treatment processes in place.

2.1 Watershed Sanitary Survey Study Area Description

The Denniston and San Vicente Watersheds are the areas of interest for this Watershed Sanitary Survey. These watersheds are located in San Mateo County, covering approximately 14 square miles in total. The majority of the land is managed by the Golden Gate National Recreation Area (GGNRA), with a small portion of the land used for agriculture, floriculture, and grazing. The Denniston Watershed covers approximately 5.7 square miles, while the San Vicente Watershed spans about 8.3 square miles. Both watersheds remain largely undeveloped, contributing to high water quality with limited human impact. A figure of the watershed boundaries can be found in Appendix B.

2.1.1 Key Hydrologic Features of the Study Area Include

Denniston Creek flows into the Denniston Reservoir and serves as a primary source of water for the Denniston Water Treatment Plant (WTP). San Vicente Creek will be fully integrated into the water supply system in the next a few years via a diversion into the Denniston Reservoir. The figure in Appendix B shows the locations of Denniston Reservoir, Denniston Creek, San Vicente Creek, and the diversion location on Denniston Creek.

These creeks are critical to the watershed’s ability to supply drinking water. Denniston Creek is the main source water during high demand season (summer). San Vicente Creek only has significant supply during low demand season (winter), while Denniston Creek also has its maximum supply.

The existing water supply from Denniston Reservoir and Denniston Creek watersheds is treated at the Denniston Water Treatment Plant (WTP). The existing Denniston WTP is a pressurized direct filtration WTP that began operating in 1974 with a rated capacity of 1.3 million gallons per day (MGD). The facility includes injection of potassium permanganate for oxidation, injection of polyaluminum chloride (PACL) as a coagulant, a coagulation tank, two contact clarification (CC) basins, three dual-media pressure filters, injection of sodium hypochlorite for disinfection, and

injection of caustic soda (CS) for corrosion control. Treatment residuals are processed onsite using a series of recovery basins and sludge drying beds. The Denniston WTP is currently under the conceptual design phase for converting it into a conventional WTP in the future.

Once the diversion is operational from the San Vicente Creek, the Denniston WTP will also be able to access source water from San Vicente watershed, enhancing the overall supply diversity of the system, further supporting the local population and surrounding communities.

2.2 Watersheds

The following section describes the location and general characteristics of the watershed.

2.2.1 Land Use

The Denniston and San Vicente watersheds are located in an unincorporated portion of the County of San Mateo east of the Half Moon Bay Airport. There have been no significant changes to land use in the Denniston Watershed since the 2021 report.

Besides farming and water supply, both watersheds remains undeveloped. The Golden Gate National Recreation Area (GGNRA) owns the watershed above Denniston Creek for hiking and biking on upland trails, but no horse use is allowed. There is no indication of an increase to the visitor base since 2021. Since the original 1996 WSS, the land use in the San Vicente Watershed has remained the same. The majority of the watershed remains undeveloped with the exception of a small portion of land used for pasture and floriculture as indicated by the watershed map in Appendix B.

2.2.2 Ownership

The land ownership of the Denniston and San Vicente Watershed remains unchanged since the 2021 WSS update. GGNRA took ownership of the majority of the watersheds in 2011 with the mission to preserve the watershed, viewshed, and ecological values through low impact use. CCWD owns a parcel within the watershed on which the Denniston WTP and water storage tank are located. GGNRA also owns the majority of the San Vicente watershed including the hillsides and upper watershed. Private landowners own the valley floor, as shown in the Parcel Map included in Appendix B.

2.2.3 Population

The residents at Cabrillo Fram reside in the Denniston watershed and there are a handful of residences in the San Vicente watershed along Christine Road.

2.2.4 Natural Setting

There have been no changes to the natural setting (including topography, geology, soils, landslide susceptibility, and seismic information) of the Denniston and San Vicente Reservoir since the last update. The topography remains characterized as primarily steep hills with level areas adjacent to the San Vicente and Denniston Creeks. The Denniston and San Vicente watersheds are primarily composed of crystalline granitic rock (Kgr) on the hillsides, which is

mostly quartz diorite and weathered up to 100 feet deep. Midlevel streambeds contain unsorted colluvium (Qsr) with a mix of sand, silt, and gravel, while the main streambeds consist of more sorted alluvium (Qal), made up of loose gravel, sand, silt, and clay. The soil characterization for the hillsides and stream bed area are characterized primarily of coarse sandy loam. The majority of the hillside areas are indicated as “Category II: Low susceptibility to land sliding” and the closest active fault is the Seal Cove Fault, located just west of the Half Moon Bay Airport.

2.2.5 Precipitation and Stream Flow Patterns

The annual precipitation ranges between 11 and 25 inches per year at the lowest and highest elevation of the watersheds, respectively. There has been little change to precipitation patterns in the past decades. Flooding does occur along the San Vicente and Denniston Creek riverbeds, though CCWD has not been required to take action in response to abnormal flooding or drought events in the watersheds since the 100-year flood in 1982 as reported in the original WSS.

2.2.6 Reservoir Characteristics

There have been no changes to the Denniston Reservoir since the last update. CCWD holds a dredging permit for the reservoir, included in Appendix D. Dredging has been used in the past to remove sediment debris and control WTP influent turbidity from the reservoir. There have been no major water quality problems such as taste or odor events or algal blooms since 2021.

Monitoring for Cryptosporidium (Crypto) and Giardia in the Denniston and San Vicente sources has revealed the presence of these pathogens in low concentrations. While the data is limited, it highlights the importance of continued monitoring to ensure water safety. A full analysis of the water quality results can be found later in the Water Quality section of this report.

2.2.7 Wetland Characteristics and Groundwater Recharge

There have been no changes to the wetland characteristics or groundwater recharge in the San Vicente and Denniston Watersheds since the last update. Previous WSS report can be found in Appendix H.

2.3 Water Supply System

2.3.1 History and Supply

There have been no changes to the Denniston Water Supply System since the 2021 report. The service area of the Denniston WTP also remains unchanged. Water from the Denniston WTP is distributed to the northern portion of the service area consisting of the communities of El Granada and Princeton. In certain occasions during the lower demand winter season, Denniston WTP is capable of supplying water into the southern part of the service area, and at times the entire distribution system. The Denniston WTP currently treats water from the Denniston Creek, which supplies Denniston Reservoir. Water from Denniston Reservoir water is then pumped to Denniston WTP for treatment. CCWD is planning to bring the San Vicente Creek online as a source in the near future via a gravity flow pipeline connecting the San Vicente Creek to

Denniston Pump Station wet well, and then to the Denniston WTP. The production rates since the last update can be found in Table 2-1.

Table 2-1: Denniston WTP Source Production Since Last Update

Year	Denniston Creek (MG)	Denniston Wells (MG)	San Vicente Creek
2020	118.7	7.7	0.0
2021	91.1	8.8	0.0
2022	142.8	13.9	0.0
2023	153.3	5.7	0.0
2024	77.4	0.0	0.0
2025 (Jan 1st to June 30th)	57.2	0.0	0.0

2.3.2 Facilities

The facilities relevant to drinking water in the watersheds have remained unchanged since the last update and include the;

- Denniston Creek Diversion.
- San Vicente Creek Diversion.
- Denniston Well Field.
- Denniston Pump Station.
- Denniston Water Treatment Plant.
- Denniston Water Storage Tank.
- Treated Water Distribution Facilities.
- Treated Water Booster Pump Station.

2.3.3 Emergency Plans

CCWD has an Emergency Communications & Contingency Operation Plan updated in July 2025 which provides information and direction for CCWD personnel for use during an emergency condition caused by a water quality problem or a water service interruption. The plan covers water quality emergencies such as high or low chlorine residual and high turbidity, water supply source interruptions, water distribution system supply interruptions, customer notification procedures, and emergency water quality monitoring program. An Emergency Response for Disinfection Failure and Emergency Notifications and Operations Plan was created in 2020 and last updated in July 2025. Due to confidentiality reasons, the Plan is not attached in this report but can be obtained upon request for legitimate reasons.

During an emergency impacting water supply from the Denniston or San Vicente sources, the Denniston facilities can be shut down at any time and the service area can be supplied water from the Pilarcitos Lake/Stone Dam or Crystal Springs Reservoir supply sources.

3.0 Potential Contaminant Sources and Impact

Significant potential contaminant sources in each watershed, the significance of the contaminants, and anticipated growth or change in contaminant sources are described in this section. Both the Denniston and San Vicente Watersheds remain largely undeveloped or impacted by human intrusion.

3.1 Potential Sources

3.1.1 Wastewater

There remains no industrial or municipal wastewater facilities or wastewater collection systems in either the Denniston or San Vicente watersheds, as stated in the original 1996 WSS Report.

There are no residences in the Denniston watershed, so wastewater is not a potential contaminant source. There are approximately seven residents in the San Vicente watershed which discharge to septic tank/leach field systems for disposal.

3.1.2 Reclaimed Water

There has been no reclaimed water development in the watersheds since the original 1996 WSS Report.

3.1.3 Urban, Industrial, and Hazardous Waste Runoff and Disposal

There has been no urban, industrial, mining, logging, or hazardous waste disposal facility development in the watersheds since the original 1996 WSS Report.

3.1.4 Agricultural Crop and Chemical Use

There have been no changes to the agricultural use in the Denniston Watershed since the 2021 WSS Report. The Lea Family owns and operates Cabrillo Farms, a farm over 100 acres, embedded in the Denniston Watershed. The Lea Family has farmed this location for several generations and the farm falls under the CA Department of Health Services food safety guidelines. Cabrillo farms is inspected regularly and unannounced. As confirmed in a letter from Cabrillo Farm (Appendix F), the following activity has remained unchanged since 2021:

- Crops: Brussel sprouts and peas.
- Insecticides: Movento, Sivanto, Radiant, Proclaim, Bravo, Wrangler.
- Fertilizers: Simplot 15-15-15, Romeo 23-0-13.

The Aenlle Family owns a parcel in the San Vicente watershed which is partially leased to floriculture farmers. The land use remains largely unchanged from the original watershed map, shown in Appendix B. During the site visit, previously utilized floriculture plots were evident though there appeared to be no active floriculture activity.

3.1.5 Animals

The CCWD staff noted wild animal human interactions with racoons, mountain lions, and deer are common in the watersheds. A full list of wild animals found in the watersheds can be found in the original 1996 WSS Report. None of the described species are a significant threat to the raw water quality.

Livestock may carry coliform bacteria but most of the grazing animals in the watershed were contained in enclosed pastures or located downstream of raw water intakes. There have been no changes to the grazing animals in the Denniston Watershed since the most recent 2021 report, and a small increase in the grazing animals in the San Vicente Watershed since the original 1996 WSS Report.

There are no Concentrated Animal Facilities in the watersheds.

3.1.6 Recreational Use

As noted in the 2016 WSS report, equestrian activity is restricted and only low impact recreation such as hiking is permitted under the GGNRA ownership. There appears to be only minor hiking and mountain biking activity in the watersheds, but it remains largely undeveloped with no indications of increased use in recent years.

3.1.7 Unauthorized Activity

There has been no observed unauthorized activity, including illegal dumping, in the watersheds in the update period. The access to the watershed is restricted due to locked gates on Christina Road to the upper San Vicente Watershed area, and the Moss Beach Ranch for the lower San Vicente Watershed. Access to the Denniston watershed is also restricted. Due to the lack of access, unauthorized activity is not anticipated to be a potential threat of contamination.

3.1.8 Traffic Accidents/Spills

There have been no traffic accidents or spills in the watersheds since the original 1996 WSS Report, largely because the watersheds are remote with very limited vehicular activity.

3.1.9 Seawater Intrusion

The diversion points in the watersheds are above sea level so seawater intrusion is not an anticipated contaminant source.

3.1.10 Geologic Hazards

Geologic hazards have the potential to damage CCWD infrastructure; though this has not been noted since the original 1996 WSS Report. CCWD has alternative water supply sources in the instance of an impacted operation due to geologic events.

3.1.11 Fires

There have been no fires in either watershed since the original 1996 WSS Report. In the case of a fire impacting San Vicente or Denniston Creek water quality, CCWD has the ability to use alternative water supply sources in the supply area.

3.2 Significance of Potential Contaminant Sources

This WSS found no significant potential contaminant sources in the San Vicente or Denniston Watersheds since the last update.

3.3 Anticipated Growth or Change in Contaminant Sources

At the current time, there are no known changes planned for the development in either watershed as zoning and planning policies in this region are exceptionally restrictive, as noted in the 1996 WSS Report. No changes in contaminant sources are anticipated.

4.0 Watershed Control and Management Practices

This section describes existing and recommended watershed management practices for protecting drinking water quality.

4.1 Water Agency Management Practices

There have been no changes to the management practices in the Denniston Watershed since the last update. The practices include:

1. The watershed area is posted as a drinking water supply source;
2. Cabrillo Farms monitors for any suspicious activity and the access road has additional signage that the public is not allowed, though gates can be locked as needed;
3. Cabrillo Farms crop, pesticide and fertilizer use is monitored;
4. The use of recreational activity in the watershed is monitored by GGNCA, which only permits low impact activities like hiking; and
5. Water quality monitoring performed by District personnel, as presented in Appendix G.

CCWD intends to bring San Vicente watershed online as a water supply source in the near future. The District currently has the following management practices in the watershed:

1. The watershed area is posted as a drinking water supply source;
2. Floriculture farmers and parcel owners in the watershed valley monitor for suspicious activity and maintain a gated and locked access road;
3. Floriculture farmer pesticide and fertilizer use is monitored;
4. The use of recreational activity in the watershed is monitored by GGNCA, which only permits low impact activities like hiking; and
5. District personnel performs water quality monitoring, as presented in Appendix G.
6. Developing and implementing a formal watershed management plan, including emergency response procedures for potential contamination events, especially in relation to agricultural runoff.
7. Introducing buffer zones or vegetated strips along waterways to minimize the runoff of contaminants into the water supply.
8. Conducting periodic reviews and updates to the watershed management practices to ensure they are aligned with the latest regulatory requirements and scientific understanding of water quality protection.

4.2 Other Agencies within the Watershed Control Authority

The County of San Mateo is the primary agency with control of the watersheds. The County Planning Department controls development by means of zoning restrictions, and the County Department of Environmental Health monitors the water quality of both Denniston and San Vicente Creeks and controls activities detrimental to the water quality. Other agencies that influence the watersheds include the Soil Conservation Service (agricultural practices), San Mateo County Agricultural Commissioner (pesticide use), the California Department of Forestry (fire prevention and protection), the California Department of Fish and Game (fish and riparian corridor policies), and the County Sheriff's Department (trespassing).

4.3 Water Agency Coordination Measures

There have been no changes since the original report with the exception of coordination to bring the San Vicente Creek online as water supply source, which has required additional coordination between CCWD and private landowners. CCWD coordinates its activities with GGNCA, Cabrillo farms, and the San Vicente floriculture farmers surrounding visitor use, pesticide/fertilizer use, water allotments and watershed security.

4.4 Recommended Control Measures

The current control measures for the Denniston watershed appear adequate. However, it is recommended that the District continue to evaluate methods to decrease the susceptibility of the CCWD facilities to negative influences from natural and human causes. This includes expanding the testing plan for the San Vicente and Denniston water supply sources in response to increased Cryptosporidium water quality results to better understand the impact of seasonal and temporal fluctuations on water quality in the watersheds.

In the past, the District has instituted vegetation management including pond dredging as needed to reduce sedimentation at the Denniston Reservoir intake. The dredging is an annual maintenance activity conducted to prevent sedimentation at the pump station intake. The dredging permit can be found in Appendix D.

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5.0 Water Quality

The purpose of this section is to identify changes in raw water quality that may impact the ability of the Denniston WTP to meet current and anticipated drinking water regulations. Additionally, this section identifies water quality changes that may indicate deterioration of the source waters. This section includes an evaluation of raw and finished water quality data in the context of regulatory limits. The monitoring schedule for the reservoirs can be found in Appendix F. CCWD monitors both the untreated and treated water supply sources in the San Vicente and Denniston watersheds.

5.1 Regulatory Overview

This section summarizes the state and federal drinking water regulations that relate directly to contaminant concentrations in the watershed. The regulations apply to treated water, as opposed to raw water, but provide the basis for the water quality review of the watershed. The regulations discussion in this report include microbiological water quality, disinfectants and disinfection by-products, chemical contaminants, and emerging contaminants.

Drinking water standards are mandated at the federal and state level by the US EPA and the (SWRCB) DDW, respectively. US EPA is responsible for developing and implementing drinking water regulations under the federal SDWA of 1974. States can either adopt the federal regulations or develop their own regulations with more stringent standards. The SWRCB DDW has authority to implement drinking water regulations within the state. For several contaminants, California has implemented standards for contaminants not regulated by the EPA or developed more stringent standards than EPA. State requirements are identified and discussed only when they are more stringent than the corresponding federal regulations.

5.1.1 Federal Regulations

Federal water quality regulations are summarized in Table 5-1. The most recently promulgated federal regulations relevant to SWTF are the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) and the Stage 2 Disinfectants/Disinfection By-Products (Stage 2 D/DBP) Rule. The goal of the new rules is to provide a higher level of protection against microbial contaminants, while limiting the production of potentially carcinogenic disinfection by-products (DBPs).

The USEPA is responsible for developing and implementing drinking water regulations under the federal Safe Drinking Water Act (SDWA) of 1974. States can either adopt the federal regulations or develop their own regulations with more stringent standards. State Water resources Control Board Department of Drinking Water (DDW), formerly the California Office of Public Health (CDPH), has been delegated the authority to implement drinking water regulations within the state. For nearly all regulated drinking water contaminants, the state has adopted the federal regulations.

Table 5-1: Summary of Federal Water Quality Regulations

Regulation	Major Requirements
National Primary Drinking Water Regulations, 1975	• Currently established for 87 contaminants, including turbidity, 7 microorganisms, 4 radionuclides, 16 inorganic contaminants, 3 Disinfectants, 4 Disinfection By-products and 53 organic contaminants. • 77 of the contaminants have maximum contaminant levels (MCLs) and maximum contaminant level goals (MCLGs), with treatment technique requirements for the remaining 9. • 15 additional contaminants have secondary (aesthetic) standards.
Surface Water Treatment Rule, 1989	• Requires that a detectable disinfectant residual be present in all portions of the distribution system (heterotrophic plate count [HPC] less than 500 colony forming units [CFU]/mL equivalent to a detectable residual). • Requires 3-log Giardia inactivation/removal. Conventional systems receive a 2.5-log credit and direct filtration systems receive a 2-log credit for meeting filter effluent turbidity requirements. Remaining requirements must be met through disinfection. • Requires 4-log virus inactivation/removal. Conventional systems receive a 2-log credit and direct filtration systems receive a 1-log credit for meeting filter effluent turbidity requirements. Remaining requirements must be met through disinfection. • Requires combined filter effluent turbidity not exceed 0.5 NTU (nephelometric turbidity units) in more than 5 percent of samples each month.
Total Coliform Rule, 1989	• Requires that less than 5 percent of distribution samples collected each month be positive for total coliform. • Requires a detectable disinfectant residual at all points in the distribution system (HPC less than 500 CFU/mL considered equivalent to a detectable residual).
Interim Enhanced Surface Water Treatment Rule (IESWTR), 1998	• Establishes an MCLG of zero for Cryptosporidium. • Requires combined effluent turbidity of less than 0.3 NTU in 95 percent of samples collected each month. • Establishes requirements for individual filter effluent turbidities, with associated requirements for a Comprehensive Performance Evaluation of underperforming filters. • Requires that new finished water reservoirs be covered.

Regulation	Major Requirements
	• Requires sanitary surveys at three-year intervals. • Requires disinfection benchmarking.
Stage 1 Disinfectants/ Disinfection By-Products (D/DBP) Rule, 1998	• Establishes MCLs for the following disinfection by-products (DBPs): Trihalomethanes [THMs] (80 µg/L), haloacetic acids [HAA] (60 µ/L), bromate (10 µg/L) and chlorite (1 mg/L). THM and HAA compliance is based on an RAA of distribution system samples. • Establishes maximum residual disinfectant levels (MRDLs) for the following disinfectants: free chlorine (4 mg/L), chloramines (4 mg/L), and chlorine dioxide (0.8 mg/L). Compliance based on an average of distribution system samples. • Establishes enhanced coagulation requirements requiring TOC removals based on raw water TOC and alkalinity. Purpose is to optimize removal of DBP precursors.
Modified Lead and Copper Rule, 2000	• Maintains MCLGs (0 mg/L for lead and 1.3 mg/L for copper) and action levels [ALs] (0.015 mg/L for lead and 1.3 mg/L for copper) established in the 1991 Lead and Copper Rule. • Compliance requires that less than 10 percent of distribution system samples exceed action levels. • Establishes additional requirements, including demonstration of optimal corrosion control, lead service line replacements, public education, monitoring, analytical methods, etc.
Arsenic Rule, 2001	• Establishes an MCL of 10 µg/L for arsenic.
Filter Backwash Recycle Rule, 2001	• Requires that all recycle streams be returned prior to or at the point of primary coagulant addition. • Requires that information on recycle streams be provided to the CDPH for evaluation.
Long-term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR), 2002	• Extended requirements of the LT1ESWTR to utilities serving less than 10,000 persons.
Long-term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR), 2006	• Assigns utilities to one of four “bins” based on raw water Cryptosporidium concentrations. • Each bin has associated requirements for additional Cryptosporidium treatment. • Includes a toolbox of options for receiving Cryptosporidium reduction credits, including watershed control, disinfection, and filtration.

Regulation	Major Requirements
	• Bin assignment is based on the average of the 12 consecutive highest months within a 2 year period of monthly Cryptosporidium samples.
Stage 2 D/DBP Rule, 2006	• Does not change the MRDLs or MCLs established in the Stage 1 Rule. • Requires an initial distribution system evaluation (IDSE) to identify sites with high DBP levels. • Systems with no samples with THM/HAA levels exceeding 40/30 µg/L can apply for an IDSE waiver. • Requires compliance with 80 µg/L THM and 60 µg/L HAA based on a location running annual average (LRAA) at each site.
Revised Total Coliform Rule (RTCR), Promulgated in 2013	• New approach to monitoring assessments and implementation when new sample positives occur
Perchlorate, promulgated in 2014	• Established interim health advisory for clean ups at 15 ppb

5.1.2 State Regulations

SWRCB DDW implements drinking water regulations within the state. DDW regulations are set forth in the DDW Drinking Water Program Title 22 Chapter 15. The most recent updated version of the Title 22 of the California Code of Regulations (CCR) was published August 30, 2024.

CDPH regulations relevant to water purveyors are summarized in Table 5-2. Only regulations and requirements that are in excess of federal requirements are mentioned.

Table 5-2: Summary of California Water Quality Regulations

Regulation	Major Requirements
State Primary Drinking Water Standards	State MCLs are more stringent than federal levels for 20 contaminants. The state also has notification levels (NLs) for 30 chemicals. NLs are health-based standards for contaminants without a current MCL. Exceedance may require public notification or switching to an alternative source.
Fluoridation	Established optimal fluoride levels and control ranges for treated water based on air temperature.
Cryptosporidium Action Plan, 1995- Revised in 2019	Sedimentation/clarification basin effluent turbidity of 1 to 2 NTU. Combined filter effluent turbidity <0.1 NTU. Reclaimed backwash water turbidity <2 NTU. Filter effluent turbidity after filter backwash or filter-to-waste <0.3 NTU.

Regulation	Major Requirements
The Basin Plan, Updated March 2015	Established water quality objectives for recreational waters. Provided water quality objectives for total coliform (median 240 MPN/100 mL and maximum 10,000 MPN/100 mL) and *E. coli* (126 MPN/100 mL) for five samples taken at equally spaced intervals over 30 days.

5.2 Constituents of Concern

This section describes the primary sources of each constituent of concern and the state and federal regulations which apply to that contaminant.

5.2.1 Microbiological Water Quality

One major function of water treatment is to remove or inactivate pathogenic organisms. Primary sources of microbiological contaminants are grazing and wild animals, wastewater treatment and septic spills, and to a lesser degree, body-contact recreation within surface water sources. Pathogen concentrations are reduced through a combination of removal by filtration processes and chemical disinfection. Chemical oxidants may also provide other benefits in addition to disinfection, including the destruction of compounds that cause taste and odor problems.

Both state and federal regulations are focused on the removal of four major pathogens/pathogen groups: coliform bacteria, Giardia, viruses and Cryptosporidium. For three of the pathogen groups, removal requirements are dependent on the level of microbial contamination of the source water. Turbidity is used as a surrogate for microbial water quality and is also discussed below.

COLIFORM BACTERIA

Coliform bacteria are used as an indicator of pathogenic contamination. Total coliform is a measure of the concentration of a specific group of bacteria in water that use organic carbon for energy and are lactose-fermenting. Their presence alone is not a cause for concern, but their source should be identified and controlled if possible. Fecal coliforms are a subgroup of total coliform that are found in the intestinal tracts of warm blooded animals including humans. The presence of these bacteria in water samples is indicative of the presence of fecal matter and possible pathogenic organisms, which may be of human origin. Escherichia coli (E. coli) is a type of fecal coliform bacteria commonly found in the intestines of animals and humans. The presence of E. coli in water is a strong indication of recent sewage or animal waste contamination.

Coliform bacteria are directly regulated under the Total Coliform Rule, which requires that less than five percent of distribution system samples collected each month be positive for the presence of coliform bacteria. Positive samples require additional action, including further testing for fecal coliform, as well as collection of additional distribution system samples. Source water total coliform levels are used by the DDW to determine Giardia and virus removal requirements through treatment, as described in the following section.

GIARDIA, VIRUSES, AND CRYPTOSPORIDIUM

Cryptosporidium parvum and *Giardia lamblia*, commonly known as *Cryptosporidium* and *Giardia*, are naturally occurring protozoa in the intestines of most mammals, including humans. Surface water contamination from these protozoa can occur as a result of: surface runoff through urban areas, woodlands, and pastures; on-site septic tank/sewage disposal system leakage/failure; sewage treatment plant/disposal system overload or malfunction; or, raw sewage deep well injection.

Giardia and viruses are regulated under the California SWTR, with removal requirements based on source water total coliform levels, as shown in Table 5-3. Systems using conventional treatment that meet filter effluent turbidity requirements receive treatment credits of 2.5-log for *Giardia* and 2-log for viruses. Credits for direct filtration systems are 2.0-log *Giardia* and 1-log virus. Credits for alternative filtration technologies are determined by DDW.

Table 5-3: California SWTR Reduction Requirements for Giardia and Viruses

Median Monthly Total Coliform Concentrations (MPN[2]/100 mL)	*Giardia* Cyst Log Reduction Requirements	Virus Log Reduction Requirements
< 1,000	3	4
> 1,000 – 10,000	4	5
>10,000 – 100,000	5	6

Source: Surface Water Treatment Rule Guidance Manual available at http://www.epa.gov/safewater/disinfection/lt2/compliance.html

Although DDW follows these guidelines that were part of the California SWTR Guidance Document, these are not requirements included in Title 22 CCR.

[2] MPN = most probable number

TURBIDITY

Turbidity is a concern in drinking water because it can reduce the effectiveness of disinfection by shielding microorganisms. It is also used as a surrogate measure for potential pathogenic contamination and as a measure of filtration performance.

The IESWTR included requirements for filtered water turbidities. In particular, it introduced monitoring of individual filter effluents, rather than just combined filter effluent. The rule requires that individual filter effluent turbidities not be greater than 1.0 nephelometric turbidity units (NTU) in any two consecutive (15 minute interval) samples at any time, or greater than 0.5 NTU after the filter has been in operation for four hours. Individual filters exceeding these standards are subject to a Comprehensive Filter Evaluation. The rule also requires that combined filter effluent turbidities be less than 0.3 NTU in ninety-five percent of samples collected each month, and the turbidity of the combined filter effluent must at no time exceed 1 NTU.

Turbidity grab samples are collected daily at Denniston WTP. In the past, dredging projects have been used to mitigate the historic, periodic high turbidity attributed to the silt accumulation behind the Denniston dam. An on-line turbidity meter monitors the influent turbidity constantly while the WTP is online. Effluent turbidity is determined using grab samples. Figure 5-1 shows the daily influent and effluent turbidity levels. The permit requires the Denniston WTP to shut down when the raw water turbidity is above 50 NTU.

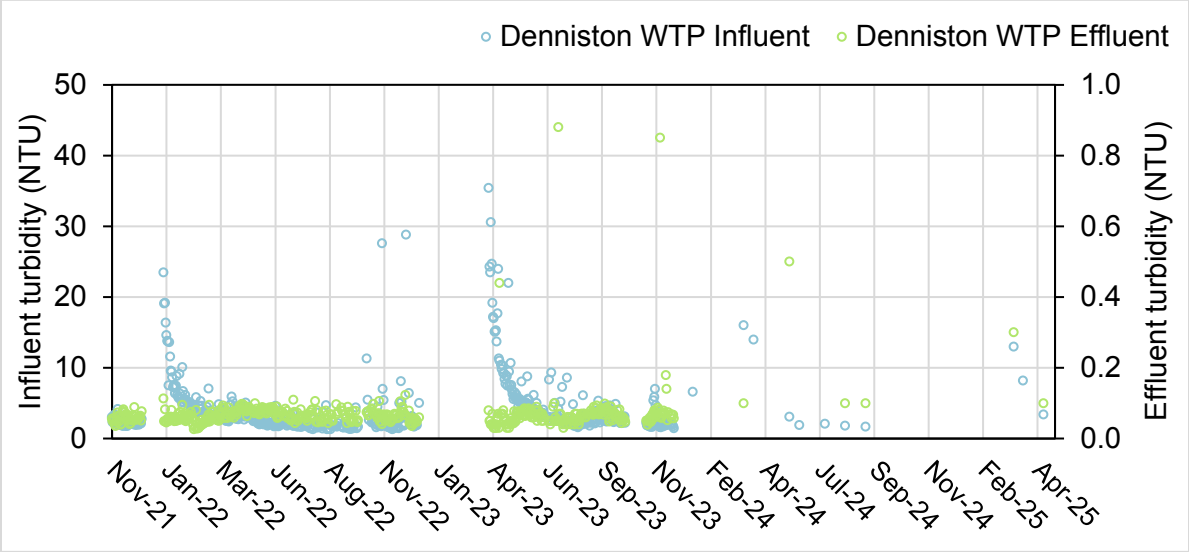

Figure 5-1: Influent and Effluent Turbidity Measurements at Denniston

WATER QUALITY DATA

Both state and federal regulations are focused on the removal of four major pathogens/pathogen groups: coliform bacteria, Giardia, viruses and Cryptosporidium. For three of the pathogen groups, removal requirements are dependent on the level of microbial contamination of the source water.

Turbidity is used as a surrogate for microbial water quality. In the following Table 5-4 and Table 5-5, the weekly total coliform and E. coli counts are shown. Figure 5-2 shows the Denniston Reservoir's monthly median Total Coliform concentrations (MPN/100 mL) from 2021-2025. Table 5-6 Shows the Monthly median of Total Coliform and E.coli concentrations in San Vicente Creek at Diversion from 2024 to 2025. The California Surface Water Treatment Rule (SWTR) uses the monthly median of total coliform levels as a key indicator for determining treatment requirements, including the removal of pathogens like Giardia and viruses.

Table 5-4: Denniston Reservoir: Monthly Median of Total Coliform Concentrations (MPN/100 mL) (2021-2025)

Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21
										1782	3441
Jan-22	**Feb-22**	**Mar-22**	**Apr-22**	**May-22**	**Jun-22**	**Jul-22**	**Aug-22**	**Sep-22**	**Oct-22**	**Nov-22**	**Dec-22**
815	530	689	713	1125	3873	1509	1076	1262	2613	631	546
Jan-23	**Feb-23**	**Mar-23**	**Apr-23**	**May-23**	**Jun-23**	**Jul-23**	**Aug-23**	**Sep-23**	**Oct-23**	**Nov-23**	**Dec-23**
7967	708	3448	823	2064	1553	1434	1467	2204	1201	1483	795
Jan-24	**Feb-24**	**Mar-24**	**Apr-24**	**May-24**	**Jun-24**	**Jul-24**	**Aug-24**	**Sep-24**	**Oct-24**	**Nov-24**	**Dec-24**
7270	2489	N/A	N/A	1723	2208	3076	3804	1352	2016	647	1124
Jan-25	**Feb-25**	**Mar-25**	**Apr-25**	**May-25**	**Jun-25**						
315	2755	932	1483	1341	2321						

Table 5-5: San Vicente Creek at Diversion: Monthly Median of Total Coliform Concentrations (MPN/100 mL) (2024-2025)

Month	Monthly Median	
	E.Coli [MPN/100mL]	TC [MPN/100mL]
Apr-24	20	2,224
May-24	N/A	N/A
Jun-24	135	5,794
Jul-24	121	6,488
Aug-24	174	7,717
Sep-24	326	8,664
Oct-24	187	6,488
Nov-24	343	5,739
Dec-24	96	3,873
Jan-25	53	2,580
Feb-25	41	3,130
Mar-25	31	2,273
Apr-25	84	2,489
May-25	744	3,430
Jun-25	543	4,892

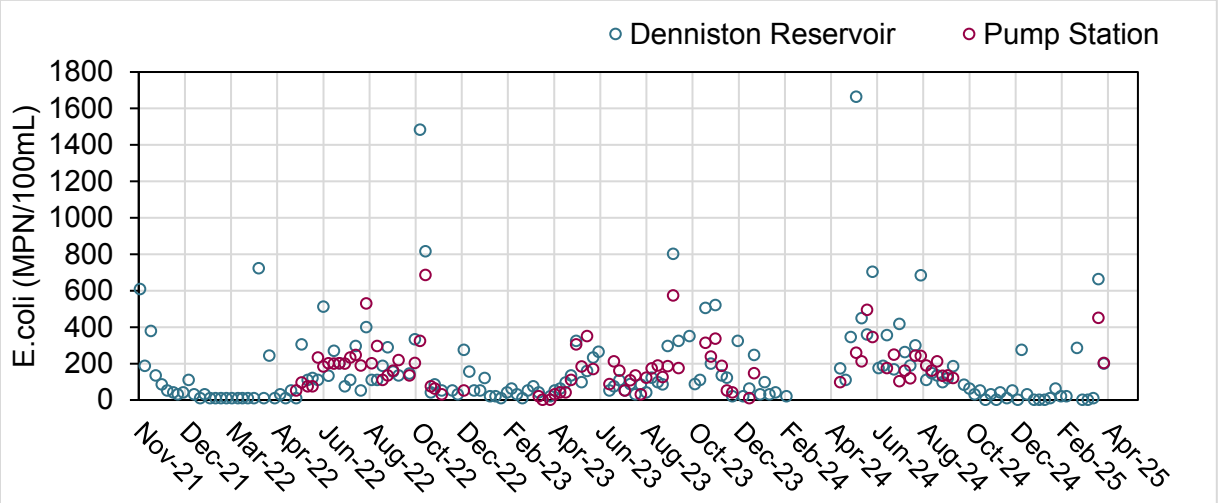

Figure 5-2: E. Coli Counts in Denniston Reservoir and Pump Station

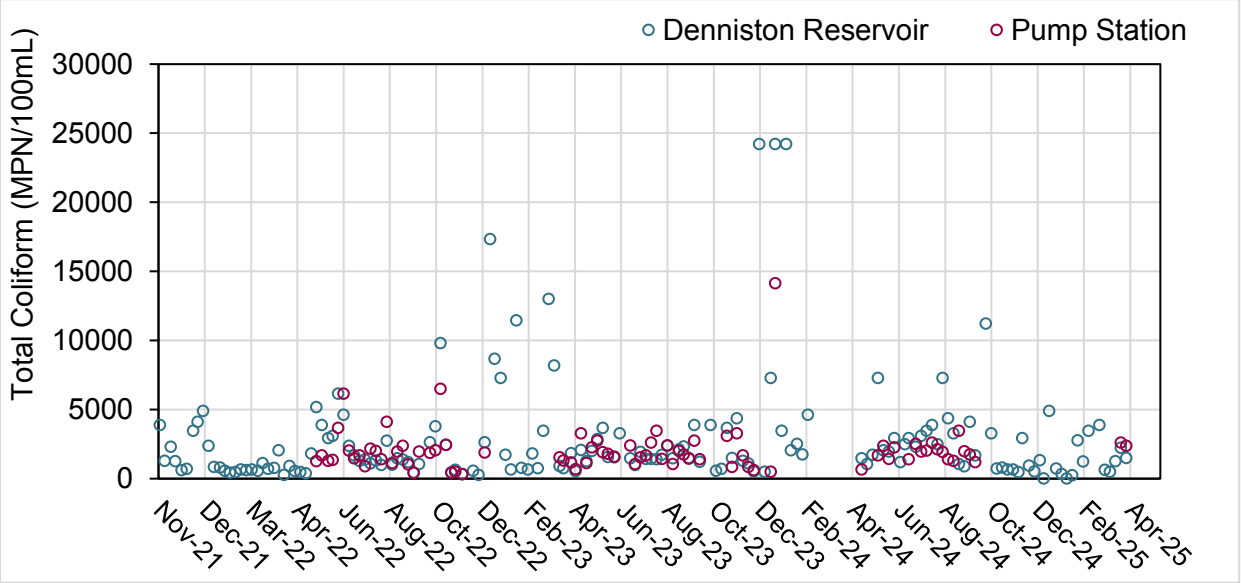

Figure 5-3: Total Coliform Counts in Denniston Reservoir and Pump Station

The Denniston Watershed monthly median of Total Coliform have been fluctuating since 2021. In some months the Total Coliform level is below 1,000 MPN/100 mL, while in some months the level is above 1,000 MPN/100 mL. Overall, the monthly median Total Coliform level for Denniston Watershed is well below 10,000 MPN/100 mL. For Total Coliform level between

1,000 to 10,000 MPN/100 mL, the log reduction requirements for Giardia and Virus are 4 log and 5 log respectively. If the Total Coliform level is above 10,000 MPN/100 mL, one additional log removal will be required for both Giardia and Virus.

CCWA started collecting the San Vicente Watershed Total Coliform data in April 2024. With limited data received, the monthly median Total Coliform is trending higher than the Denniston Watershed. However, the monthly median still falls within the range of 1,000 to 10,000 MPN/100 mL. As a result, the log reduction requirements for Giardia and Virus are 4 log and 5 log respectively for San Vicente Watershed. Given the limited data, CCWA will continue to collect Coliform samples and monitor closely if the monthly media will go above the additional log removal triggering point of 10,000 MPN/100 mL.

The monthly CT Calculation reports (attached in Appendix I) indicates that the Denniston WTP is capable of meeting the 4 log and 5 log removal CT credit towards Giardia Cyst and Virus respectively. Therefore, no additional log removal credit is required at Denniston WTP for Giardia and Virus.

5.2.2 pH

pH grab samples are collected daily at Denniston WTP influent and effluent and shown in Figure 5-4. The pH of the influent water ranged from 7.0 to 7.7 during the period of this update. Effluent pH is targeted at levels over 8.0 for corrosion control using the Langelier Saturation Index but ranged from 7.3 to 9.2 during the period of this update.

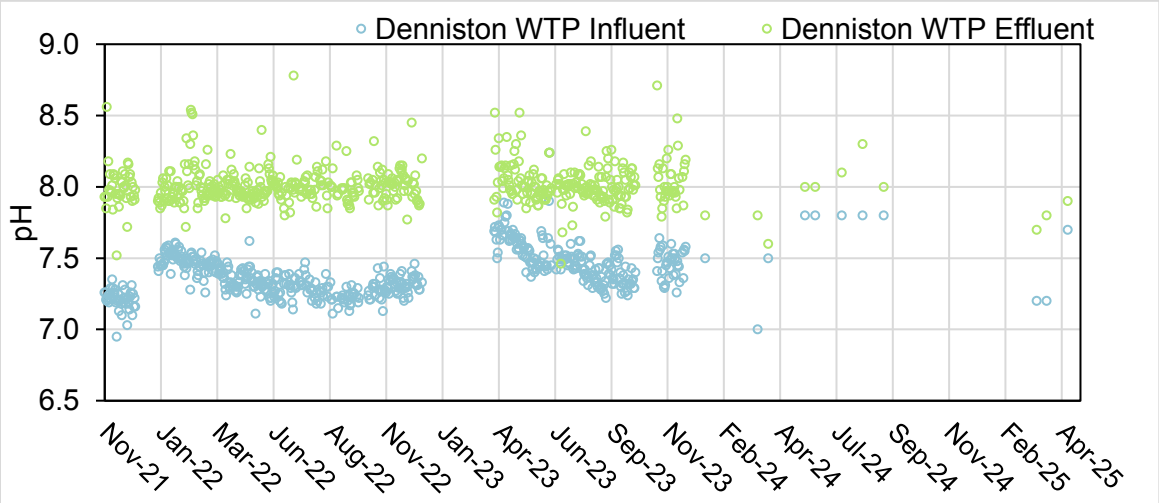

Figure 5-4: pH Levels at Denniston Water Treatment Plant Influent and Effluent

5.2.3 Temperature

The temperature of the Denniston WTP influent and effluent is analyzed daily and used for CT calculations. The temperatures range from 9.7 to 19.1 degree Celsius in the influent and 11.5 to

22.1 degree Celsius in the effluent during the period of this update. Figure 5-5 and 5-6 show the monthly temperature at Denniston Water Treatment Plant effluent and influent.

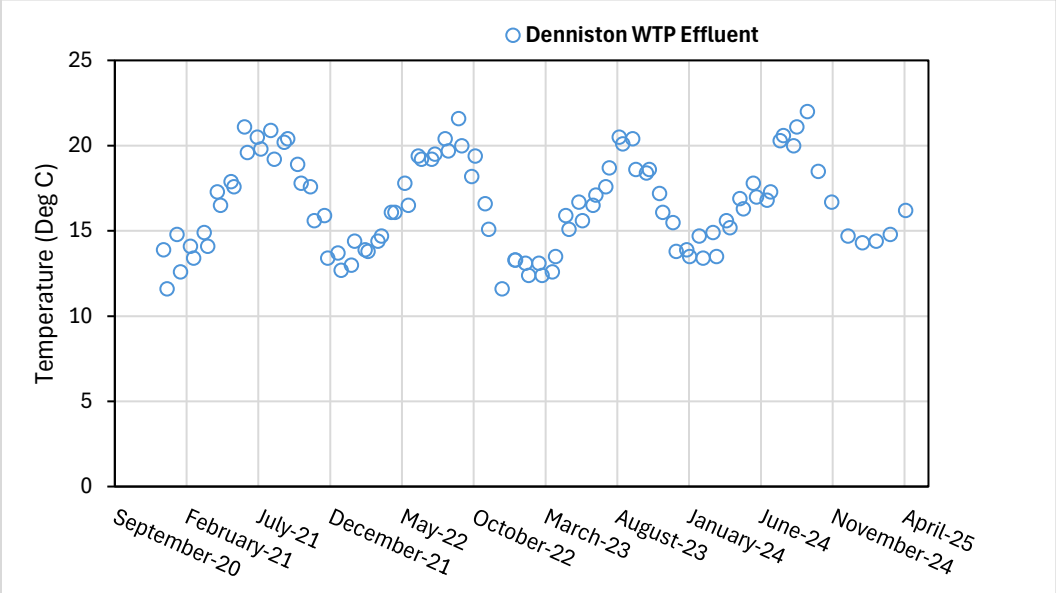

Figure 5-5: Monthly Temperature at Denniston Water Treatment Plant Effluent (2021-2025)

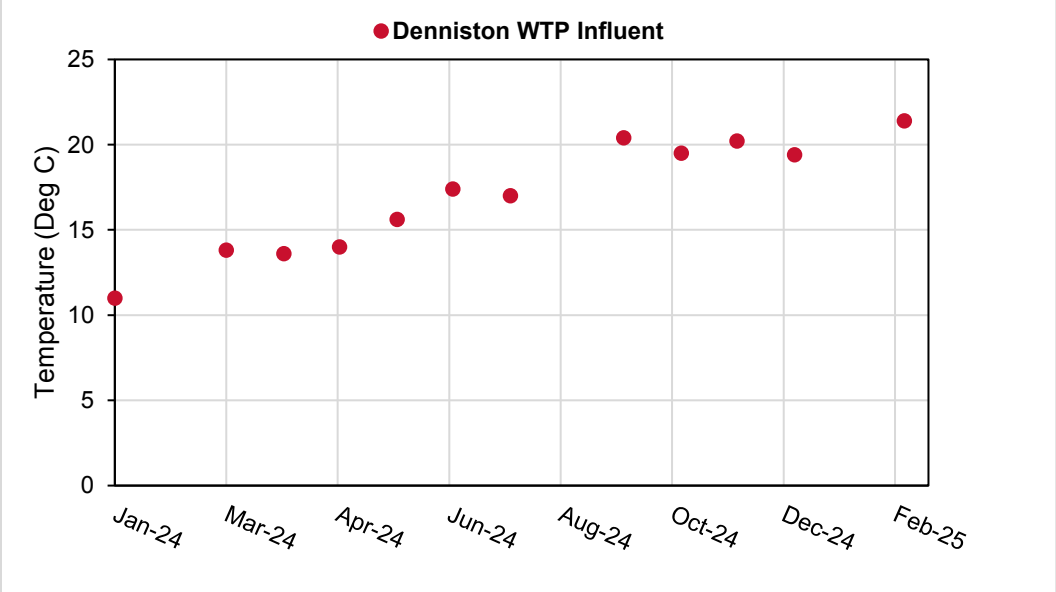

Figure 5-6:**Monthly Temperature at Denniston Water Treatment Plant influent (2024-2025)**

5.2.4 TOC

Total organic carbon (TOC) is a measure of soluble and insoluble organic carbon compounds in water that are primarily contributed by decaying NOM such as humic and fulvic acids. Disinfectants added to water react with NOM to form DBPs. Because TOC is a measure of NOM present in water, TOC is a direct indicator of the potential to form DBPs during drinking water disinfection. In addition to reducing the potential to form DBPs, enhancing existing treatment to reduce TOC levels can also result in added benefits that include reduced potential for bacterial regrowth in the distribution system, improved taste and odor, reduction in disinfectant demand, and reduced levels of unknown or unregulated DBPs.

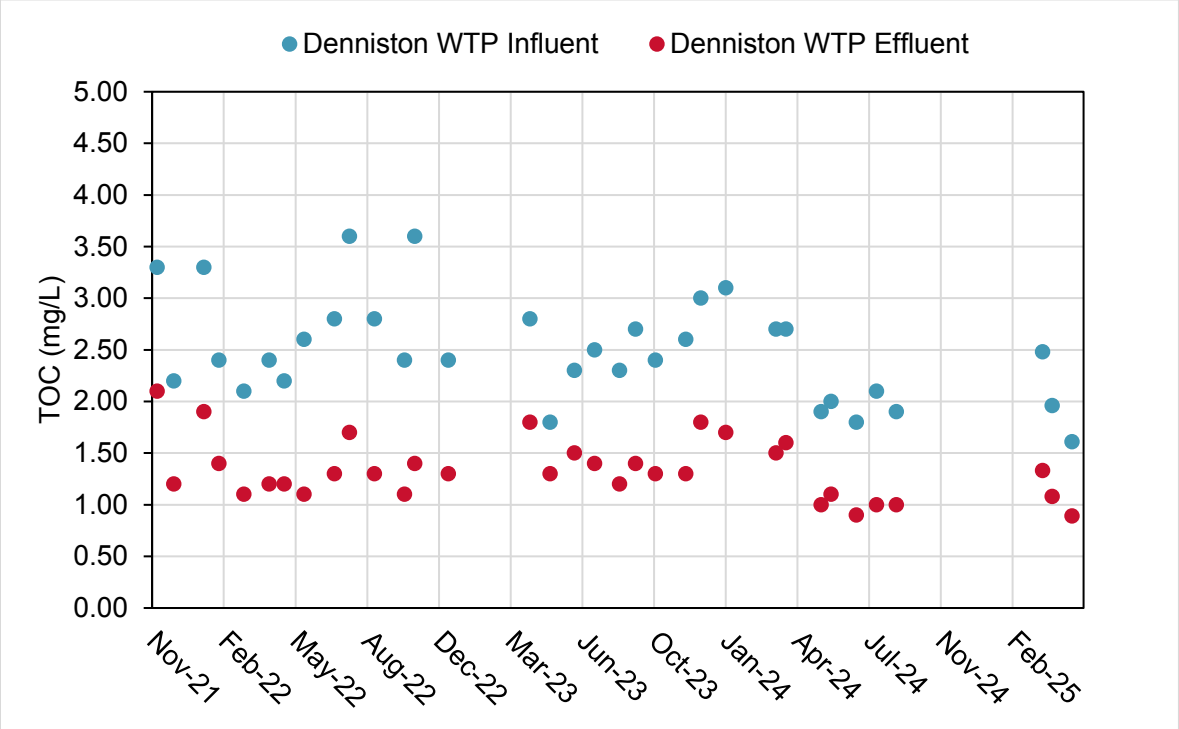

Figure 5-7 illustrates the reduction in TOC from the source water to treated water, demonstrating effective control of DBP formation potential. As shown in

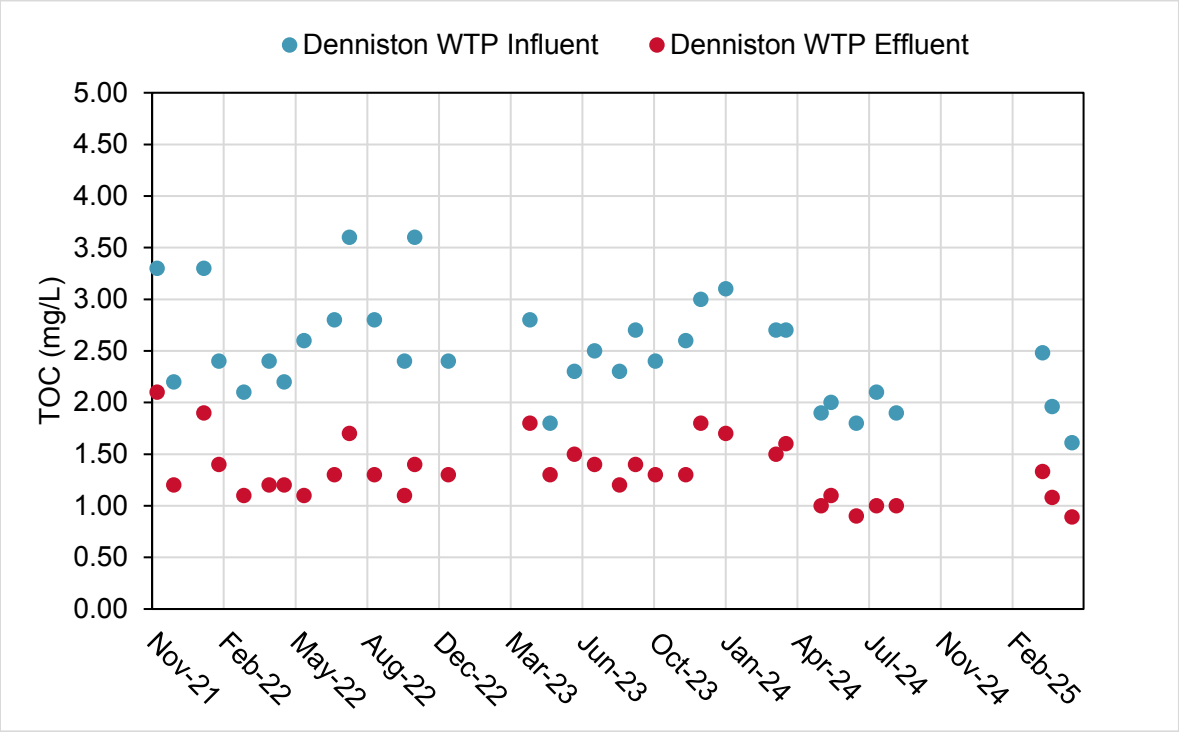

Figure 5-7, the TOC in the source water was relatively low ranging between 1.8-3.6 mg/L in the Denniston Reservoir. Treated TOC ranged from 1.1 to 2.1 mg/L, indicating low DBP formation potential.

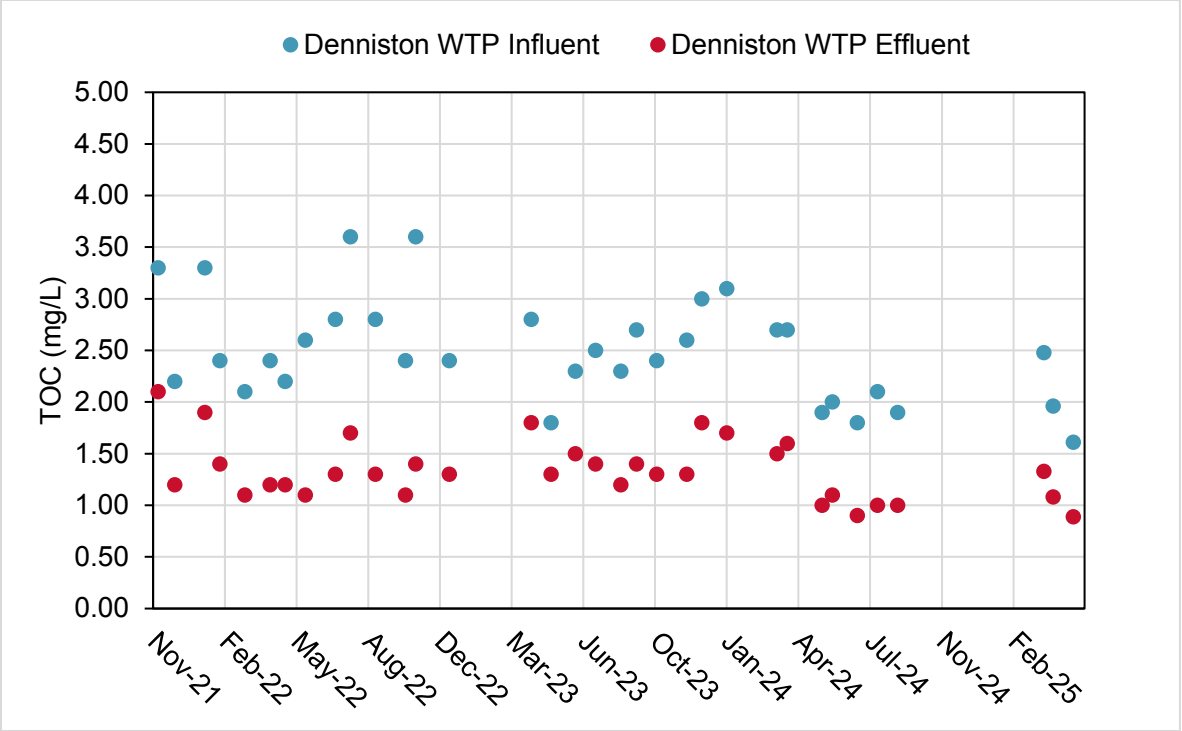

Figure 5-7: Comparison of Source and Treated Water TOC Levels at Denniston Reservoir

5.2.5 DBP

Disinfection By-Products (DBPs) are produced through the reaction of chemical disinfectants with natural organic matter (NOM) present in the source water. DBPs are a concern due to a number of confirmed or suspected health effects, including increased rates of cancer, miscarriages and developmental defects. The DBPs of greatest concern to the SWTF are trihalomethanes (THMs) and haloacetic acids (HAAs).

TTHMs and HAAs form through the interaction of chlorine with NOM in the source water. The SWTF uses sodium hypochlorite for disinfection, which can contribute chlorine as Cl_2 to react with NOM to produce these DBPs. Under the Stage 2 D/DBP Rule, both TTHMs and HAA are regulated based on samples collected at locations within the distribution system, which were identified from the Initial Distribution System Evaluation (IDSE) and which represent maximum TTHM and HAA concentrations. Compliance is based on a locational running annual average (LRAA) of quarterly samples collected at each sample location.

The SWTF collects annual samples of TTHM and HAAs at the intake as the water enters the distribution system. Daily samples of TOC, a precursor to DBPs, are collected at the SWTF intake.

The MCLs for DBPs are summarized in Table 5-6. This table includes maximum residual disinfectant levels (MRDLs) which regulate the disinfectant concentrations in the distribution

system based on a system-wide annual average. All values are from the US EPA Stage 1 and 2 D/DBP Rules, which supersede previous DBP regulations.

Table 5-6: US EPA Stage 1 and 2 D/DBP Rules Disinfectants and Disinfection By-product Limits

Disinfection By-Products	
DBP	Maximum contaminant level
Trihalomethanes	80 µg/L
Haloacetic acids	60 µg/L
Bromate (Plant that use Ozone)	10 ug/l
Chlorite (plants that use chlorine dioxide)	1000 ug/l
Disinfectant	Maximum residual disinfectant level
Chlorine	4 mg/L (as Cl_2)
Chloramines	4 mg/L (as Cl_2)
Chloramine dioxide	0.8 mg/L (as ClO_2)

The district monitors DBPS at points in the distribution system based on the most problematic residence times. The DBP results for the period of this update can be found in Table 5-7 below. CCWD only had once exceedance, in the summer of 2022, for TTHMs.

Table 5-7: DBP Sampling Data for the Denniston WTP Distribution System, including TTHMs (MCL= 80 µg/L) and HAA5 (MCL=60µg/L)

	TTHM concentration (µg/L)			
TESTING DATE	DST 900_El Grenada	DST 901_Cornell	DST 902_Miramont	DST 903_Obisbo
11/17/2021	42	56	41	71
2/16/2022	39	39	40	40
5/18/2022	47	55	50	47
8/17/2022	48	90	53	78
11/16/2022	26	79	59	73
2/8/2023	36	49	45	50
5/17/2023	33	50	41	50
11/7/2023	34	39	29	40
2/14/2024	37	50	36	50

5/13/2024	36	40	33	44
8/21/2024	40	59	44	51
11/20/2024	28	41	37	32
2/12/2025	34	41	44	36

HAA5 concentration (µg/L)

TESTING DATE	DST 900_El Grenada	DST 901_Cornell	DST 902_Miramont	DST 903_Obisbo
11/17/2021	45	45	24	39
2/16/2022	37	21	17	17
5/18/2022	14	14	24	15
8/17/2022	23	28	25	32
11/16/2022	25	35	30	42
2/8/2023	56	27	23	23
5/17/2023	33	20	19	16
11/7/2023	18	14	12	14
2/14/2024	34	29	16	25
5/13/2024	17	24	18	22
8/21/2024	12	21	20	18
11/20/2024	30	17	19	16
2/12/2025	24	23	22	20

5.2.6 Nutrients

Nutrients such as nitrogen, in the forms of ammonia, and nitrate, and phosphates, are important water quality indicators as an abundance of nutrients in water can lead to algal blooms, oxygen depletion and ultimately and taste and odor issues for drinking water consumers. Nitrogen and phosphorus may also be contributed to a water source via non-point source pollution via agricultural activity. Table 5-8 illustrates the monthly concentrations of ammonia, nitrate, and orthophosphates in the Denniston and San Vicente watersheds, highlighting areas of concern related to nutrient levels. The overall nutrient level in both watersheds appear to be in the acceptable range. See MCL regulation in the TDS section below.

Table 5-8: Concentrations of nutrients level in Denniston and San Vicente Watersheds

Date	San Vicente Creek @ Diversion (mg/l)					Denniston Reservoir (mg/l)				
	Ammonia	Nitrate	Orthophosphate	TOC	DOC	Ammonia	Nitrate	Orthophosphate	TOC	DOC
6/26/2024	ND	ND	ND	2.1	2.1	ND	ND	ND	1.7	1.7
7/31/2024	ND	ND	ND	3	2.8	ND	ND	ND	2.4	2.4
8/28/2024	ND	ND	ND	2.2	2.4	ND	ND	ND	2.4	2.7

9/25/2024	ND	ND	ND	2.5	2.5	ND	ND	ND	2.1	2.1
10/30/2024	ND	ND	ND	2.1	2.0	ND	ND	ND	1.8	1.9
11/25/2024	ND	0.2	ND	5.0	5.0	ND	ND	ND	3.7	3.7
12/18/2024	ND	0.2	ND	3.8	3.8	ND	ND	ND	3.9	2.9
1/29/2025	ND	0.1	ND	2.2	2.2	ND	0.2	ND	1.7	1.7
3/26/2025	ND	ND	ND	2.8	2.7	ND	0.1	ND	2.3	2.2

ND- Below the detection limit

5.2.7 TDS, Chloride, Bromide

Surface waters have a naturally occurring dissolved solids concentration (salinity). However, elevated total dissolved solids (TDS) and chloride may indicate potential issues for a drinking water supply including taste and odor, mineral accumulation, and corrosion. Elevated TDS and chloride may also indicate groundwater intrusion in inland water sources. Figure 5-8 illustrates the TDS and chloride concentrations for influent and effluent water at the Denniston WTP, highlighting their compliance with regulatory standards. The WTP influent values are representative of Denniston Creek with small contributions from the groundwater wells. The Denniston WTP TDS influent concentrations ranged from 146 to 298 mg/L and the effluent ranged from 124 to 232 mg/L, well below the secondary MCL of 500 mg/L. The influent chloride values ranged from 27 to 42mg/L, and the effluent ranged from 33 to 50 mg/L, also well below the EPA drinking water standard of 250 mg/L characterized by water tasting “salty”.

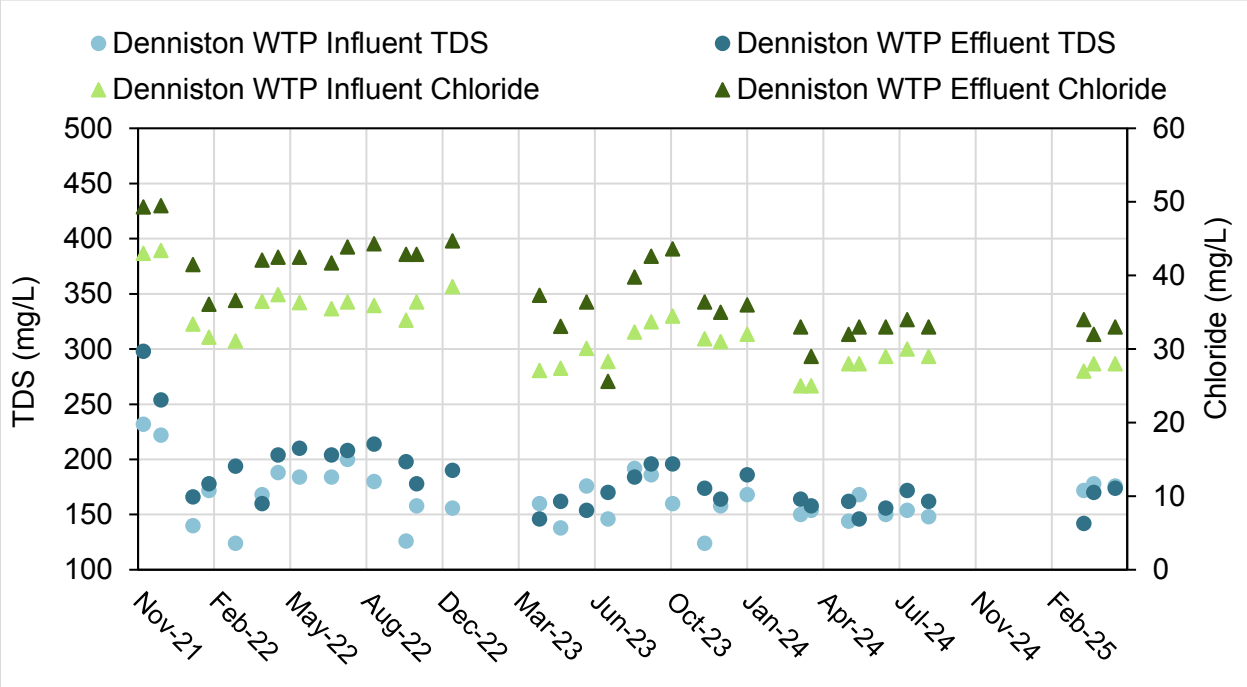

Figure 5-8: TDS and Chloride Concentrations in Influent and Effluent Water at Denniston WTP

Bromide is a trace element found in coal, wastewater from oil and gas development and in some mine drainage. Elevated bromide may indicate anthropological activity in a watershed or, similar to TDS and chloride, seawater intrusion. Bromide is also a precursor to bromate, a toxic byproduct that forms when ozone is used to treat drinking water. 5-9 presents the bromide concentrations in the Denniston WTP influent and effluent, illustrating their levels in relation to typical values. Bromide levels <0.2 mg/L are considered normal for surface waters.

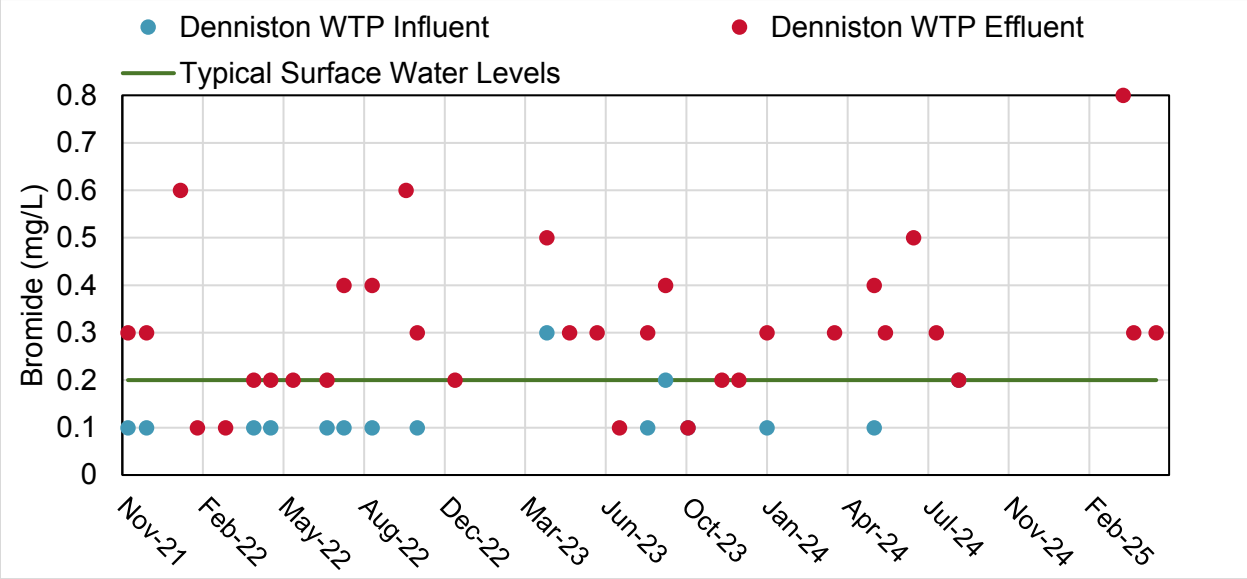

Figure 5-9: Bromide Concentrations in Influent and Effluent Water at Denniston WTP Compared to Typical Surface Water Levels

5.2.8 Hardness

The average total hardness as CaCO3 since the period of the last update is 85mg/L in both the Denniston WTP Influent and Effluent. The influent values ranged from 63 to 115 mg/L and the effluent values ranged from 70 to 114 mg/L as CaCO3.

5.2.9 Metals

The Denniston Reservoir and San Vicente Creek Diversion iron and manganese levels are presented in Figure 5-10 and Figure 5-11 below. Treated water iron and manganese levels have been non-detect in the Denniston WTP effluent during the period of this update, meeting the iron MCL of 300 µg/L and manganese MCL of 50 µg/L. Zinc and copper were not present in the Denniston Reservoir or Denniston WTP Influent during the period of this update. This indicates effective treatment processes and the absence of significant sources of these metals in the watershed.

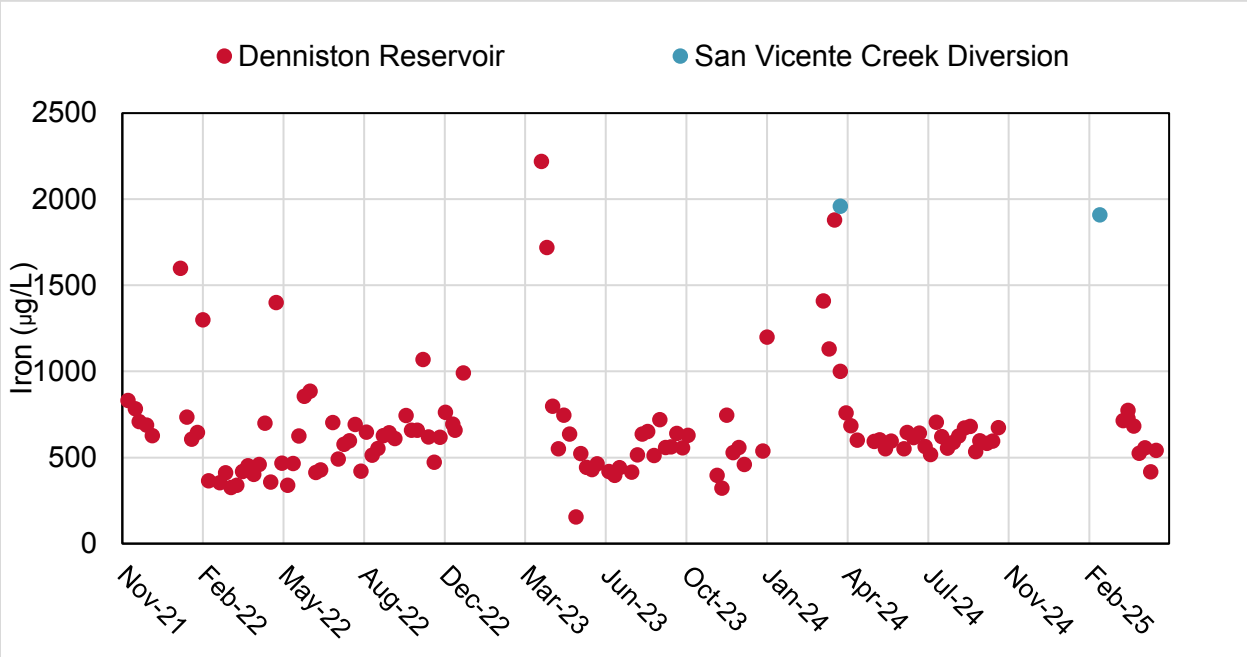

Figure 5-10: Iron Levels in Denniston Reservoir and San Vicente Creek at Diversion

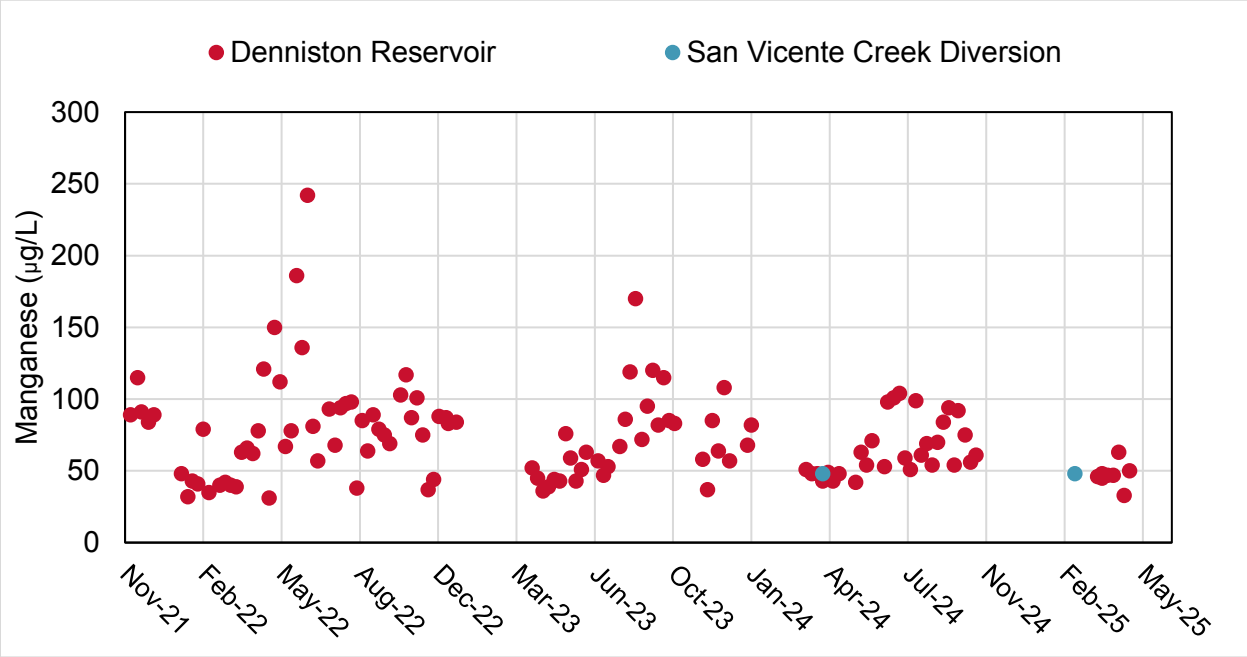

Figure 5-11: Manganese Levels in Denniston Reservoir and San Vicente Creek at Diversion

5.2.10 Organics

SOCs or VOCs including as benzene, toluene, ethylbenzene, and xylene are environmental pollutants that indicate the presence of anthropological impact in a watershed including industry, agriculture, and transportation. SOCs and VOCs were not detected in the Denniston Reservoir or San Vicente Creek at Diversion during the period of this update.

5.2.11 Inorganic chemicals

Inorganic compounds include a combination of metals, salts, compounds, particles, and mineral complexes which do not contain carbon. Many inorganic compounds have already been discussed including ammonia, nitrate, phosphorus, chloride, bromide, iron, and manganese. Additional inorganic compounds and their presence in the San Vicente and Denniston influent and Denniston WTP effluent are presented against the EPA MCLs in Table 5-10. Inorganic chemical contamination does not appear to be a concern for the watersheds.

Table 5-9: Range of Inorganic Compound Water Quality Results from 2021 to 2025

Inorganic Compound	San Vicente Creek at Diversion	Denniston Reservoir	MCL[1]
Antimony (µg/L)	ND	ND	6
Arsenic (µg/L)	1.2	ND	10
Barium (µg/L)	39.4	11.9-15.3	1000
Beryllium (µg/L)	ND	ND	4
Cadmium (µg/L)	ND	ND	5
Chromium (µg/L)	ND	2.5-2.6	50
Copper (µg/L)	ND	ND	1300
Cyanide (µg/L)	ND	ND	0.15
Fluoride (mg/L)	0.3	ND- 0.3	4
Lead (µg/L)	ND	ND	15
Mercury (µg/L)	ND	ND	2
Selenium (µg/L)	ND	ND- 1.2	50
Thallium (µg/L)	ND	ND	2

[1]All applicable MCLs provided, some are secondary MCLs
[2] ND- Below the detection limit

5.2.12 Radionuclides

Gross alpha particle activity is a test that measures the overall radioactivity in drinking water. It measures the amount of radiation in drinking water from either radium, uranium, and/or radon. In the period of this update, the Denniston Reservoir and San Vicente Creek at Diversion has ND gross alpha particle activity.

6.0 Conclusions and Recommendations

This section provides a prioritized list of recommendations regarding watershed management measures that CCWD may take to help control potential contaminant sources, and to identify water quality constituents of concern. The list of recommendations is described below.

1. Continue to monitor turbidity levels and concentrations of TOC, pathogens, and pesticides in the Denniston Reservoir and San Vicente Creek Diversion to determine the impact of stormwater discharges, recreation, and urban and agricultural runoff.
2. Conduct monthly sampling for nutrients like ammonia, nitrate, and phosphorus which will inform the impact of agricultural activities on the reservoirs.
3. Determine potential sources of bacterial and other contamination by:
    a. Continue to monitor water quality at the creek intakes to establish baseline water quality data and identify constituents of concern.
4. Conducting annual sampling in the summer rather than winter months to obtain information on contaminants which have summer seasonal usage. For example, pesticides and herbicides sampling should occur during periods of application in the watershed.
5. Continue to develop and maintain relationships between the private landowners in the watershed (Cabrillo Farms and floriculture farms) to better understand and predict impacts of their land use on the watersheds.
6. Continue to inspect and monitor security measures like signs and locked gates around the watershed to prevent unauthorized activity, like dumping.
7. Implement adaptive management practices by reviewing and updating watershed management strategies annually based on the latest data, ensuring that the measures remain effective against emerging threats to water quality

7.0 References

American Water Works Association, California-Nevada Section, Source Water Quality Committee. Watershed Sanitary Survey Guidance Manual. December 1993.

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California Office of Emergency Services. Spill Release Reporting. Database accessed June 2020 from: http://www.caloes.ca.gov/for-governments-tribal/plan-prepare/spill-release- reporting

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Cabrillo Farms, Agricultural Operations Letter for the 2024 Watershed Survey. Cabrillo Farms, Half Moon Bay, CA, 2011.

Golden Gate National Recreation Area (GGNRA). *Land Use and Environmental Management in Protected Watersheds*. San Francisco, CA: GGNRA, 2021.

8.0 APPENDICES

Appendix A: Denniston and San Vicente Watersheds Sanitary Survey Photos

Appendix B: Denniston San Vicente Watershed

Appendix C: San Vicente Watershed – parcel owned by Victor and Marina Aenlle Appendix C: San Vicente Watershed – parcel owned by Victor and Marina Aenlle

Appendix D: Dredging Permit

Appendix E: NOT USED

Appendix F: Cabrillo Farms Agricultural Use Letter

Appendix G: Water Quality Monitoring Schedule

Appendix H: Previous WWS Reports

Appendix I: Denniston WTP CT Calculation

Appendix A: Denniston and San Vicente Watersheds Sanitary Survey Photos

Visit Date: February 29th 2024

Conducted By: HDR

Photo 1: Denniston reservoir, facing east. Large amounts of sediment in the reservoir.

Photo 2. Denniston Creek diversion, flowing into the Denniston reservoir. Photo facing north towards Denniston Creek.

Photo 3: Denniston reservoir outfall.

Photo 4: Unnamed dirt road north of the Denniston WTP.

Photo 5: Slight erosion along the unnamed road past the Denniston WTP.

Photo 6: San Vicente Creek Diversion located off of Ranch Road past Moss Beach ranch.

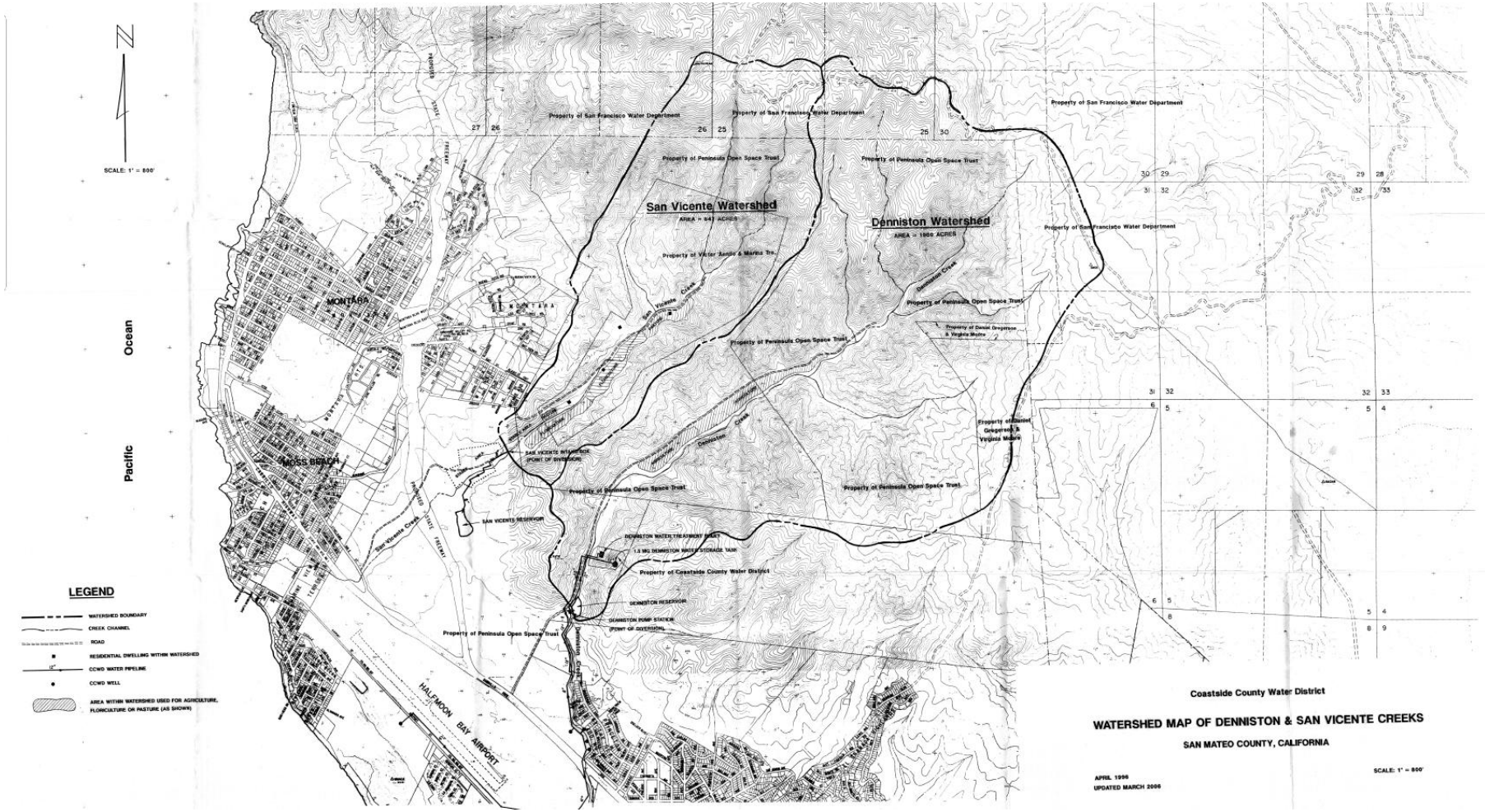
Photo 7: Upper San Vicente Creek Watershed, taken above the San Vicente Creek Diversion. As shown here, the San Vicente watershed is largely undeveloped and unimpacted by human activity.

Photo 8: Floriculture farms in the San Vicente watershed, accessed via Christine Road.

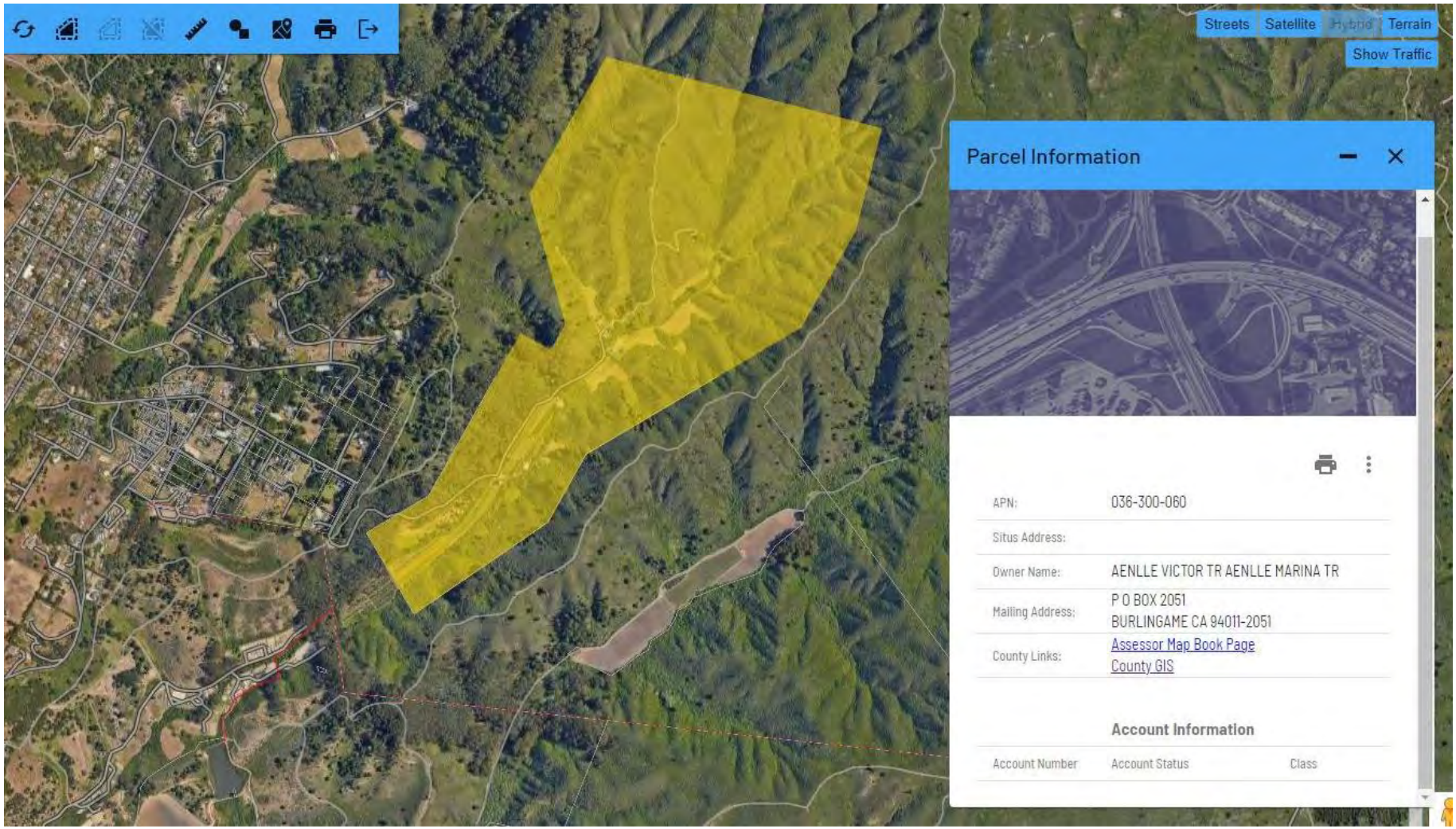
Photo 9: Floriculture plot in the San Vicente watershed.

Photo 10: A pasture with cows along Christine Road in the San Vicente watershed. There appears to be small amounts of livestock including a few horses and cows in the parcel owned by the Anelle Family.

Appendix B: Denniston San Vicente Watershed Boundaries



Appendix C: San Vicente Watershed – parcel owned by Victor and Marina Aenlle



Appendix D: Dredging Permit

Add CDFW Permit

Appendix E: Not Used

Appendix F: Cabrillo Farms Agricultural Use Letter

Sean Donovan

To the best of your knowledge, could you please fill out the following table with any information you have for your parcel?

Item	Type/quantity
Farmed acreage	20 acres
Livestock (cows, horses, pigs, chickens, etc.)	Ø
Crops	Brussels Sprouts, Peas
Insecticides	Movento, Sivanto, Radiant, Proclaim, Bravo, Wrangler
Fertilizers	Simplot 15-15-15 Romeo 23-0-13

Additionally, please provide information regarding the creek intake(s) located on your property. This includes any details surrounding the application, pumps, intake amounts, maintenance activities, etc.

No major changes or adjustments from last report. Good agricultural and food safety practices are followed

FEB 0 8 2000

February 3, 2000

Shannon Whiton
Department of Health Services
Drinking Water Field Operations Branch
2151 Berkeley Way, Room 458
Berkeley, CA 94704-1011

Re: Crop Chemicals - Denniston

Dear Ms. Whiton:

The purpose of this letter is to respond to your request of February 2, 2000 for a current list of chemicals used on the crops around the Denniston Well Field.

I contacted Cabrillo Farms, the company currently farming the area, and requested a list of chemicals they are presently using on their crops. Enclosed is a copy of the list of chemicals that are being utilized for the growing of vegetable crops.

If you need further information please do not hesitate to contact me.

Yours truly,

David L. Mier
Superintendent of Operations

Enclosure

CC: Robert R. Rathborne, General Manager

766 MAIN STREET, HALF MOON BAY, CALIFORNIA 94019 650-726-4405

Cabrillo Farms Inc.
845 MAIN STREET · HALF MOON BAY, CALIFORNIA 94019 · (415) 726-4412

FEB 0 8 2000

2/3/2000

Mr. David Mier
CCWD

As per your request I am supplying you with a list of the chemicals we use to grow our vegetable crops. They are used and applied in accordance with all pesticide laws under the supervision of the San Mateo County Agricultural Commissioner.

Telone	Pounce	Alliete
Vapam	Bravo	Diazinon
Terra Chlor	Benlate	Success
Lorsban	Di-methoate	
Ambush	Provado	

Sincerly
David Lea

Appendix G: Water Quality Monitoring Schedule

San Vincente Reservoir 2023 Sampling Schedule

All samples will be collected as soon as possible, beginning October 2023.

Group Name	Analyte Number	Analyte Name	Last Sampled	Frequency (months)	Next Due
SECONDARY/GP	1928	ALKALINITY, BICARBONATE	01-25-2021	12	2022/01
	1919	CALCIUM	01-09-2012	12	2013/01
	1929	ALKALINITY, CARBONATE	01-09-2012	12	2013/01
	1017	CHLORIDE	01-09-2012	12	2013/01
	1905	COLOR	01-09-2012	12	2013/01
	1022	COPPER, FREE	01-09-2012	12	2013/01
	2905	FOAMING AGENTS (SURFACTANTS)	01-09-2012	12	2013/01
	1915	HARDNESS, TOTAL (AS CACO3)	01-09-2012	12	2013/01
	1021	HYDROXIDE AS CALCIUM CARBONATE	01-09-2012	12	2013/01
	1028	IRON	01-09-2012	12	2013/01
	1031	MAGNESIUM	01-09-2012	12	2013/01
	1032	MANGANESE	01-25-2021	12	2022/01
	1920	ODOR	01-25-2021	12	2022/01
	1925	PH	01-09-2012	12	2013/01
	1050	SILVER	01-09-2012	12	2013/01
	1052	SODIUM	01-09-2012	12	2013/01
	1064	CONDUCTIVITY @ 25 C UMHOS/CM	11-22-2021	12	2022/11
	1055	SULFATE	01-09-2012	12	2013/01
	1930	TDS	01-09-2012	12	2013/01
	0100	TURBIDITY	11-30-2022	12	2023/11
	1095	ZINC	01-09-2012	12	2013/01
INORGANIC	1002	ALUMINUM	01-25-2021	12	2022/01
	1074	ANTIMONY, TOTAL	01-25-2021	12	2022/01
	1005	ARSENIC	01-25-2021	12	2022/01
	1010	BARIUM	01-25-2021	12	2022/01
	1075	BERYLLIUM, TOTAL	01-25-2021	12	2022/01
	1015	CADMIUM	01-25-2021	12	2022/01
	1020	CHROMIUM	01-25-2021	12	2022/01
	1024	CYANIDE	11-22-2021	12	2022/11
	1025	FLUORIDE	01-25-2021	12	2022/01
	1035	MERCURY	01-25-2021	12	2022/01
	1036	NICKEL	01-25-2021	12	2022/01
	1039	PERCHLORATE	11-22-2021	12	2022/11

	1045	SELENIUM	01-25-2021	12	2022/01
	1085	THALLIUM, TOTAL	01-25-2021	12	2022/01
NITRATE/ NITRITE	1040	NITRATE	01-25-2021	3	2021/04
	1041	NITRITE	01-25-2021	36	2024/01
RADIO-LOGICAL	4109	GROSS ALPHA PARTICLE ACTIVITY	01-27-2015	108	2024/01
REGULATED VOC	2981	1,1,1-TRICHLOROETHANE	11-22-2021	12	2022/11
	2988	1,1,2,2-TETRACHLOROETHANE	11-22-2021	12	2022/11
	2985	1,1,2-TRICHLOROETHANE	11-22-2021	12	2022/11
	2978	1,1-DICHLOROETHANE	11-22-2021	12	2022/11
	2977	1,1-DICHLOROETHYLENE	11-22-2021	12	2022/11
	2378	1,2,4-TRICHLOROBENZENE	11-22-2021	12	2022/11
	2968	O-DICHLOROBENZENE	11-22-2021	12	2022/11
	2980	1,2-DICHLOROETHANE	11-22-2021	12	2022/11
	2983	1,2-DICHLOROPROPANE	11-22-2021	12	2022/11
	2413	1,3-DICHLOROPROPENE	11-22-2021	12	2022/11
	2969	P-DICHLOROBENZENE	11-22-2021	12	2022/11
	2990	BENZENE	11-22-2021	12	2022/11
	2982	CARBON TETRACHLORIDE	11-22-2021	12	2022/11
	2380	CIS-1,2-DICHLOROETHYLENE	11-22-2021	12	2022/11
	2964	DICHLOROMETHANE	11-22-2021	12	2022/11
	2992	ETHYLBENZENE	11-22-2021	12	2022/11
	2251	METHYL TERT-BUTYL ETHER	11-22-2021	12	2022/11
	2989	CHLOROBENZENE	11-22-2021	12	2022/11
	2996	STYRENE	11-22-2021	12	2022/11
	2987	TETRACHLOROETHYLENE	11-22-2021	12	2022/11
	2991	TOLUENE	11-22-2021	12	2022/11
	2979	TRANS-1,2-DICHLOROETHYLENE	11-22-2021	12	2022/11
	2984	TRICHLOROETHYLENE	11-22-2021	12	2022/11
	2218	TRICHLOROFLUOROMETHANE	11-22-2021	12	2022/11
	2904	TRICHLOROTRIFLUOROETHANE	11-22-2021	12	2022/11
	2976	VINYL CHLORIDE	11-22-2021	12	2022/11
	2955	XYLENES, TOTAL	11-22-2021	12	2022/11
	2414	1,2,3-TRICHLOROPROPANE	11-26-2018	3	2019/02
	2063	2,3,7,8-TCDD	01-25-2021	33	2023/10
	2110	2,4,5-TP	01-25-2021	33	2023/10
	2105	2,4-D	01-25-2021	33	2023/10

REGULATED SOC	2051	LASSO (ALACHLOR)	01-25-2021	33	2023/10
	2050	ATRAZINE	01-25-2021	33	2023/10
	2625	BENTAZON	01-25-2021	33	2023/10
	2306	BENZO(A)PYRENE	01-25-2021	33	2023/10
	2046	CARBOFURAN	01-25-2021	33	2023/10
	2959	CHLORDANE	01-23-2018	33	2020/10
	2031	DALAPON	01-25-2021	33	2023/10
	2035	DI(2-ETHYLHEXYL) ADIPATE	01-25-2021	33	2023/10
	2039	DI(2-ETHYLHEXYL) PHTHALATE	01-25-2021	33	2023/10
	2931	1,2-DIBROMO-3-CHLOROPROPANE	01-25-2021	33	2023/10
	2041	DINOSEB	01-25-2021	33	2023/10
	2032	DIQUAT	01-25-2021	33	2023/10
	2033	ENDOTHALL	01-25-2021	33	2023/10
	2005	ENDRIN	01-23-2018	33	2020/10
	2946	ETHYLENE DIBROMIDE	01-25-2021	33	2023/10
	2034	GLYPHOSATE	01-25-2021	33	2023/10
	2065	HEPTACHLOR	01-23-2018	33	2020/10
	2067	HEPTACHLOR EPOXIDE	01-23-2018	33	2020/10
	2274	HEXACHLOROBENZENE	01-23-2018	33	2020/10
	2042	HEXACHLOROCYCLOPENTADIENE	01-23-2018	33	2020/10
	2010	BHC-GAMMA	01-23-2018	33	2020/10
	2015	METHOXYCHLOR	01-23-2018	33	2020/10
	2626	MOLINATE	01-25-2021	33	2023/10
	2036	OXAMYL	01-25-2021	33	2023/10
	2326	PENTACHLOROPHENOL	01-25-2021	33	2023/10
	2040	PICLORAM	01-25-2021	33	2023/10
	2383	TOTAL POLYCHLORINATED BIPHENYLS (PCB)	01-23-2018	3	2018/04
	2037	SIMAZINE	01-25-2021	33	2023/10
	2727	THIOBENCARB (BOLERO)	01-25-2021	33	2023/10
	2020	TOXAPHENE	01-23-2018	33	2020/10

Appendix H: Previous WSS Reports

2021 Update to Watershed Sanitary Survey

Coastside County Water District

WS 4110011

2021 UPDATE TO THE WATERSHED SANITARY SURVEY

Prepared by
Jim Steele Independent Environmental Consultant (hereinafter Consultant), Lake County CA, ecological evaluation, environmental permits, RPF #2421
November 2021

TABLE OF CONTENTS

I. INTRODUCTION

The Surface Water Filtration and Disinfection Treatment Regulations (SWTR), Section 64665, Title 22, California Code of Regulations (CCR) require that each supplier subject to the SWTR shall conduct a watershed sanitary survey once every 3 years and every 5 years for systems with outstanding performance. The Coastside County Water District (District) is an outstanding performance water district and currently utilizes surface water from Denniston Creek as a supply source to supplement water from other sources. Therefore this report reflects Denniston Watershed.

The District also has future plans to use water from San Vicente Creek as a supply source but presently there are no facilities in place for use of that source. The District does have a non-perfected water right for diversion of surface water from San Vicente Creek and considers it to be a potential future water supply source. San Vicente watershed will be included when it is an active water supply.

In 1996 the District prepared its initial (original) watershed sanitary survey (WSS) for Denniston & San Vicente Creek watersheds. The Department of Public Health has on file the initial WSS as well as the 2001, 2006, 2011 and 2016 updates.

The current report, dated November 2021, is the required 5-year update of the sanitary survey report for the Denniston Watershed and uses the same methodologies as the original report.

II. FINDINGS, CONCLUSIONS & RECOMMENDATIONS

A. Findings and Conclusions:

1. The District currently diverts surface water from Denniston Creek at Denniston Reservoir, and the District plans on continuing these diversions.
2. The ownership of the valley floor and upper slope area is Golden Gate National Recreation Area (GGNRA) and this ownership provides very low impact recreation such as hiking (with privy stops) with no horse or bicycle use. Embedded within this ownership is a 20 acre (8 hectares) farming ownership by the Lea family. The Lea family has farmed this location for several generations and is under strict food safety controls.
3. The Consultant performed a field investigation of potential contaminant sources. Ground survey found native riparian vegetation intact protecting the stream environment along Denniston Creek. A no-changes to the riparian policy exists for the farm and farm workers. No evidence of inappropriate riparian use was discovered. Field portable sanitary systems are provided for workers and the operation follows food safety protocols. One water supply pump exists in the stream for agricultural water supply and has been in place for several decades. Currently there are no observed or known significant potential contaminant sources.
4. The current watershed control and management practices within the Denniston watershed including those of the District, GGNRA, and the farmer have been reviewed and found adequate.
5. The water quality of the surface water from Denniston Creek and the water produced by the Denniston Water Treatment Plant (WTP) is in compliance with all state drinking water standards MCLs (maximum contaminant levels).
6. The current monitoring program for untreated water from Denniston Creek and for treated water from the Denniston WTP is in conformance with current regulations.
7. During the last report, the District finished the construction phase of an upgraded pretreatment process and 2017 upgrades to the chemical treatment system at the Denniston WTP are complete. These upgrades are performing as planned.

B. Recommendations:

8. This is a natural watershed which undergoes change from geologic and wildlife processes. The District should continue to annually evaluate methods to decrease the susceptibility of the Denniston Project facilities to influence from natural and human causes. Additional vigilance toward wildlife interactions with local human populations is recommended.
9. The District should maintain a channel as much as possible through the sediment created wetland upstream of the water intake in order to maintain high quality water flow, provide for a consolidated area for sediment dredging and reduce road flooding. Clearing plants along a defined channel route is the preferred method to keep the channel established and also avoid habitat impacts. This will minimize potential for contamination from within the wetland area.
10. The current CCWD water quality monitoring program for the Denniston Watershed (untreated water) and the Denniston WTP (treated water) is in compliance with DHS requirements and is considered adequate in that there are no known significant contaminant sources within the watershed. No changes are recommended.

III. CHANGES SINCE 2021 UPDATE

Brief: There have been no significant land or operational changes in the Denniston watershed which affects water quality since the 2016 Update Report. Comments below:

Section 1. Watershed and Water Supply System

A. **Watershed:**

1. Location -- No changes to CCWD facility locations since the 2016 report.
2. Land Uses -- No significant changes since the 2016 report. The watershed, other than farming and water supply remains undeveloped. The GGNRA opens the watershed above Denniston Creek to hiking and biking on upland trails, but no horse use is allowed. This is virtually the same use as previous owner POST (but without horses allowed by POST). The use is mostly by locals who are familiar with how to access the area and there is no indication of significant increase to the visitor base. The areas of access and use are the same, so the interest group remains the same (except for the loss of the horse community).
3. Zoning No changes since the 2016 report (zoned “Planned Agricultural District”).
4. Land Ownership POST was reported changed to GGNRA in the 2016 report. The ownership change was 12/9/2011. The mission of the GGNRA is preservation of the watershed, viewshed and ecological values through low impact use. The land is protected from planned golf links, subdivisions and ranchettes. Watershed ownerships for others remains unchanged; map attached. Map-Appendix 1.
5. Population No changes since the original report (No residents in the upper watershed area).
6. Topography No changes since the original report.
7. Geology No changes since the original report.
8. Soils No changes since the original report.
9. Landslide Susceptibility -- No changes since the original report.
10. Seismic Information No changes since the original report.
11. Precipitation, Runoff and Flooding Potential No significant changes since the original report. The local area has been in a prolonged drought (as was the State) but with flashy storm events. Flooding of a small portion ofaccess road to the treatment facility has occurred which resulted in additional creek brush clearing to aid flow.Rock was brought in to raise the road bed and some road edge repairs were made.
12. Hydrology No changes since the original report.
13. Reservoir Characteristics of Denniston Reservoir – As mitigation for the continuous sedimentation of the Denniston Reservoir the District annually undertakes a small dredging project to clear ~500 cu yards of sediment in the reservoir to open a small channel to the reservoir inlet (Appendix 5). No major water quality

problems, such as significant toxin, taste or odor from algae blooms, have occurred within the past 5 years.

However, Cryptosporidium and Giardia have occurred in very low concentrations and are considered a potential risk. Cryptosporidium (Crypto) are monitored under Bin 2 protocol of the SWRCB, DDW. Crypto is somewhat affected by dry conditions and the recent monitored results could indicate a decreased occurrence during the low rain period. Crypto is a widespread contaminant in surface water spread through animal agriculture, wastewater discharges, slaughter houses and wild animals or other sources of fecal matter. Only wildlife occur in significant quantities in the watershed.

Also, the potential for algae and other issues is sometimes possible during low flows since the channel passing through Tule overgrowth upstream of the intake cannot be reached by dredging. A permit (1602 Agreement) from the CA Department of Fish and Wildlife has allowed for pond dredging and some hand-cleared channel through the overgrowth to establish the channel there. Clear water generally passes through that channel reach lowering the risk of algae and bacteria influence.

14. Wetland Characteristics ----- No changes since the original report.
15. Groundwater Recharge------No changes since the original report.

B. **Water Supply System:**

1. History------No changes for Denniston since the last report.
2. Service Area Characteristics ------No changes since the original report.
3. Water Supply Sources ----- No changes in source since the original report.

Updated Production by source since 2015 in MG:

Year	Denniston Creek	Denniston Wells	San Vicente Creek
2016	144.3	8.6	0.0

2017	196.8	5.44	0.0
2018	133.8	4.55	0.0
2019	228.2	2.89	0.0
2020	127.1	11.73	0.0
2021	71.7	5.71	0.0

4. Facilities ----- No changes except: The water treatment facility has been upgraded as projected previously for 2016 but with final treated water pump station and transmission pipeline construction completed in 2017. The improvements have been signed off by the oversight agencies.
   Appendix 1. Watershed Map indicates current land ownerships.
5. Emergency Plans------ An updated emergency response plan is updated as of 11/2021.

Section 2. Potential Contaminant Sources in the Watersheds

Larry McCollum of LJMWQC conducted a basic field survey of the Denniston watershed and reservoir for the 1996 base report and in 2010 (for 2011 report) and Jim Steele an independent environmental consultant in later years to review the status of potential contaminant sources. Interviews of District staff and local farmers were also utilized to confirm watershed conditions during the period covered by this update.

A. Potential Contaminant Sources –

No changes since the 2011 and 2016 reports. The watershed is remarkably unchanged by human intrusion. There remains no wastewater, reclaimed water, urban, animal agriculture or industrial runoff in the watershed. The farming operation is under CA Department of Health Services food safety guidelines and inspected regularly and unannounced.

A letter by Cabrillo Farms Agriculture Inc. (Appendix 2. Dave Lea, 2021) indicates there are no new operations (20 acres farmed) in the upper watershed.

Crops are: Brussel sprouts, peas and leaks with occasional pumpkins.

Insecticides are: List of chemicals used on crops upstream of Denniston Water Treatment Plant (provided by the farmer): Durivo, Proclaim, Warrior II, Liberate, Wrangler, Movento, Radiant, Sivanto, Initiate, Blocker 4F.

Fertilizers are: 15-15-15, 12,12,12, Urea, 16-20, Ammonium Nitrate, Calcium Nitrate.

Grazing Animals, Concentrated Animal Facilities, Vegetation, Mine Runoff, Solid and hazardous Waste Disposal Facilities or Logging activity are not in watershed and not potential contamination sources so remain unchanged from original report.

Recreational Uses: The recreational use is limited and remains as described in the original report except that GGNRA does not allow horses in the watershed.

Unauthorized Activity: remains unchanged and no illegal dump sites are known or were detected in the field survey.

Groundwater: There remains no known wells or other activity within the watershed which could have a deleterious impact on ground water.

Seawater Intrusion: The diversion point within the watershed is well above sea level and not an issue.

Geologic Hazards: Hazards remain such as earthquakes and landslides. Heavy precipitation periods can contribute turbidity above treatment capacity. Alternate sources are groundwater and pipeline from Crystal Basin.

Fires: The potential for fire exists despite an absence of historical incidents. Alternate sources of water are available as above. Fire is not a major concern for safe operations.

B. Significance of Potential Contaminant Sources -- --

No changes since the 2011 and 2016 reports. Those reports and this one conclude there are no known significant potential sources within the Denniston watershed area, and therefore the potential for contamination of this supply source is low. However, since there has been a sampling result for Crypto in the surface water raw water supply. A positive result for Crypto is potentially significant and the source is unknown.

C. Anticipated Growth and Projected Changes in Sources of Contaminants -- -- No changes since the 2011 and 2016 reports. The conclusion is there are no known changes planned for the land in either of the watersheds, and because of ownerships, zoning and planning policies most types of development would be extremely difficult. No changes in sources of contaminants are anticipated for the same reasons.

D. Current Ownerships

The current major ownership of the valley floor is the Golden Gate National Recreation Area (GGNRA)-federal with inholdings by Lea farms-private and CCWD-State authorized district. The GGNRA provides very low impact recreation such as hiking in the watershed upstream of the intake. This is similar to the activities allowed by POST (Previous owner) except horse riding is presently restricted.

Section 3. Watershed Control and Management Practices

This section contains a discussion of existing and recommended watershed management practices for protection of drinking water quality for the Denniston Watershed.

A. Water Agency Management Practices for the Denniston Watershed -- --

No changes since the original report. Exceptions are additional signage indicating the sensitive nature of the area and public entrance is not allowed rather than locked gates (gates are present and can be locked as needed).

B. Other Agencies with Watershed Control Authority -- --

The changes since the 2016 report are minor but positive for reducing polluting constituents of concern since the new ownership by GGNRA.

C. Water Agency Coordination Measures -- --

No changes since the original report.

D. Recommended Control Measures –

This update report concludes that the current control measures for the Denniston watershed appear adequate. However, as with all of the District's facilities, it is recommended that the District continue to evaluate methods to decrease the susceptibility of the Denniston Project facilities to negative influences from natural and human causes. To this aim the District has instituted vegetation management immediately upstream of the intake and will continue pond dredging as needed to reduce sedimentation at the intake. The dredged area provides room in the reservoir for upstream land-erosion sediments due to storm events.

Section 4. Water Quality

This section contains a summary and evaluation of collected water quality data. The District monitors both the untreated and treated water in conformance with DPH regulations. Results are in Appendix 3 and online.

A. Bacteriological/Parasitic –Samples are collected throughout the water distribution system as originally described except for the following: Microbiological (E. coli) assessment as part of the LT2SWTR requirements determined placement in Bin 1 for the first round and Bin 2 based on the second round results of greater than 100 MPN/100mL. Bin 2 placement is for positive cryptosporidium results. CCWD is currently following a more stringent 0.15 NTU CFE/IFE requirement as per Bin 2 classification.

Annualized result example:

B.	Total Coliform MPN/100mL	E. coli MPN/100mL
2016 [1]	1840	282
2017 [2]	2135	58
2018 [3]	1363	143
2019	3571	49
2020	2867	188
2021 [4]	2107	56

1. In 2016, 8 of 11 samples were "> 2419 MPN/100 mL".
2. In 2016, 9 of 11 samples were "> 2419 MPN/100 mL".
3. From April 2018 onward, CCWD switched from monthly to weekly bacteriological sampling of Denniston raw water.
4. Results through October 27, 2021.

C. Turbidity – In addition to the annual source samples, turbidity grab samples are collected daily at Denniston WTP Influent during periods that the plant is online. To mitigate the historic, periodic high turbidity attributed to the silt accumulation behind the Denniston dam, a dredging project was conducted as described in III.1.A.13, above and in Appendix 5. The Denniston WTP is shut down during periods of high turbidity. An on-line turbidity meter is in place and monitors the influent turbidity constantly while the WTP is online.

D. Iron and Manganese – Plant influent and effluent are monitored daily for Iron and Manganese. Confirmation samples are collected weekly and sent to a contract lab for analysis. Raw water manganese levels average 0.1 mg/l and iron

1.3 mg/l in the annual sampling during the period of this update. Treated water manganese and iron levels average ND in the treatment plant effluent.

E. pH -- pH grab samples are collected daily at Denniston WTP influent and effluent. The pH of the untreated water ranges from 6.7 – 7.7. Effluent pH is targeted at levels over 8.0 for corrosion control using the Langelier Saturation Index.

F. Temperature – The temperature of the untreated and treated water at Denniston WTP is analyzed daily and is used for CT calculations.

G. Organic Chemicals –There have been no hits for any SOCs or VOCs in the Denniston watershed during the period of this update.

H. Inorganic Chemicals – When the plant is on line, General Mineral and General Physical constituents are monitored monthly and Inorganic constituents are monitored annually. Aluminum and Iron continue to be monitored weekly. Monitoring Schedule is Appendix 4. The raw water remains easy to treat and all constituents are reduced to levels below their respective MCL at the plant effluent. Improvements to the flash mixer in January 2006 improved coagulation efficiency. At the time of this report, and with the acceptance of plans by DPH, Denniston WTP has undergone major upgrades to the chemical delivery and control, solids handling, SCADA and pretreatment systems. These changes are signed off and operating.

I. Radionuclides –Radium levels were below the DLR in all four quarters of sampling, which was scheduled for 2007 during the period before this update.

Evaluation of Ability to Meet Surface Water Treatment Regulations Requirements:

A. SWTR/IESWTR/LT1ESWTR/Stage1D-DBPR -- The Denniston WTP is in compliance with the current regulations. CCWD continues to meet SWTR compliance in the areas of 1. Filtration; 2. Disinfection; 3. Monitoring; 4. Treatment Reliability. The watershed is an undisturbed watershed with minimal known influences on raw WQ.

B. Filter Backwash Rule – The Denniston WTP has dealt with issues raised in the 2011 Update and continues to be in compliance with the FBR.

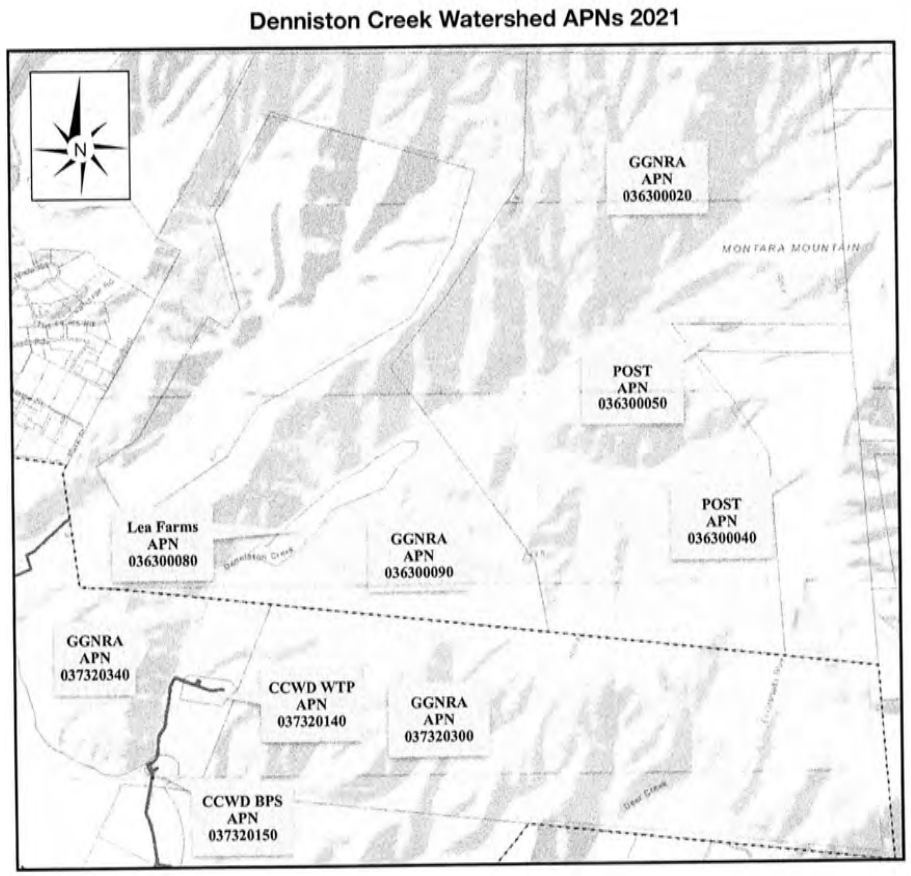
Evaluation of Ability to Meet Future Surface Water Treatment Regulations Requirements:

A. LT2SWTR – The results of District sampling have place it in Bin 2 because of the crypto monitoring result. The cryptosporidium results require additional monitoring and reporting to determine if additional steps should be taken in treatment. A continued evaluation of the source for crypto would be valuable. None of the usual sources exist in this relatively undisturbed watershed except for wildlife and that source has not changed. Wildlife transmission from potential sources such as nearby downstream human housing are possible through interaction with raccoon and bear scavenging. Raccoons are known to range throughout the lower and upper watershed. This interaction can be reduced significantly through increased waste-security public information as practiced by some rural counties.

B. Stage 2 DBPR -- The Denniston WTP has dealt with issues mentioned in the 2011 Update and continues to be compliant with the Stage 2 DBPR.

IV. APPENDICIES

Appendix 1 Ownership Map



Cabrillo Farms Agriculture Inc.

September 27, 2021

James Derbin
Superintendent of Operations
Coastside County Water District
650 726 4405

Dear James,

In response to your query regarding the Watershed Sanitary Survey, Cabrillo Farms Agriculture, Inc. has not made any changes in its land usage or operations within the backfield watershed. All cultural practices used are in accordance with all agricultural laws and regulations. We are also supervised by the San Mateo County Agricultural Commissioner's office.

Please let me know if you have any questions.

Dave Lea
650 888 2302

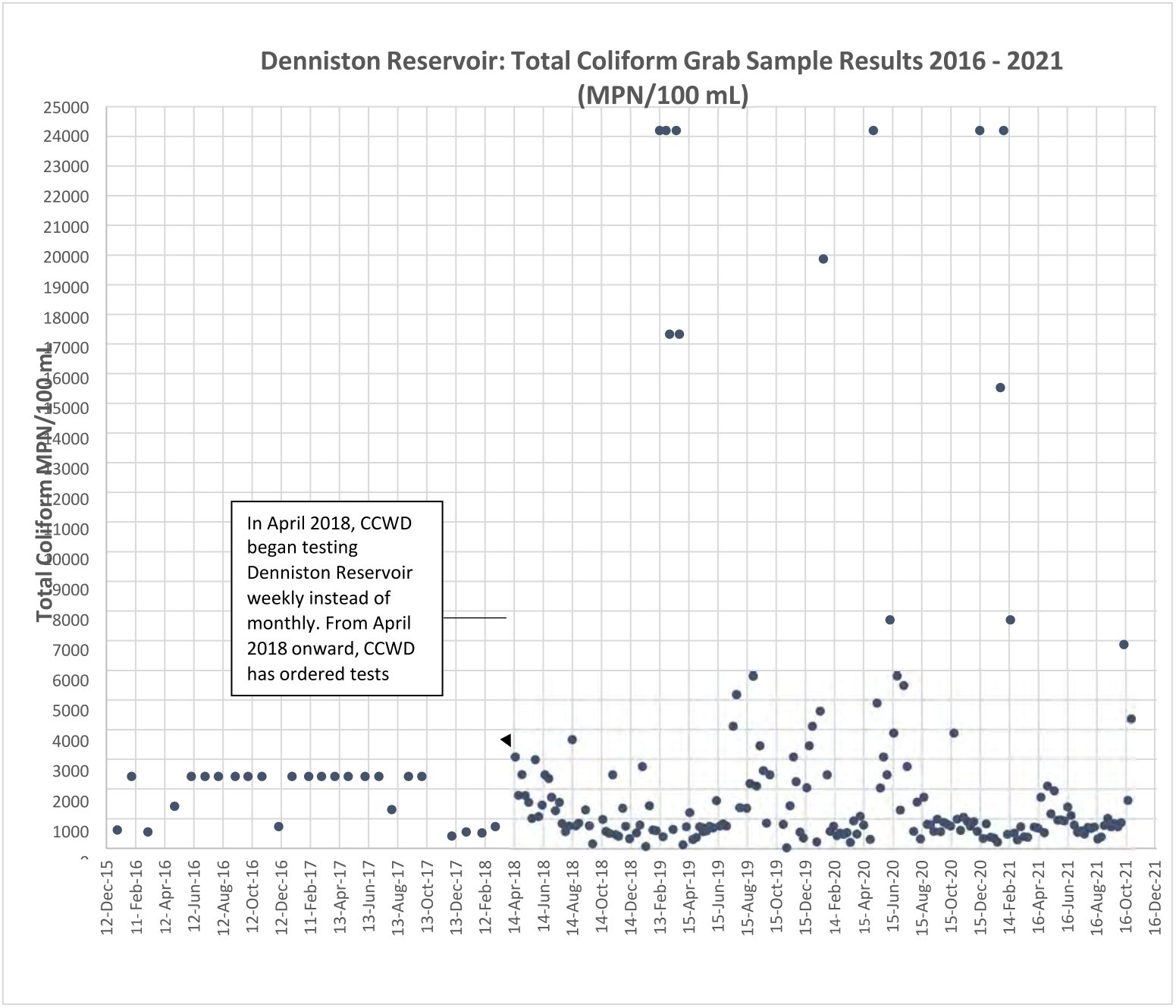
Thanks
David

Appendix 3. Water Sampling Results.

All data is available online at the Water Board data center at this link:

https://sdwis.waterboards.ca.gov/PDWW/JSP/NMonitoringSchedules.jsp?tinwsys_is_number=4127&tinwsys_st_code=CA&ReportFormat=SR

! **1550 Entries are on file for all analytes required by DHD. Charts below indicate coliform, E.coli and turbidity results:**


Denniston Reservoir: Total Coliform Grab Sample Results 2016 - 2021
(MPN/100 mL)
Total Coliform MPN/100 mL
In April 2018, CCWD began testing Denniston Reservoir weekly instead of monthly. From April 2018 onward, CCWD has ordered tests
25000
24000
23000
22000
21000
20000
19000
18000
17000
16000
15000
14000
13000
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
12-Dec-15
11- Feb-16
12- Apr-16
12-Jun-16
12-Aug-16
12-Oct-16
12-Dec-16
11-Feb-17
13-Apr-17
13-Jun-17
13-Aug-17
13-Oct-17
13-Dec-17
12-Feb-18
14-Apr-18
14-Jun-18
14-Aug-18
14-Oct-18
14-Dec-18
13-Feb-19
15-Apr-19
15-Jun-19
15-Aug-19
15-Oct-19
15-Dec-19
14- Feb-20
15- Apr-20
15-Jun-20
15-Aug-20
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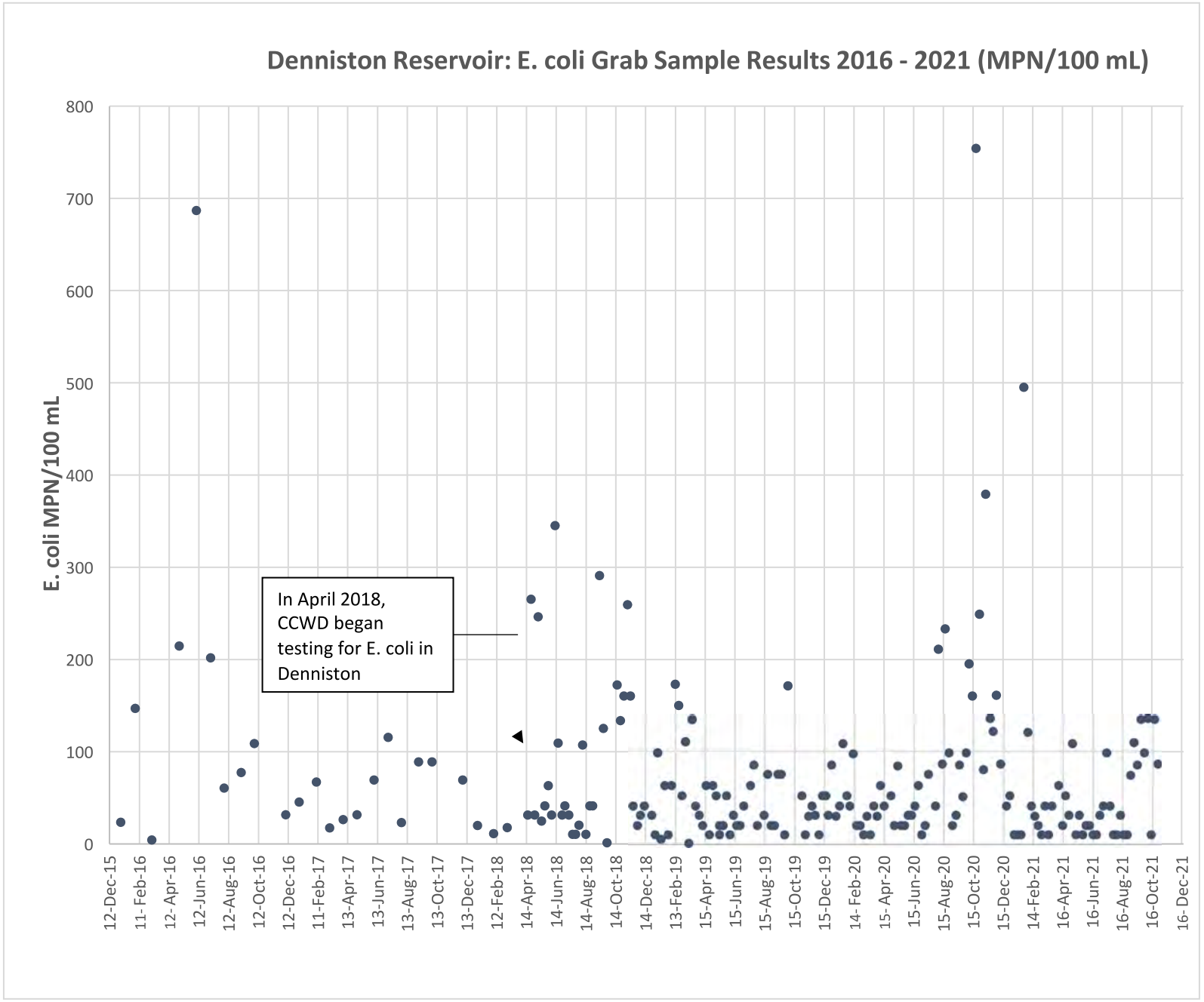
16-Apr-21
16-Jun-21
16-Aug-21
16-Oct-21
16-Dec-21


Denniston Reservoir: E. coli Grab Sample Results 2016 - 2021 (MPN/100 mL)
E. coli MPN/100 mL
800
700
600
500
400
300
200
100
0
In April 2018, CCWD began testing for E. coli in Denniston
12-Dec-15
11-Feb-16
12-Apr-16
12-Jun-16
12-Aug-16
12-Oct-16
12-Dec-16
11-Feb-17
13-Apr-17
13-Jun-17
13-Aug-17
13-Oct-17
13-Dec-17
12-Feb-18
14-Apr-18
14-Jun-18
14-Aug-18
14-Oct-18
14-Dec-18
13-Feb-19
15-Apr-19
15-Jun-19
15-Aug-19
15-Oct-19
15-Dec-19
14-Feb-20
15-Apr-20
15-Jun-20
15-Aug-20
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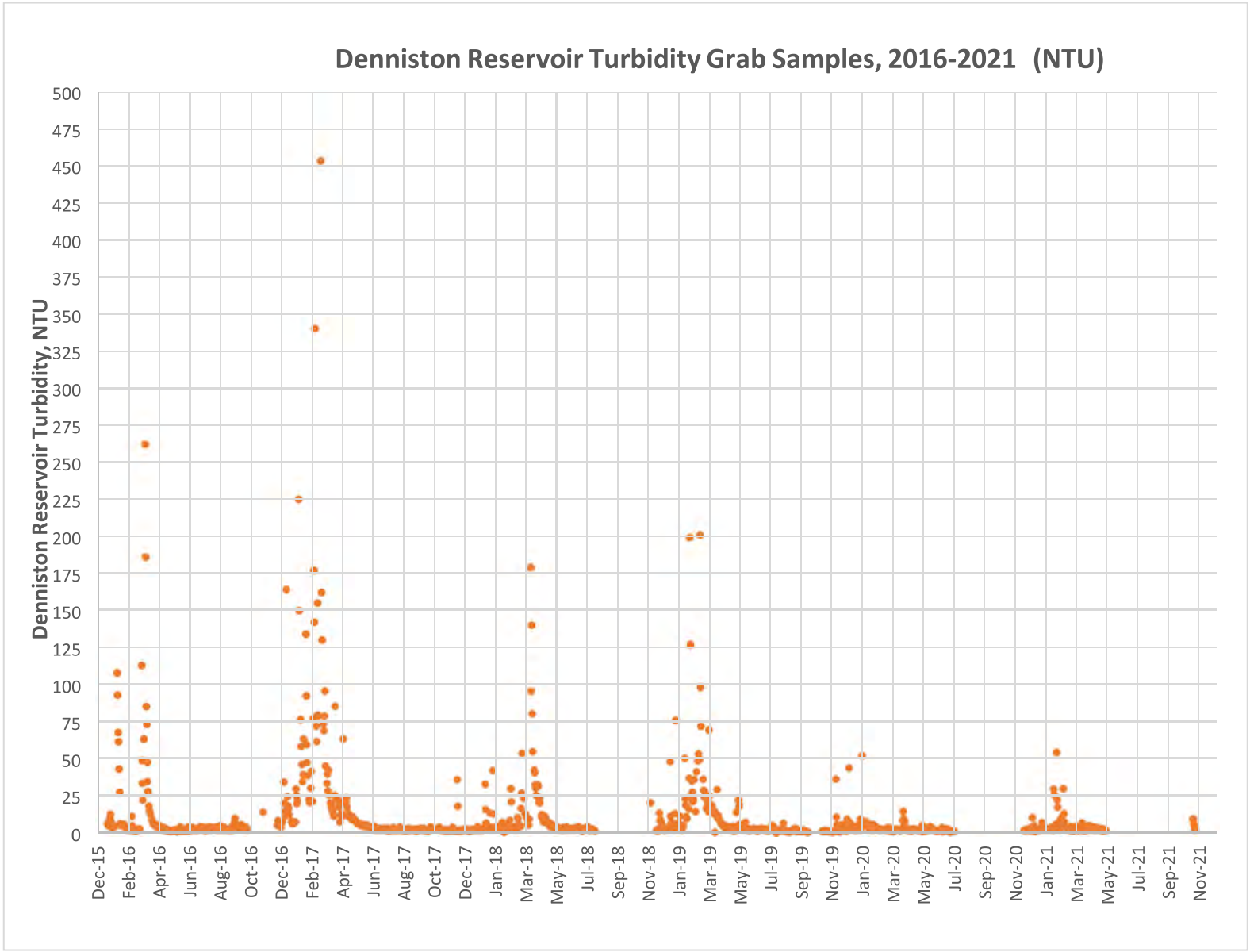
16-Apr-21
16-Jun-21
16-Aug-21
16-Oct-21
16-Dec-21


Denniston Reservoir Turbidity Grab Samples, 2016-2021 (NTU)
Denniston Reservoir Turbidity, NTU
500
475
450
425
400
375
350
325
300
275
250
225
200
175
150
125
100
75
50
25
0
Dec-15
Feb-16
Apr-16
Jun-16
Aug-16
Oct-16
Dec-16
Feb-17
Apr-17
Jun-17
Aug-17
Oct-17
Dec-17
Jan-18
Mar-18
May-18
Jul-18
Sep-18
Nov-18
Jan-19
Mar-19
May-19
Jul-19
Sep-19
Nov-19
Jan-20
Mar-20
May-20
Jul-20
Sep-20
Nov-20
Jan-21
Mar-21
May-21
Jul-21
Sep-21
Nov-21

Appendix #4 sampling schedule

Denniston WTP Watershed: Monitoring Frequencies

Sample Point Name	Denniston Reservoir - Raw	Denniston Well 1	Denniston Well 9	Denniston WTP - Treated	Denniston WTP Influent - Raw Blend
PS Code	*CA4110011_001_001*	*CA4110011_002_002*	*CA4110011_008_008*	*CA4110011_010_010*	*CA4110011_024_024*
Secondary/GP Panel	Annually	Three years	Three years	Annually	
Inorganics Panel	Annually	Three years	Three years	Annually	
Nitrate/Nitrite	Annually	Three years	Three years	Annually	
Regulated VOC Panel	Annually	Three years	Three years	Annually	
Regulated SOC Panel	Annually	21 months	33 months	Annually	
Gross Alpha	Nine Years	Three years	Three years		
Iron/Manganese/Aluminum	Weekly			Weekly	Monthly
Iron/Manganese			Quarterly		

Appendix #5 Surface Water Dredging Report.

Coastside County Water District

Denniston Reservoir Maintenance Project
Department of Fish and Game permit 1600-2016-350-R3

Independent biological oversight monitoring report for
California Department of Fish and Wildlife
Jim Steele
October 03 through-October 06, 2021 (5th year)

The Coastside County Water District water intake pond facility at Denniston Reservoir was dredged of ~500 Cu. Yds. sediment and vegetative spoils and transported to an approved disposal site ~1/2 mile upstream. Denniston Reservoir is located ~one-mile NE of the Half Moon Bay Airport on Denniston Road. The following is a report of operations. Among important species to protect were the ESA Listed SF Garter Snake (SFGS) *Thamnophis sirtalis tetrataenia* and the CA red-legged frog (CRLF) *Rana aurora*. The SFGS has one historical unconfirmed sighting (Berry) on record and the CRLF is confirmed at this site. Other species not ESA listed but of concern, are the (pacific pond turtle) and the dusty footed wood rat (DFWR). Also monitored for risk from operations were all nesting bird species, and the CA foothill yellow legged frog *Rana boylei* (which have not been sighted in the area).

A night survey was conducted October 3rd for CRLF before dredging operations began on Oct 4th and was repeated following dredge operations. Hot spot areas significant for CRLF were avoided during dredging or if discovered while dredging. Each area was surveyed during operations using binoculars.

Before operations began, straw bales were placed on strategic banks to protect frog and snake movement near equipment. Straw bales have been found useful as frogs are excluded from movement near the equipment and snakes tend to locate under the bales as a hide response. The bales were checked for wildlife by rolling each bale and then moving them as needed. Several common garter snakes *T. sirtalis,* and *T. elegans* and CRLF were detected this way. At one area where plastic silt fencing was used to protect from road silt during edge repairs a *T. sirtalis* was detected trying to get past the

barrier. This highlighted the trapping nature of the plastic silt fence toward the operations and demonstrated the value of the straw bales (straw bales should only be used in areas where introduced weeds are not a concern).

Prior to beginning operations training was provided to operators about avoiding and protecting CRLF and SFGS specifically and other wildlife generally. Drivers were restricted to 10 MPH on hauls. No truck drivers were switched out during the week and the drivers were enthusiastic about protecting wildlife. A plus for this operation is the use of a seasoned dredging equipment operator with several years' experience in Denniston Creek pond.

Dredging operations began on 10/04/2021 until 10/06/2021 from 1 hour after sunrise to sunset. The operations ran generally without interruption through the day. Before dredging equipment is moved to each area the equipment tracks are checked for wildlife. After movement, the track path is checked for casualties as a quality assurance. None were found.

At the beginning of each day and at the end, the dredge site was inspected for displaced wildlife. Several CA newt *Torica torosa* tracks and one individual were found (by a truck driver). The dredge site was also inspected at the end of operations to ensure that proper erosion controls (straw bales) were in place.

A biological monitor (Steele) was on site for all equipment operations. A 10X binocular was used to inspect each placement of the bucket, particularly where new bank area was disturbed.

General numbers of interest: Fog bank early clearing by 10. Air T 14C, H2O T 16C
Species noted: American coots~10, Great Blue Heron 3, King Fisher 1, extensive schools of three spine stickleback, several hundred tricolored blackbirds in tules early in the morning.

A significant hatch of CRLF were evident with 1 ½ to 3" frogs common. Maintaining the ponds open water area has been important during the past drought years. Several large adults were also noted.

Recommendations:

1. CDFW should consider aeration rather than pond drawdown to protect small fish species. Hypoxic conditions that affect wildlife are more likely during low water than maintaining water levels and adding aeration with water spray. Aeration is also more effective during light cyanobacteria blooms in maintaining O2 levels in the water column.
2. Retain hay bale boundary for operations. This has been very successful at keeping wildlife from equipment.

3. For new permits, retain the ability of CCWD to keep the channel above the pond clear of vegetation. This improves water quality for wildlife and water supply. Using equipment and developing a proper channel rather than hand cutting is recommended (the channel is closing down faster than the hand cutting effort). Water quality improvement will be significant.


616-44-6007
HercRentals

Water is discharged down race way

Straw bales are placed along N. edge of operations. Note large tules across waterway. 10/04/2021

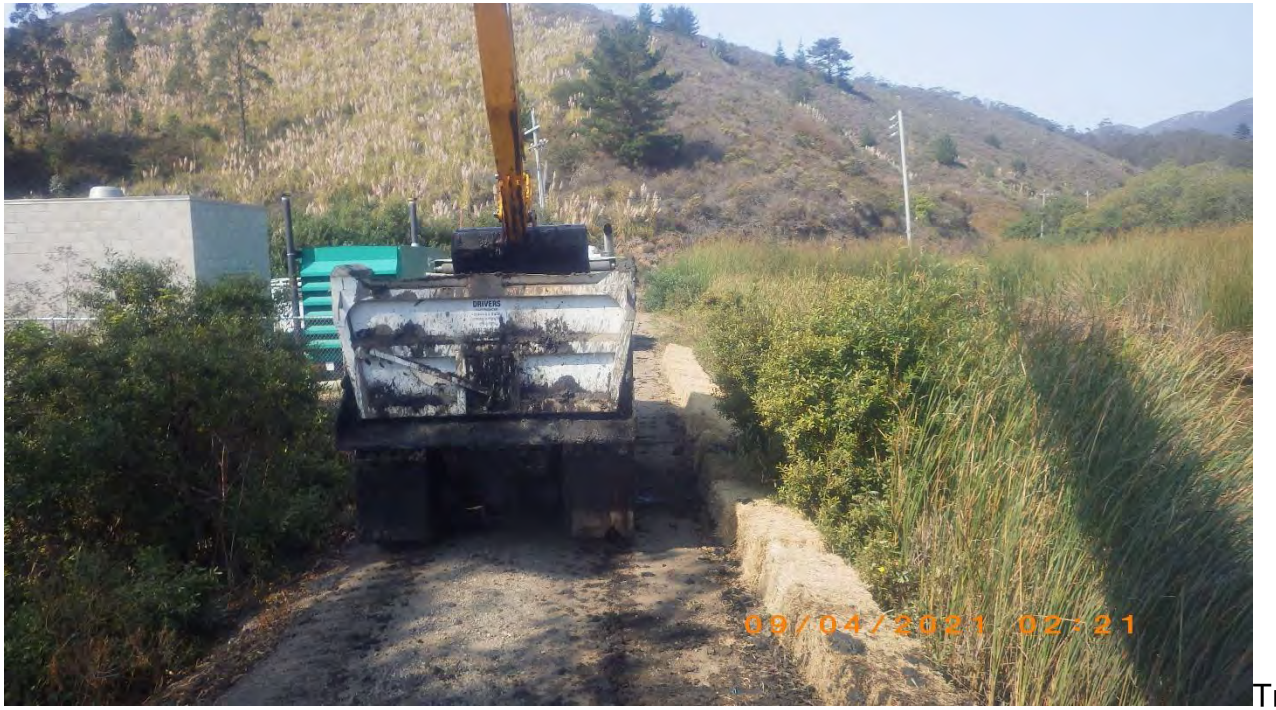
Equipment being cleaned offsite before using at pond. Correct time stamp 10/03/2021

Tules are pulled down for better viewing of bucket arm and wildlife. They spring back later.

View before dredging. Correct time stamp 10/04/2021

Face of dam immediately after dredging complete. Correct time stamp 10/05/2021

Long reach excavator avoids contact with bank. Correct time stamp 10/05/2021



Trucks are loaded behind hay bale protection before transport to dumpsite 10/04/2021

Dump site ½ mile up watershed is a temporary holding facility while materials dry out. 10/05/2021

Morning inspections before operations find and remove CRLF back to pond environment.

View to south after water fill and dredge complete 10/25/2021

Dredging is complete and pond is refilled. View to North taken 10/25/2021

Attested: Jim Steele, Biological Consultant

Jim Steele, Independent Biological Monitor
RPF#2421, Fresh water and Watershed Ecologist
Submitted October 27, 2021.

2016 Update to Watershed Sanitary Survey

Coastside County Water District

WS 4110011

2016 UPDATE TO THE WATERSHED SANITARY SURVEY

Prepared by
Jim Steele Independent Environmental Consultant
(hereinafter Consultant)
Lake County CA RPF #2421
August 2016

TABLE OF CONTENTS

APPENDICES

I. INTRODUCTION

The Surface Water Filtration and Disinfection Treatment Regulations (SWTR), Section 64665, Title 22, California Code of Regulations (CCR) require that each supplier subject to the SWTR shall conduct a watershed sanitary survey once every 3 years and every 5 years for systems with outstanding performance. The Coastside County Water District (District) is an outstanding performance water district and currently utilizes surface water from Denniston Creek as a supply source. The District plans to use water from San Vicente Creek as a supply source but presently there are no facilities in place for use of that source. The District does have a non-perfected water right for diversion of surface water from San Vicente Creek and considers it to be a potential future water supply source.

Cabrillo Farms with superior right does divert some water from the San Vicente Creek to fill one of its ponds via a small structure that was constructed back in the 1970s. The District is currently in negotiations with the Department of Water Resources to perfect their water right to the San Vicente watershed. The District must obtain an extension of its permit to 2021 so that construction of permanent facilities and conveyance structures can take place. The progress for this project was delayed during the last period but is anticipated for the next period.

In 1996 the District prepared its initial watershed sanitary survey (WSS) for Denniston & San Vicente Creek watersheds. The Department of Public Health has on file the initial WSS as well as the 2001, 2006 and 2011 updates.

The current report, dated July 2016, is the required 5-year update of the sanitary survey report for the Denniston Watershed. The San Vicente Creek Watershed is not included, as the District has not utilized it during this update period. Future updates to the WSS will include the San Vicente Creek Watershed at such time as the District utilizes its surface waters.

II. FINDINGS, CONCLUSIONS & RECOMMENDATIONS

A. Findings and Conclusions:

1. The District currently diverts surface water from Denniston Creek at Denniston Reservoir, and the District plans on continuing these diversions.
2. The Peninsula Open Space Trust (POST) ownership of the valley floor area has changed to the Golden Gate National Recreation Area (GGNRA) and resulted in minor change in land usage. (Appendix A).
3. The Consultant performed a field investigation of potential contaminant sources. Ground survey found riparian vegetation intact along the Denniston Creek protecting the stream environment, and significant natural vegetative boarders surrounding the farm fields. A no entry into the riparian policy exists for the farm workers. No evidence of inappropriate use was discovered.

   Currently there are no known significant potential contaminant sources.
4. The current watershed control and management practices within the Denniston watershed including those of the District, GGNRA, and the tenant farmer have been reviewed and found adequate. (Appendices A and B)
5. The water quality of the surface water from Denniston Creek and the water produced by the Denniston Water Treatment Plant is in compliance with all state drinking water standards MCLs (maximum contaminant levels).
6. The current monitoring program for untreated water from Denniston Creek and for treated water from the Denniston WTP is in conformance with current regulations.
7. The District finished the construction phase of a new pretreatment process, along with upgrades to the chemical treatment system, at the Denniston WTP.

B. Recommendations:

1. The District should continue to annually evaluate methods to decrease the susceptibility of the Denniston Project facilities to damage from natural and human causes.

2. The District should maintain a channel through the wetland upstream of the water intake in order to maintain high quality water flow, provide for a consolidated area for sediment dredging and reduce road flooding. Hand clearing of plants is the preferred method to keep the channel clear and avoid habitat impacts (see Section 1, A.13.)

III. CHANGES SINCE 2011 UPDATE

There have been no significant changes in the Denniston watershed which affects water quality since the 2011 Update Report.

Section 1. Watershed and Water Supply System

A. Watershed:

1. Location -- No changes since the 2011 report.
2. Land Uses -- No significant changes since the 2011 report. The GGNRA opens the watershed above Denniston Creek to hiking, but no horse use is allowed on upland trails and biking. This is virtually the same use as POST but without the horses. The use is mostly by locals who know how to access the area and there is no indication of significant increase to the visitor base. The areas of access and use are the same, so the interest group remains the same except for the loss of the horse community.
3. Zoning -- -- No changes since the 2011 report.
4. Land Ownership -- -- POST changed to GGNRA since the 2011 report. The ownership change was 12/9/2011. The mission of the GGNRA is preservation of the watershed, view shed and ecological values through low impact use. The land is protected from planned golf links, subdivisions and ranchettes.
5. Population -- -- No changes since the 2011 report.
6. Topography -- -- No changes since the 2011 report.
7. Geology -- -- No changes since the 2011 report.
8. Soils -- -- No changes since the 2011 report.
9. Landslide Susceptibility -- No changes since the 2011 report.
10. Seismic Information -- -- No changes since the 2011 report.
11. Precipitation, Runoff and Flooding Potential -- -- No changes since the 2011 report. California has been in a prolonged drought but with some flashy storm events. Flooding of a small portion of access road to the treatment facility has occurred which resulted in additional creek brush clearing to aid flow. Rock may be brought in to raise the road bed.
12. Hydrology -- -- No changes since the 2011 report.

13. Reservoir Characteristics of Denniston Reservoir – As mitigation for the continuous sedimentation of the Denniston Reservoir the District undertook a small dredging project to clear accumulated material near the reservoir outlet and open a small channel to the reservoir inlet (Appendix C). No major water quality problems, such as taste and odor from algae blooms, have occurred within the past 5 years. However, the potential for algae issues was possible since the channel passing through Tule overgrowth upstream of the intake was closed and could not be reached by dredging. A permit through the CA Department of Fish and Wildlife was obtained and a hand cleared channel through the overgrowth was achieved. Clear water now passes through that reach lowering the risk of algae and bacteria influence.
14. Wetland Characteristics -- -- No changes since the 2011 report.
15. Groundwater Recharge -- -- No changes since the 2011 report.

B. Water Supply System:

1. History -- -- No changes since the 2011 report.
2. Service Area Characteristics -- -- No changes since the 2011 report.
3. Water Supply Sources -- -- No changes since the 2011 report.
4. Facilities -- -- The water treatment facility has been upgraded as projected in the 2011 report and the improvements have been signed off by the oversight agencies. .
5. Emergency Plans -- -- No changes since the 2011 report

Section 2. Potential Contaminant Sources in the Watersheds

Larry McCollum of LJMWQC conducted a basic field survey of the Denniston watershed and reservoir on May 19, 2010 to review the status of potential contaminant sources. Interviews of District staff were also utilized to confirm watershed conditions during the period covered by this update.

A. Potential Contaminant Sources -- No changes since the 2011 report.

B. Significance of Potential Contaminant Sources -- -- No changes since the 2011 report. That report concludes that there are no significant potential contaminant sources within the Denniston watershed area, and therefore the potential for contamination of this supply source is unlikely.

C. Anticipated Growth and Projected Changes in Sources of Contaminants -- -- No changes since the 2011 report. The report concludes that there are no known changes planned for the land in either of the watersheds, and because of zoning and planning policies most types of development would be extremely difficult. No changes in sources of contaminants are anticipated for the same reasons.

D. The current ownership of the valley floor was transferred by POST to the Golden Gate National Recreation Area (GGNRA) during the period of the last WSS update. The GGNRA provides very low impact recreation such as hiking in the watershed upstream of the intake. This is similar to the activities allowed by POST except horse riding is presently restricted.

Section 3. Watershed Control and Management Practices

This section contains a discussion of existing and recommended watershed management practices for protection of drinking water quality for the Denniston Watershed.

A. Water Agency Management Practices for the Denniston Watershed -- -- No changes since the 2011 report.

B. Other Agencies with Watershed Control Authority -- -- The changes since the 201 report are minor and positive since the new ownership by GGNRA.

C. Water Agency Coordination Measures -- -- No changes since the 2011 report.

D. Recommended Control Measures -- This update report concludes that the current control measures for the Denniston watershed appear adequate.

However, as with all of the District's facilities, it is recommended that the District continue to evaluate methods to decrease the susceptibility of the Denniston Project facilities to damage from natural and human causes. To this aim the District has instituted vegetation management immediately upstream of the

intake and will continue dredging as needed to reduce sedimentation at the intake. The dredged area provides room in the reservoir for upstream land erosion due to storm events.

Section 4. Water Quality

This section contains a summary and evaluation of collected water quality data. The District monitors both the untreated and treated water in conformance with DPH monitoring schedule received in 2010. See attached Appendix D for attached schedules.

A. Bacteriological – DHS does not require bacteriological samples collected from the Denniston source at the present time. Microbiological assessment as part of the LT2SWTR requirements determined placement in Bin 1.

B. Turbidity – In addition to the annual source samples, turbidity grab samples are collected daily at Denniston WTP Influent during periods that the plant is online. To mitigate the historic, periodic high turbidity attributed to the silt accumulation behind the Denniston dam, a dredging project was conducted as described in III.1.A.13, above and in Appendix C. The Denniston WTP is shut down during periods of high turbidity. An on-line turbidity meter is in place and monitors the influent turbidity constantly while the WTP is online.

C. Iron and Manganese – Plant influent and effluent are monitored weekly for Iron and Manganese. Confirmation samples are collected weekly and sent to a contract lab for analysis. Raw water manganese levels average 0.1 mg/l and iron 1.3 mg/l in the annual sampling during the period of this update. Treated water manganese and iron levels average ND in the treatment plant effluent.

D. pH -- pH grab samples are collected daily at Denniston WTP influent and effluent. The pH of the untreated water ranges from 6.7 – 7.7. Effluent pH is targeted at levels over 8.0 for corrosion control using the Langelier Saturation Index.

E. Temperature – The temperature of the untreated and treated water at Denniston WTP is analyzed daily and is used for CT calculations.

F. Organic Chemicals –There have been no hits for any SOCs or VOCs in the Denniston watershed during the period of this update.

G. Inorganic Chemicals – When the plant is on line, General Mineral and General Physical constituents are monitored monthly and Inorganic constituents are monitored annually. Aluminum and Iron continue to be monitored weekly. The raw water remains easy to treat and all constituents are reduced to levels below their respective MCL at the plant effluent. Improvements to the flash mixer in January 06 improved coagulation efficiency. At the time of this report, and with the acceptance of plans by DPH, Denniston WTP has undergone major upgrades to the chemical delivery and control, solids handling, SCADA and pretreatment systems. These changes are signed off and operating.

H. Radionuclides –Radium levels were below the DLR in all four quarters of samples collected in 2015.

Evaluation of Ability to Meet Surface Water Treatment Regulations Requirements:

A. SWTR/IESWTR/LT1ESWTR/Stage1D-DBPR -- The Denniston WTP is in compliance with the current regulations.

B. Filter Backwash Rule – The Denniston WTP has dealt with issues raised in the 2011 Update and is currently in compliance with the FBR.

Evaluation of Ability to Meet Future Surface Water Treatment Regulations Requirements:

A. LT2SWTR – The results of District sampling have place it in Bin 1.

B. Stage 2 DBPR -- The Denniston WTP has dealt with issues mentioned in the 2011 Update and will be compliant with the Stage 2 DBPR.

2011 Update to Watershed Sanitary Survey

Coastside County Water District

WS 4110011

2011 Update
to the
Watershed Sanitary Survey

Prepared by LJMcCollum Water Quality Consulting
August 2011

TABLE OF CONTENTS

APPENDICES

I. INTRODUCTION

The Surface Water Filtration and Disinfection Treatment Regulations (SWTR), Section 64665,Title 22, California Code of Regulations (CCR) require that each supplier subject to the SWTR shall conduct a watershed sanitary survey once every five years. The Coastside County Water District (District) currently utilizes surface water from Denniston Creek as a supply source. The District does not currently utilize water from San Vicente Creek as a supply source and there are no facilities in place for use of that source, but the District does have water rights for diversion of surface water from San Vicente Creek and considers it to be a potential future water supply source.

Cabrillo Farms does utilize some water from the San Vicente Creek to fill one of his ponds via a small diversion structure that was constructed back in the 1970s. The District is currently in negotiations with the Department of Water Resources to perfect their water rights on the San Vicente watershed. The first step in this process is for the District to obtain an extension of its permit to 2016 so that construction of permanent facilities and conveyance structures can take place.

In 1996 the District prepared its initial watershed sanitary survey (WSS) for Denniston & San Vicente Creek watersheds. The Department of Public Health has on file the initial WSS as well as the 2001 and 2006 updates.

The current report, dated August 2011, is the required 5-year update sanitary survey report for the Denniston Watershed. The San Vicente Creek Watershed is not included, as the District has not utilized it during this update period. Future updates to the WSS will include the San Vicente Creek Watershed at such time as the District utilizes its surface waters.

II. FINDINGS, CONCLUSIONS & RECOMMENDATIONS

A. Findings and Conclusions:

1. The District currently diverts surface water from Denniston Creek at Denniston Reservoir, and the District plans on continuing these diversions.
2. The Peninsula Open Space Trust (POST) ownership of the valley floor area has resulted in no change in land usage. (Appendix A)
3. An investigation has been performed of potential contaminant sources. Currently there are no known significant potential contaminant sources.
4. The current watershed control and management practices within the Denniston watershed including those of the District, POST, and the farmer have been reviewed and found adequate. (Appendices A and B)
5. The water quality of the surface water from Denniston Creek and the water produced by the Denniston Water Treatment Plant is in compliance with all state drinking water standards MCLs (maximum contaminant levels).
6. The current monitoring program for untreated water from Denniston Creek and for treated water from the Denniston WTP is in conformance with current regulations.
7. The District is currently in the construction phase of an addition of a new pretreatment process, along with upgrades to the chemical treatment system, at the Denniston WTP.

B. Recommendations:

1. The District should continue to evaluate methods to decrease the susceptibility of the Denniston Project facilities to damage from natural and human causes.

III. CHANGES SINCE 2006 UPDATE

There have been no significant changes in the Denniston watershed, which affects water quality since the year 2006 Update Report.

Section 1. Watershed and Water Supply System

A. Watershed:

1. Location -- No changes since the 2006 report.
2. Land Uses -- No changes since the 2006 report.
3. Zoning -- -- No changes since the 2006 report.
4. Land Ownership -- -- No changes since the 2006 report.
5. Population -- -- No changes since the 2006 report.
6. Topography -- -- No changes since the 2006 report.
7. Geology -- -- No changes since the 2006 report.
8. Soils -- -- No changes since the 2006 report.
9. Landslide Susceptibility -- No changes since the 2006 report.
10. Seismic Information -- -- No changes since the 2006 report.
11. Precipitation, Runoff and Flooding Potential -- -- No changes since the 2006 report.
12. Hydrology -- -- No changes since the 2006 report.
13. Reservoir Characteristics of Denniston Reservoir – As mitigation for the continuous sedimentation of the Denniston Reservoir the District undertook a small dredging project to clear accumulated material near the reservoir outlet and open a small channel to the reservoir inlet (Appendix C). No major water quality problems, such as taste and odor from algae blooms, have occurred within the past 5 years.
14. Wetland Characteristics -- -- No changes since the 2006 report.
15. Groundwater Recharge -- -- No changes since the 2006 report.

B. Water Supply System:

1. History -- -- No changes since the 2006 report.
2. Service Area Characteristics -- -- No changes since the 2006 report.
3. Water Supply Sources -- -- No changes since the 2006 report.
    a. Facilities -- -- No changes since the 2006 report.
4. Emergency Plans -- -- No changes since the 2006 report.

Section 2. Potential Contaminant Sources in the Watersheds

Larry McCollum of LJMWQC conducted a basic field survey of the Denniston watershed and reservoir on May 19, 2010 to review the status of potential contaminant sources. Interviews of District staff were also utilized to confirm watershed conditions during the period covered by this update.

A. Potential Contaminant Sources -- No changes since the 2006 report.

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C. Anticipated Growth and Projected Changes in Sources of Contaminants -- -- No changes since the 2006 report. The report concludes that there are no known changes planned for the land in either of the watersheds, and because of zoning and planning policies most types of development would be extremely difficult. No changes in sources of contaminants are anticipated for the same reasons.

D. The current ownership of the valley floor may be transferred by POST to the Golden Gate National Recreation Area during the period of the next WSS update, but that status has not changed during the period of this update.

Section 3. Watershed Control and Management Practices

This section contains a discussion of existing and recommended watershed management practices for protection of drinking water quality for the Denniston Watershed.

A. Water Agency Management Practices for the Denniston Watershed -- -- No changes since the 2006 report.

B. Other Agencies with Watershed Control Authority -- -- No changes since the 2006 report.

C. Water Agency Coordination Measures -- -- No changes since the 2006 report.

D. Recommended Control Measures -- This update report concludes that the current control measures for the Denniston watershed appear adequate. However, as with all of the District's facilities, it is recommended that the District continue to evaluate methods to decrease the susceptibility of the Denniston Project facilities to damage from natural and human causes.

Section 4. Water Quality

This section contains a summary and evaluation of collected water quality data. The District monitors both the untreated and treated water in conformance with DPH monitoring schedule received in 2010. See attached Appendix D for attached schedules.

A. Bacteriological – DHS does not require bacteriological samples collected from the Denniston source at the present time. Microbiological assessment as part of the LT2SWTR requirements determined placement in Bin 1.

B. Turbidity – In addition to the annual source samples, turbidity grab samples are collected daily at Denniston WTP Influent during periods that the plant is online. To mitigate the historic, periodic high turbidity attributed to the silt accumulation behind the Denniston dam, a dredging project was conducted as described in III.1.A.13, above and in Appendix C. The Denniston WTP is shut down during

periods of high turbidity. An on-line turbidimeter is in place and monitors the influent turbidity constantly while the WTP is online.

C. Iron and Manganese – Plant influent and effluent are monitored daily for Iron and Manganese. Confirmation samples are collected weekly and sent to a contract lab for analysis. Raw water manganese levels average 0.1 mg/l and iron 1.3 mg/l in the annual sampling during the period of this update. Treated water manganese and iron levels average ND in the treatment plant effluent.

D. pH -- pH grab samples are collected daily at Denniston WTP influent and effluent. The pH of the untreated water ranges from 6.7 – 7.7. Effluent pH is targeted at levels over 8.0 for corrosion control using the Langelier Saturation Index.

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G. Inorganic Chemicals – When the plant is on line, General Mineral and General Physical constituents are monitored monthly and Inorganic constituents are monitored annually. Aluminum and Iron continue to be monitored weekly. The raw water remains easy to treat and all constituents are reduced to levels below their respective MCL at the plant effluent. Recent improvements to the flash mixer in January 06 improved coagulation efficiency. At the time of this report, and with the acceptance of plans by DPH, Denniston WTP is undergoing major upgrades to the chemical delivery and control, solids handling, SCADA and pretreatment systems.

H. Radionuclides –Radium levels were below the DLR in all four quarters of sampling, which was scheduled for 2007 during the period of this update.

Evaluation of Ability to Meet Surface Water Treatment Regulations Requirements:

A. SWTR/IESWTR/LT1ESWTR/Stage1D-DBPR -- The Denniston WTP is in compliance with the current regulations.

B. Filter Backwash Rule – The Denniston WTP has dealt with issues raised in the 2006 Update and is currently in compliance with the FBR.

Evaluation of Ability to Meet Future Surface Water Treatment Regulations Requirements:

A. LT2SWTR – The results of District sampling have place it in Bin 1.

B. Stage 2 DBPR -- The Denniston WTP has dealt with issues mentioned in the 2006 Update and will be compliant with the Stage 2 DBPR.

Peninsula Open Space Trust

July 19, 2011

Coastside County Water District
Attn: Joe Guistino
766 Main Street
Half Moon Bay, CA 94019

Re: Change in land operations in San Vicente Watershed

Dear Joe,

POST is in receipt of your letter dated June 28, 2011 regarding changes in land operations in the San Vicente watershed. This letter is to certify that there have been no significant changes to POST property or our land use activities within the San Vicente watershed over the past five years. A five-acre cut flower operation has ceased operation as of early 2011. No changes of ownership have occurred; however, as you are aware POST is actively working with the National Park Service to transfer approximately 3,800 acres of our Rancho Corral de Tierra property to become part of the Golden Gate National Recreation Area. Additionally, POST continues to monitor water quality in the watershed in partnership with the San Mateo County Resource Conservation District.

Please don't hesitate to contact Meghan Scanlon, POST's Conservation Project Manager, at 650-854-7696 or mscanlon@openspacetrust.org if you have any questions or need any additional information.

Regards,

Paul C. Ringgold
Director of Land Stewardship

222 High Street
Palo Alto, California 94301
Tel: (650) 854-7696
Fax: (650) 854-7703
www.openspacetrust.org

Cabrillo Farms
P.O. Box 355
Moss Beach, CA 94038

7/11/11

Joe Guistino
Superintendent of Operations
Coastside County Water District
766 Main Street
Half Moon Bay, CA 94019

Dear Joe:

I received your letter regarding the Watershed Sanitary Survey. We have had no changes in our land usage or our operations within the watershed the last 5 years. Our farming practices have changed very little over the last 30 years. If I can provide any specific information, please let me know.

Sincerely,

David Lea

David Lea, President
Cabrillo Farms

Coastside County Water District

Denniston Reservoir Maintenance Project
Department of Fish and Game permit 1600-2007-0480-3

Independent biological oversight monitoring report
Jim Steele
October 4 through-October 12, 2010

The Coastside County Water District water intake facility at Denniston Reservoir was dredged of ~400 Cu. Yds. sediment and spoils and transported to an approved disposal site ~1/2 mile upstream. Denniston Reservoir is located ~one mile NE of the Half Moon Bay Airport. The following is a report of the operations. Important species to protect were the ESA Listed SF Garter Snake (SFGS) and the CA red-legged frog (CRLF). The SFGS has one unconfirmed sighting on record and the CRLF is confirmed at this site. Other species not listed but of concern, were the (pacific pond turtle) and the dusty footed wood rat (DFWR). Also monitored for risk from operations were all nesting bird species.

A Focused survey was conducted for the CRLF to determine areas to be avoided on 10/04/10. Four site visits were made on the same night at different times separated by a couple of hours. Fewer CRLFs were noted earlier in the evening and additional visits made until all areas used by the frogs were noted. These areas were not dredged.

Before operations began, straw bales were placed on strategic banks to protect frog and snake movement near equipment. Straw bales have been found useful as frogs are excluded from movement near the equipment and snakes tend to hide under the bales as a hide response. The bales were checked for hiding snakes and moved as needed. Several Western aquatic garter snakes, *Thamnophis couchi* young of the year were found and moved to safety. No SFGS were seen.

Prior to beginning operations training was provided to operators about avoiding and protecting CRLF and SFGS specifically and other wildlife generally. Photos and pamphlets were shown.

Dredging operations began on 10/05/10 until 10/08/10 from ~8am until 4pm. The operations ran generally without interruption through the day. Before dredging equipment is moved to a new area the tracks are checked for wildlife. After movement, the track path is checked for casualties as a quality assurance. None were found.

At the beginning of each day and at the end the dredge site was inspected for displaced wildlife. None were found. The dredge site was also inspected at the end of operations to ensure that proper erosion controls were in place. The site closeout was completed 10/13/10.

A biological monitor (Steele) was on site for all equipment operations. A 10X binocular was used to inspect each placement of the bucket, particularly where new bank area was disturbed. No frogs were noted as at risk. At the conclusion of operations, erosion containment hay bales were placed at the disposal site.

Hay bales are ready to place. Water is drawn down.

Hay bales are in place. Area around intakes is cleared.

Creek inlet area is cleared in preparation to reconnect stream.

Tule habitat edge is maintained.

Habitat edge where frogs were noted was avoided.

Spoils site is maintained by concentrating sediment and has containment berm.

Tules are kept separated. For quality assurance, each morning ant tracks near spoils were inspected for signs of frogs. None were noted, but several newt tracks were detected.

As each reach was made, the water and bank was inspected for frogs and other wildlife movement. No dredging operation was conducted if frogs were detected. Frog activity was very low and presumably because water temperatures were low (~10 C).

No wildlife of concern was detected as harmed during this operation. Several CA. newts were captured by the bucket as noted by tracks at the dump site.

Jim Steele, Biological Monitor
Submitted October 22, 2010.

Water Quality Monitoring Plan: Coastside County Water District (WS4110011)

Surface Water and Treatment Plants

Source	Chem. Group	Sampling Frequency	Last sampled or status	2010 Q1	2010 Q2	2010 Q3	2010 Q4	2011 Q1	2011 Q2	2011 Q3	2011 Q4	2012 Q1	2012 Q2	2012 Q3	2012 Q4	2013 Q1	2013 Q2	2013 Q3	2013 Q4	2014 Q1	2014 Q2	2014 Q3	2014 Q4	2015 Q1	2015 Q2	2015 Q3	2015 Q4	2016 Q1	2016 Q2	2016 Q3	2016 Q4	Comments
Denniston Reservoir (4110011-001) Active Raw *Untreated surface water*	GM, GP	once / year	02/10	x				x				x				x				x				x				x				* = Future monitoring requirements will based on one's year's results.
	IOC	once / year	02/10	x				x				x				x				x				x				x				
	VOC	once / year	01/09	x				x				x				x				x				X				x				
	SOC	2 Q / 3 years	05/07	x	*x*											x	*x*											x	x			
	Gross alpha	once / 9 years	05/05																	x												
	Nitrate	once / year	02/10	x				x				x				x				x				x				x				
	Nitrite	once / 3 years	02/10	x												x																
	Asbestos	once / 9 years	01/08																							(next due Q1 2017)				
San Vincente Reservoir (4110011-019) Standby Raw *Untreated surface water*	GM, GP	once / 9 years	11/05									x														(next due Q1 2021)				
	IOC	once / 9 years	03/02									x														(next due Q1 2021)				
	VOC	once / 9 years	03/02									x														(next due Q1 2021)				
	SOC	once / 9 years	03/02									x														(next due Q1 2021)				
	Gross alpha	once / 9 years	03/06																					x		(next due Q1 2024)				
	Nitrate	once / 9 years	11/05									x														(next due Q1 2021)				
	Asbestos	once / 9 years	03/01	x																						(next due Q1 2019)				
Stone Dam Reservoir (4110011-022) Active Raw *Untreated surface water*	GM, GP	once / year	02/10	x				x				x				x				x				x				x				
	IOC	once / year	02/10	x				x				x				x				x				x				x				
	VOC	once / year	01/09	x				x				x				x				x				X				x				
	SOC	2 Q / 3 years	05/08					x	x											*x*	*x*											
	Gross alpha	once / 9 years	02/06																					x		(next due Q1 2024)				
	Nitrate	once / year	02/10	x				x				x				x				x				x				x				
	Nitrite	once / 3 years	02/10	x												x												x				
	Asbestos	once / 9 years	11/05																	x						(next due Q1 2023)				
Crystal Springs Reservoir (4110011-021) Active Raw *Untreated surface water*	GM, GP	once / year	02/10	x				x				x				x				x				x				x				
	IOC	once / year	02/10	x				x				x				x				x				x				x				
	VOC	once / year	01/09	x				x				x				x				x				X				x				
	SOC	2 Q / 3 years	05/08					x	x											*x*	*x*											
	Gross alpha	once / 9 years	02/06																					x		(next due Q1 2024)				
	Nitrate	once / year	02/10	x				x				x				x				x				x				x				
	Nitrite	once / 3 years	02/10	x												x												x				
	Asbestos	once / 9 years	11/05																	x						(next due Q1 2023)				
Denniston WTP Influent (4110011-024) Active Raw *Untreated SW & GW*	GM, GP	once / year	07/09	x				x				x				x				x				x				x				
	Al,Mn & Fe	Daily (in-house); Weekly (lab)	12/09	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	IOC	once / year	03/08	x				x				x				x				x				x				x				
	VOC	once / year	05/09	x				x				x				x				x				*x*				x				
	SOC	once / year	03/08	x				x				x				x				x				x				x				
	Nitrate	once / year	03/08	x				x				x				x				x				x				x				
	Nitrite	once / 3 years	03/08					x												x												

Surface Water and Treatment Plants

Source	Chem. Group	Sampling Frequency	Last sampled or status	2010 Q1	2010 Q2	2010 Q3	2010 Q4	2011 Q1	2011 Q2	2011 Q3	2011 Q4	2012 Q1	2012 Q2	2012 Q3	2012 Q4	2013 Q1	2013 Q2	2013 Q3	2013 Q4	2014 Q1	2014 Q2	2014 Q3	2014 Q4	2015 Q1	2015 Q2	2015 Q3	2015 Q4	2016 Q1	2016 Q2	2016 Q3	2016 Q4	Comments
Nunes WTP Influent (4110011-023) Active Raw *Untreated SW & GW*	GM, GP	once / year	03/10	x				x				x				x				x				x				x				
	Aluminum	Weekly (in-house); Weekly (lab)	05/10	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	*x*	x	x	x	x	x	x	x	x	x	x	x	
	Manganse	Monthly (lab)	05/10	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	*x*	x	x	x	x	x	x	x	x	x	x	x	
	Iron	Weekly (in-house); Monthly (lab)	05/10	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	IOC	once / year	01/10	x				x				x				x				x				x				x				
	VOC	once / year	01/10	x				x				x				x				x				*x*				x				
	SOC	once / year	01/10	x				x				x				x				x				x				x				
	Nitrate	once / year	01/10	x				x				x				x				x				x				x				
	Nitrite	once / 3 years	01/10													x												x				
	Asbestos	once / 9 years	11/07																									x				
Denniston WTP (4110011-010) Active Treated *Treated SW/GW*	GM, GP	once / year	07/09	x				x				x				x				x				x				x				* = Future monitoring requirements will based on one's year's results.
	Al, Mn & Fe	Daily (in-house), Weekly (lab)	05/10	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	IOC	once / year	03/08	x				x				x				x				x				x				x				
	VOC	once / year	05/09	x				x				x				x				x				*x*				x				
	SOC	once / year	03/08	x				x				x				x				x				x				x				
	Nitrate	once / year	03/08	x				x				x				x				x				x				x				
	Nitrite	once / 3 years	03/08					x												x												
Nunes WTP (4110011-011) Active Treated *Treated SW/GW*	GM, GP	once / year	03/10	x				x				x				x				x				x				x				* = Future monitoring requirements will based on one's year's results.
	Alumimum	Weekly (in-house & lab)	05/10	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	*x*	x	x	x	x	x	x	x	x	x	x	x	
	Manganese	Monthly (lab)	05/10	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	*x*	x	x	x	x	x	x	x	x	x	x	x	
	Iron	Weekly (in-house); Monthly (lab)	05/10	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	IOC	once / year	01/10	x				x				x				x				x				x				x				
	VOC	once / year	01/10	x				x				x				x				x				*x*				x				
	SOC	once / year	01/10	x				x				x				x				x				x				x				
	Nitrate	once / year	01/10	x				x				x				x				x				x				x				
	Nitrite	once / 3 years	01/10													x												x				
	Asbestos	once / 9 years	11/07																									x				

Legend:

GM, GP = General Mineral, General Physical
Radio = Radiological
IOC = Inorganic Chemicals
VOC = Volatile Organic Chemicals
SOC = Synthetic Organic Chemicals
TTHMs/HAA5s = Total Trihalomethanes/Haloacetic Acids

WQP = Water Quality Parameters
Q = Quarter
MTBE = Methyl-tert-butyl ether

d = daily; wk = weekly; mo = monthly
x = monitoring required in the quarter indicated
w = monitoring waiver granted
v = monitoring required or apply for waiver
[v] = as applicable, apply for continued waiver or monitor
r = monitoring required or apply for reduced monitoring
c = monitoring complete

Sampling frequencies are based on minimum monitoring requirements where no trigger levels or maximum contaminant levels are exceeded.

Notes on sampling:

1. Please see attached listing for compounds under each chemical group.
2. Raw water source samples must be taken from point prior to any treatment.
3. Samples must be analyzed using approved EPA methods for drinking water analysis.
4. All samples must be analyzed by a laboratory which is certified by the Department's Environmental Laboratory Accreditation Program (ELAP) to perform the analytical method(s).
5. Analytical results/reports received by the water supplier in a calendar month must be submitted to the Department no later than the tenth of the following month. All results/reports must be submitted using State Standard Reporting forms.

Denniston Reservoir Water Quality Data

Sample Site	Collected	Analysis	Result	Units
DENNISTON RESERVOIR	4/3/06	502.2 Volatile Organic Compound	ND	ug/l
DENNISTON RESERVOIR	2/20/07	502.2, Volatile Organic Compound	ND	ug/l
DENNISTON RESERVOIR	1/23/08	502.2, Volatile Organic Compound	ND	ug/l
DENNISTON RESERVOIR	1/28/09	502.2, Volatile Organic Compound	ND	ug/l
DENNISTON W.T. PLANT INFLUENT	11/24/09	Aluminum (Al)	ND	ug/L
DENNISTON CREEK UPSTREAM	7/10/06	Aluminum (Al)	206	ug/L
DENNISTON RESERVOIR	2/28/06	Aluminum (Al)	472	ug/L
DENNISTON RESERVOIR	5/30/06	Aluminum (Al)	295	ug/L
DENNISTON RESERVOIR	9/11/06	Aluminum (Al)	532	ug/L
DENNISTON RESERVOIR	2/20/07	Aluminum (Al)	486	ug/L
DENNISTON RESERVOIR	4/26/07	Aluminum (Al)	63	ug/L
DENNISTON RESERVOIR	1/23/08	Aluminum (Al)	182	ug/L
DENNISTON RESERVOIR	1/28/09	Aluminum (Al)	ND	ug/L
DENNISTON RESERVOIR	4/7/09	Aluminum (Al)	146	ug/L
DENNISTON RESERVOIR	2/23/10	Aluminum (Al)	187	ug/L
DENNISTON RESERVOIR	5/5/10	Aluminum (Al)	64	ug/L
DENNISTON RESERVOIR	2/28/06	Antimony (Sb)	ND	ug/L
DENNISTON RESERVOIR	2/20/07	Antimony (Sb)	ND	ug/L
DENNISTON RESERVOIR	1/23/08	Antimony (Sb)	ND	ug/L
DENNISTON RESERVOIR	1/28/09	Antimony (Sb)	ND	ug/L
DENNISTON RESERVOIR	2/23/10	Antimony (Sb)	0.1	ug/L
DENNISTON RESERVOIR	2/28/06	Arsenic (As)	ND	ug/L
DENNISTON RESERVOIR	2/20/07	Arsenic (As)	ND	ug/L
DENNISTON RESERVOIR	1/23/08	Arsenic (As)	ND	ug/L
DENNISTON RESERVOIR	1/28/09	Arsenic (As)	ND	ug/L
DENNISTON RESERVOIR	2/23/10	Arsenic (As)	0.2	ug/L
DENNISTON RESERVOIR	1/23/08	Asbestos	ND	MFL
DENNISTON RESERVOIR	2/28/06	Barium (Ba)	ND	ug/L
DENNISTON RESERVOIR	2/20/07	Barium (Ba)	ND	ug/L
DENNISTON RESERVOIR	1/23/08	Barium (Ba)	ND	ug/L
DENNISTON RESERVOIR	1/28/09	Barium (Ba)	ND	ug/L
DENNISTON RESERVOIR	2/23/10	Barium (Ba)	13.8	ug/L

Denniston Reservoir Water Quality Data

Sample Site	Collected	Analysis	Result	Units
DENNISTON RESERVOIR	2/28/06	Beryllium (Be)	ND	ug/L
DENNISTON RESERVOIR	2/20/07	Beryllium (Be)	ND	ug/L
DENNISTON RESERVOIR	1/23/08	Beryllium (Be)	ND	ug/L
DENNISTON RESERVOIR	1/28/09	Beryllium (Be)	ND	ug/L
DENNISTON RESERVOIR	2/23/10	Beryllium (Be)	0.1	ug/L
DENNISTON W.T. PLANT INFLUENT	11/24/09	Bicarbonate Alkalinity (as HCO3)	118.3	mg/L
DENNISTON RESERVOIR	2/28/06	Bicarbonate Alkalinity (as HCO3)	85.4	mg/L
DENNISTON RESERVOIR	2/20/07	Bicarbonate Alkalinity (as HCO3)	84.2	mg/L
DENNISTON RESERVOIR	1/23/08	Bicarbonate Alkalinity (as HCO3)	90.3	mg/L
DENNISTON RESERVOIR	1/28/09	Bicarbonate Alkalinity (as HCO3)	112.2	mg/L
DENNISTON RESERVOIR	2/23/10	Bicarbonate Alkalinity (as HCO3)	83	mg/L
DENNISTON RESERVOIR	2/28/06	Cadmium (Cd)	ND	ug/L
DENNISTON RESERVOIR	2/20/07	Cadmium (Cd)	ND	ug/L
DENNISTON RESERVOIR	1/23/08	Cadmium (Cd)	ND	ug/L
DENNISTON RESERVOIR	1/28/09	Cadmium (Cd)	ND	ug/L
DENNISTON RESERVOIR	2/23/10	Cadmium (Cd)	0.3	ug/L
DENNISTON W.T. PLANT INFLUENT	11/24/09	Calcium	25	mg/L
DENNISTON RESERVOIR	2/28/06	Calcium	18	mg/L
DENNISTON RESERVOIR	2/20/07	Calcium	20	mg/L
DENNISTON RESERVOIR	1/23/08	Calcium	23	mg/L
DENNISTON RESERVOIR	1/28/09	Calcium	23	mg/L
DENNISTON RESERVOIR	2/23/10	Calcium	20	mg/L
DENNISTON W.T. PLANT INFLUENT	11/24/09	Calculated Langelier	-0.76	CaCO3
DENNISTON RESERVOIR	2/28/06	Calculated Langelier	-0.86	CaCO3
DENNISTON RESERVOIR	2/20/07	Calculated Langelier	-0.01	CaCO3
DENNISTON RESERVOIR	1/23/08	Calculated Langelier	-0.42	CaCO3
DENNISTON RESERVOIR	1/28/09	Calculated Langelier	-0.52	CaCO3
DENNISTON RESERVOIR	2/23/10	Calculated Langelier	-0.91	CaCO4
DENNISTON RESERVOIR	2/28/06	Carbonate Alkalinity (as CO3)	ND	mg/l
DENNISTON RESERVOIR	2/20/07	Carbonate Alkalinity (as CO3)	ND	mg/l
DENNISTON RESERVOIR	1/23/08	Carbonate Alkalinity (as CO3)	ND	mg/L
DENNISTON RESERVOIR	1/28/09	Carbonate Alkalinity (as CO3)	ND	mg/L
DENNISTON RESERVOIR	2/23/10	Carbonate Alkalinity (as CO3)	ND	mg/L

Denniston Reservoir Water Quality Data

Sample Site	Collected	Analysis	Result	Units
DENNISTON RESERVOIR	2/28/06	Chromium (Cr)	ND	ug/L
DENNISTON RESERVOIR	2/20/07	Chromium (Cr)	ND	ug/L
DENNISTON RESERVOIR	1/23/08	Chromium (Cr)	ND	ug/L
DENNISTON RESERVOIR	1/28/09	Chromium (Cr)	ND	ug/L
DENNISTON RESERVOIR	2/23/10	Chromium (Cr)	0.7	ug/L
DENNISTON RESERVOIR	2/28/06	Cl (Chloride)	32	mg/L
DENNISTON RESERVOIR	2/20/07	Cl (Chloride)	32	mg/L
DENNISTON RESERVOIR	1/23/08	Cl (Chloride)	35	mg/L
DENNISTON RESERVOIR	1/28/09	Cl (Chloride)	35	mg/L
DENNISTON RESERVOIR	2/23/10	Cl (Chloride)	37	mg/L
DENNISTON W.T. PLANT INFLUENT	11/24/09	Color Determination	15	Color Units
DENNISTON RESERVOIR	2/28/06	Color Determination	200	Color Units
DENNISTON RESERVOIR	2/20/07	Color Determination	30	Color Units
DENNISTON RESERVOIR	1/23/08	Color Determination	50	Color Units
DENNISTON RESERVOIR	1/28/09	Color Determination	40	Color Units
DENNISTON RESERVOIR	2/23/10	Color Determination	75	Color Units
DENNISTON W.T. PLANT INFLUENT	11/24/09	Conductivity	298	umho/cm
DENNISTON RESERVOIR	2/28/06	Conductivity	263	umho/cm
DENNISTON RESERVOIR	2/20/07	Conductivity	270	umho/cm
DENNISTON RESERVOIR	1/23/08	Conductivity	302	umho/cm
DENNISTON RESERVOIR	1/28/09	Conductivity	300	umho/cm
DENNISTON RESERVOIR	2/23/10	Conductivity	249	umho/cm
DENNISTON W.T. PLANT INFLUENT	11/24/09	Copper (Cu)	ND	ug/L
DENNISTON RESERVOIR	2/20/07	Copper (Cu)	ND	ug/L
DENNISTON RESERVOIR	1/23/08	Copper (Cu)	ND	ug/L
DENNISTON RESERVOIR	1/28/09	Copper (Cu)	ND	ug/L
DENNISTON RESERVOIR	2/23/10	Copper (Cu)	2.2	ug/L
DENNISTON RESERVOIR	2/28/06	Copper (Cu)	ND	ug/L
DENNISTON RESERVOIR	2/28/06	Cyanide	ND	ug/L
DENNISTON RESERVOIR	2/20/07	Cyanide	ND	ug/L
DENNISTON RESERVOIR	1/23/08	Cyanide	ND	ug/L
DENNISTON RESERVOIR	1/28/09	Cyanide	ND	ug/L
DENNISTON RESERVOIR	2/23/10	Cyanide	ND	ug/L

Denniston Reservoir Water Quality Data

Sample Site	Collected	Analysis	Result	Units
DENNISTON RESERVOIR	2/20/07	Dioxin (EPA1613)	ND	ug/L
DENNISTON RESERVOIR	5/14/07	Dioxin (EPA1613)	ND	ug/L
DENNISTON RESERVOIR	2/23/10	Dioxin (EPA1613)	ND	ug/L
DENNISTON RESERVOIR	5/11/10	Dioxin (EPA1613)	ND	ug/L
DENNISTON RESERVOIR	2/20/07	Diuron	ND	ug/L
DENNISTON RESERVOIR	5/14/07	Diuron	ND	ug/L
DENNISTON RESERVOIR	2/23/10	Diuron	ND	ug/L
DENNISTON RESERVOIR	5/11/10	Diuron	ND	ug/L
DENNISTON RESERVOIR	2/28/06	F (Fluoride)	0.25	mg/L
DENNISTON RESERVOIR	2/20/07	F (Fluoride)	0.23	mg/L
DENNISTON RESERVOIR	1/23/08	F (Fluoride)	0.26	mg/L
DENNISTON RESERVOIR	1/28/09	F (Fluoride)	0.28	mg/L
DENNISTON RESERVOIR	2/23/10	F (Fluoride)	0.21	mg/L
DENNISTON W.T. PLANT INFLUENT	11/24/09	Hardness	101	mg/L
DENNISTON RESERVOIR	2/28/06	Hardness	74.6	mg/l
DENNISTON RESERVOIR	2/20/07	Hardness	75.9	mg/l
DENNISTON RESERVOIR	1/23/08	Hardness	88.3	mg/L
DENNISTON RESERVOIR	1/28/09	Hardness	88.7	mg/L
DENNISTON RESERVOIR	2/23/10	Hardness	75.1	mg/L
DENNISTON W.T. PLANT INFLUENT	11/24/09	Hydroxide Alkalinity (as OH)	ND	mg/L
DENNISTON RESERVOIR	2/28/06	Hydroxide Alkalinity (as OH)	ND	mg/l
DENNISTON RESERVOIR	2/20/07	Hydroxide Alkalinity (as OH)	ND	mg/l
DENNISTON RESERVOIR	1/23/08	Hydroxide Alkalinity (as OH)	ND	mg/L
DENNISTON RESERVOIR	1/28/09	Hydroxide Alkalinity (as OH)	ND	mg/L
DENNISTON RESERVOIR	2/23/10	Hydroxide Alkalinity (as OH)	ND	mg/L
DENNISTON RESERVOIR	2/28/06	Iron	1810	ug/L
DENNISTON RESERVOIR	2/20/07	Iron	795	ug/L
DENNISTON RESERVOIR	1/23/08	Iron	1000	ug/L
DENNISTON RESERVOIR	1/28/09	Iron	1530	ug/L
DENNISTON RESERVOIR	2/23/10	Iron	1300	ug/L

Denniston Reservoir Water Quality Data

Sample Site	Collected	Analysis	Result	Units
DENNISTON RESERVOIR	2/28/06	Lead (Pb)	ND	ug/L
DENNISTON RESERVOIR	2/20/07	Lead (Pb)	ND	ug/L
DENNISTON RESERVOIR	1/23/08	Lead (Pb)	ND	ug/L
DENNISTON RESERVOIR	1/28/09	Lead (Pb)	ND	ug/L
DENNISTON RESERVOIR	2/23/10	Lead (Pb)	0.1	ug/L
DENNISTON W.T. PLANT INFLUENT	11/24/09	Magnesium	9.4	mg/L
DENNISTON RESERVOIR	2/28/06	Magnesium	7.2	mg/L
DENNISTON RESERVOIR	2/20/07	Magnesium	6.3	mg/L
DENNISTON RESERVOIR	1/23/08	Magnesium	7.5	mg/L
DENNISTON RESERVOIR	1/28/09	Magnesium	7.6	mg/L
DENNISTON RESERVOIR	2/23/10	Magnesium	6.1	mg/L
DENNISTON W.T. PLANT INFLUENT	11/24/09	Manganese (Mn)	94	ug/L
DENNISTON RESERVOIR	2/28/06	Manganese (Mn)	84	ug/L
DENNISTON RESERVOIR	2/20/07	Manganese (Mn)	52	ug/L
DENNISTON RESERVOIR	1/23/08	Manganese (Mn)	132	ug/L
DENNISTON RESERVOIR	1/28/09	Manganese (Mn)	153	ug/L
DENNISTON RESERVOIR	2/23/10	Manganese (Mn)	120.1	ug/L
DENNISTON RESERVOIR	2/28/06	MBAS surfactants	ND	mg/L
DENNISTON RESERVOIR	2/20/07	MBAS, calculated as LAS, mol wt. 340	ND	mg/L
DENNISTON RESERVOIR	1/23/08	MBAS, calculated as LAS, mol wt. 340	ND	mg/L
DENNISTON RESERVOIR	1/28/09	MBAS, calculated as LAS, mol wt. 340	ND	mg/L
DENNISTON RESERVOIR	2/23/10	MBAS, calculated as LAS, mol wt. 340	ND	mg/L
DENNISTON RESERVOIR	2/28/06	Mercury (Hg)	ND	ug/L
DENNISTON RESERVOIR	2/20/07	Mercury (Hg)	ND	ug/L
DENNISTON RESERVOIR	1/23/08	Mercury (Hg)	ND	ug/L
DENNISTON RESERVOIR	1/28/09	Mercury (Hg)	ND	ug/L
DENNISTON RESERVOIR	2/23/10	Mercury (Hg)	0	ug/L
DENNISTON RESERVOIR	2/28/06	Nickel (Ni)	ND	ug/L
DENNISTON RESERVOIR	2/20/07	Nickel (Ni)	ND	ug/L
DENNISTON RESERVOIR	1/23/08	Nickel (Ni)	ND	ug/L
DENNISTON RESERVOIR	1/28/09	Nickel (Ni)	ND	ug/L
DENNISTON RESERVOIR	2/23/10	Nickel (Ni)	3.1	ug/L

Denniston Reservoir Water Quality Data

Sample Site	Collected	Analysis	Result	Units
DENNISTON RESERVOIR	2/28/06	Nitrite as nitrogen	ND	ug/L
DENNISTON RESERVOIR	2/20/07	Nitrite as nitrogen	ND	ug/L
DENNISTON RESERVOIR	1/23/08	Nitrite as nitrogen	ND	ug/L
DENNISTON RESERVOIR	1/28/09	Nitrite as nitrogen	ND	ug/L
DENNISTON RESERVOIR	2/23/10	Nitrite as nitrogen	<400	ug/L
DENNISTON RESERVOIR	2/28/06	NO3 (Nitrate)	ND	mg/L
DENNISTON RESERVOIR	2/20/07	NO3 (Nitrate)	4	mg/L
DENNISTON RESERVOIR	1/23/08	NO3 (Nitrate)	3	mg/L
DENNISTON RESERVOIR	1/28/09	NO3 (Nitrate)	ND	mg/L
DENNISTON RESERVOIR	2/23/10	NO3 (Nitrate)	2	mg/L
DENNISTON RESERVOIR	3/5/08	Perchlorate	ND	ug/L
DENNISTON RESERVOIR	9/3/08	Perchlorate	ND	ug/L
DENNISTON RESERVOIR	5/26/09	Perchlorate	ND	ug/L
DENNISTON RESERVOIR	5/5/10	Perchlorate	ND	ug/L
DENNISTON W.T. PLANT INFLUENT	11/24/09	pH (Laboratory)	6.7	Std Units
DENNISTON RESERVOIR	2/28/06	pH (Laboratory)	6.9	Std Units
DENNISTON RESERVOIR	2/20/07	pH (Laboratory)	7.7	Std Units
DENNISTON RESERVOIR	1/23/08	pH (Laboratory)	7.2	Std Units
DENNISTON RESERVOIR	1/28/09	pH (Laboratory)	7	Std Units
DENNISTON RESERVOIR	2/23/10	pH (Laboratory)	6.8	Std Units
DENNISTON W.T. PLANT INFLUENT	11/24/09	Potassium	0.8	mg/L
DENNISTON RESERVOIR	2/28/06	Potassium	0.8	mg/L
DENNISTON RESERVOIR	2/20/07	Potassium	0.9	mg/L
DENNISTON RESERVOIR	1/23/08	Potassium	0.7	mg/L
DENNISTON RESERVOIR	1/28/09	Potassium	0.6	mg/L
DENNISTON RESERVOIR	2/23/10	Potassium	0.6	mg/L
DENNISTON RESERVOIR	2/20/07	Radium 228	ND	pCi/l
DENNISTON RESERVOIR	6/5/07	Radium 228	ND	pCi/l
DENNISTON RESERVOIR	9/20/07	Radium 228	ND	pCi/l
DENNISTON RESERVOIR	12/10/07	Radium 228	ND	pCi/l

Denniston Reservoir Water Quality Data

Sample Site	Collected	Analysis	Result	Units
DENNISTON RESERVOIR	2/28/06	Selenium (Se)	ND	ug/L
DENNISTON RESERVOIR	2/20/07	Selenium (Se)	6	ug/L
DENNISTON RESERVOIR	1/23/08	Selenium (Se)	ND	ug/L
DENNISTON RESERVOIR	1/28/09	Selenium (Se)	ND	ug/L
DENNISTON RESERVOIR	2/23/10	Selenium (Se)	0.2	ug/L
DENNISTON W.T. PLANT INFLUENT	11/24/09	Silver (Ag)	ND	ug/L
DENNISTON RESERVOIR	2/28/06	Silver (Ag)	ND	ug/L
DENNISTON RESERVOIR	2/20/07	Silver (Ag)	ND	ug/L
DENNISTON RESERVOIR	1/23/08	Silver (Ag)	ND	ug/L
DENNISTON RESERVOIR	1/28/09	Silver (Ag)	ND	ug/L
DENNISTON RESERVOIR	2/23/10	Silver (Ag)	0.3	ug/L
DENNISTON RESERVOIR	2/28/06	SO4 (Sulfate)	9	mg/L
DENNISTON RESERVOIR	2/20/07	SO4 (Sulfate)	10	mg/L
DENNISTON RESERVOIR	1/23/08	SO4 (Sulfate)	13	mg/L
DENNISTON RESERVOIR	1/28/09	SO4 (Sulfate)	10	mg/L
DENNISTON RESERVOIR	2/23/10	SO4 (Sulfate)	14	mg/L
DENNISTON W.T. PLANT INFLUENT	11/24/09	Sodium	30	mg/L
DENNISTON RESERVOIR	2/28/06	Sodium	24	mg/L
DENNISTON RESERVOIR	2/20/07	Sodium	23	mg/L
DENNISTON RESERVOIR	1/23/08	Sodium	29	mg/L
DENNISTON RESERVOIR	1/28/09	Sodium	24	mg/L
DENNISTON RESERVOIR	2/23/10	Sodium	23	mg/L
DENNISTON RESERVOIR	2/20/07	Synthetic Organic Compounds	ND	ug/l
DENNISTON RESERVOIR	5/14/07	Synthetic Organic Compounds	ND	ug/l
DENNISTON RESERVOIR	2/23/10	Synthetic Organic Compounds	ND	ug/L
DENNISTON RESERVOIR	5/11/10	Synthetic Organic Compounds	ND	ug/L
DENNISTON RESERVOIR	2/28/06	Thallium (Tl)	ND	ug/L
DENNISTON RESERVOIR	2/20/07	Thallium (Tl)	ND	ug/L
DENNISTON RESERVOIR	1/23/08	Thallium (Tl)	ND	ug/L
DENNISTON RESERVOIR	1/28/09	Thallium (Tl)	ND	ug/L
DENNISTON RESERVOIR	2/23/10	Thallium (Tl)	0	ug/L

Denniston Reservoir Water Quality Data

Sample Site	Collected	Analysis	Result	Units
DENNISTON W.T. PLANT INFLUENT	11/24/09	Threshold odor number	3	TON
DENNISTON RESERVOIR	2/28/06	Threshold odor number	5	TON
DENNISTON RESERVOIR	2/20/07	Threshold odor number	3	TON
DENNISTON RESERVOIR	1/23/08	Threshold odor number	4	TON
DENNISTON RESERVOIR	1/28/09	Threshold odor number	3	TON
DENNISTON RESERVOIR	2/23/10	Threshold odor number	6	TON
DENNISTON W.T. PLANT INFLUENT	11/24/09	Total Alkalinity (as CaCO3)	97	mg/L
DENNISTON RESERVOIR	2/28/06	Total Alkalinity (as CaCO3)	70	mg/L
DENNISTON RESERVOIR	2/20/07	Total Alkalinity (as CaCO3)	69	mg/L
DENNISTON RESERVOIR	1/23/08	Total Alkalinity (as CaCO3)	74	mg/L
DENNISTON RESERVOIR	1/28/09	Total Alkalinity (as CaCO3)	92	mg/L
DENNISTON RESERVOIR	2/23/10	Total Alkalinity (as CaCO3)	68	mg/L
DENNISTON W.T. PLANT INFLUENT	11/24/09	Total Dissolved Solids (TDS)	164	mg/L
DENNISTON RESERVOIR	2/28/06	Total Dissolved Solids (TDS)	205	mg/L
DENNISTON RESERVOIR	2/20/07	Total Dissolved Solids (TDS)	190	mg/L
DENNISTON RESERVOIR	1/23/08	Total Dissolved Solids (TDS)	180	mg/L
DENNISTON RESERVOIR	1/28/09	Total Dissolved Solids (TDS)	188	mg/L
DENNISTON RESERVOIR	2/23/10	Total Dissolved Solids (TDS)	180	mg/L
DENNISTON RESERVOIR SITE #1	6/17/10	Total Dissolved Solids (TDS)	148	mg/L
DENNISTON RESERVOIR SITE #2	6/17/10	Total Dissolved Solids (TDS)	188	mg/L
DENNISTON RESERVOIR SITE #3	6/17/10	Total Dissolved Solids (TDS)	192	mg/L
DENNISTON RESERVOIR SITE #4	6/17/10	Total Dissolved Solids (TDS)	252	mg/L
DENNISTON RESERVOIR SITE #5	6/17/10	Total Dissolved Solids (TDS)	204	mg/L
DENNISTON RESERVOIR SITE #6	6/17/10	Total Dissolved Solids (TDS)	200	mg/L
DENNISTON RESERVOIR	2/20/07	Total Radium 228	ND	Attached
DENNISTON RESERVOIR	5/14/07	Total Radium 228	ND	Attached
DENNISTON RESERVOIR	8/22/07	Total Radium 228	ND	Attached
DENNISTON RESERVOIR	11/7/07	Total Radium 228	ND	Attached

Denniston Reservoir Water Quality Data

Sample Site	Collected	Analysis	Result	Units
DENNISTON RESERVOIR	1/9/06	Total Suspended Solids	26	mg/L
DENNISTON RESERVOIR	5/15/06	Total Suspended Solids	5.4	mg/L
DENNISTON RESERVOIR	9/11/06	Total Suspended Solids	52	mg/L
DENNISTON RESERVOIR SITE #1	6/17/10	Total Suspended Solids	<5	mg/L
DENNISTON RESERVOIR SITE #2	6/17/10	Total Suspended Solids	12	mg/L
DENNISTON RESERVOIR SITE #3	6/17/10	Total Suspended Solids	<5	mg/L
DENNISTON RESERVOIR SITE #4	6/17/10	Total Suspended Solids	<5	mg/L
DENNISTON RESERVOIR SITE #5	6/17/10	Total Suspended Solids	<5	mg/L
DENNISTON RESERVOIR SITE #6	6/17/10	Total Suspended Solids	<5	mg/L
DENNISTON W.T. PLANT INFLUENT	11/24/09	Turbidity (Laboratory)	6.3	NTU
DENNISTON RESERVOIR	2/28/06	Turbidity (Laboratory)	37	NTU
DENNISTON RESERVOIR	2/20/07	Turbidity (Laboratory)	9.3	NTU
DENNISTON RESERVOIR	1/23/08	Turbidity (Laboratory)	11	NTU
DENNISTON RESERVOIR	1/28/09	Turbidity (Laboratory)	12	NTU
DENNISTON RESERVOIR	2/23/10	Turbidity (Laboratory)	9.5	NTU
DENNISTON RESERVOIR	2/23/10	Volatile Organic Compounds	ND	ug/L
DENNISTON W.T. PLANT INFLUENT	11/24/09	Zinc (Zn)	ND	ug/L
DENNISTON RESERVOIR	2/28/06	Zinc (Zn)	ND	ug/L
DENNISTON RESERVOIR	2/20/07	Zinc (Zn)	ND	ug/L
DENNISTON RESERVOIR	1/23/08	Zinc (Zn)	ND	ug/L
DENNISTON RESERVOIR	1/28/09	Zinc (Zn)	ND	ug/L
DENNISTON RESERVOIR	2/23/10	Zinc (Zn)	3.6	ug/L

2006 Update to Watershed Sanitary Survey

Coastside County Water District

WATERSHED SANITARY SURVEY UPDATE
DENNISTON & SAN VICENTE CREEK WATERSHEDS

SAN MATEO COUNTY, CALIFORNIA

April 2006

Prepared by District Staff & District Engineer

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I. INTRODUCTION

The Surface Water Filtration and Disinfection Treatment Regulations (SWTR), Section 64665,Title 22, California Code of Regulations (CCR) require that each supplier subject to the SWTR shall conduct a watershed sanitary survey once every five years. The Coastside County Water District (District) currently utilizes surface water from Denniston Creek as a supply source. The District does not currently utilize water from San Vicente Creek as a supply source and there are no facilities in place for use of that source, but the District does have water rights for diversion of surface water from San Vicente Creek and considers it to be a potential future water supply source.

In 1996 the District prepared its initial watershed sanitary survey for Denniston & San Vicente Creek watersheds. That report, dated April 1996, is contained in this report as Appendix B.

In 2001 the District prepared its first 5-year update report. That report, dated May 2001, is contained in this report as Appendix B. Department of Health Services (DHS) reviewed the May 2001 report, and by letter dated August 16, 2001 and required that additional information was required. The required additional information was submitted as an addendum dated October 30, 2001, and that addendum is also contained in this report as Appendix C.

The current report, dated April 2006, is the required 5-year update sanitary survey report for the Denniston & San Vicente Creek Watersheds.

II. FINDINGS, CONCLUSIONS & RECOMMENDATIONS

Denniston Creek Watershed

A. Findings and Conclusions:

1. The District currently diverts surface water from Denniston Creek at Denniston Reservoir, and the District plans on continuing these diversions.
2. The change in ownership of the valley floor area, from E.T.O.P. to POST (Peninsula Open Space Trust), has resulted in no change in land usage.
3. An investigation has been performed of potential contaminant sources. Currently there are no known significant potential contaminant sources.
4. The current watershed control and management practices within the Denniston watershed including those of the District, POST, and the farmer have been reviewed and found adequate.
5. The water quality of the surface water from Denniston Creek and the water produced by the Denniston Water Treatment Plant is in compliance with all state drinking water standards MCL's (maximum contaminant levels).
6. The current monitoring program for untreated water from Denniston Creek and for treated water from the Denniston WTP is in conformance with current regulations.

B. Recommendations:

1. The District should continue to evaluate methods to decrease the susceptibility of the Denniston Project facilities to damage from natural and human causes.

San Vicente Creek Watershed

A. Findings and Conclusions:

1. The District has not used water from San Vicente Creek as a source of drinking water for over 20 years. Most of the facilities formerly used to

convey water from San Vicente Creek to the Denniston Pump Station have been removed.

2. The District considers San Vicente Creek to be a potential source of drinking water. However, before that could occur (1) an extension of time is required for the water rights permit, (2) diversion facilities need to be designed, (3) a Coastal Development Permit needs to be obtained, (4) compliance with all DHS regulations is required, and (5) the facilities need to be constructed.
3. An investigation has been performed of potential contaminant sources. The only potential source of significant contamination is grazing animals (horses) near the diversion point.

B. Recommendations:

1. If an extension of time for the water rights permit is obtained and the District decides to begin the process of diverting water from the creek, a water quality monitoring program should begin to determine the degree of water treatment required for this source.

III. CHANGES SINCE INITIAL SURVEY IN 1996 & UPDATE IN 2001

There have been no changes in the Denniston watershed, which affects water quality since the year 2001 Update Report. The only major update item to report is a change in land ownership as described below.

There has been one change in the San Vicente watershed, which affects water quality since the year 2001 Update Report---the number of horses being boarded and grazed in the area upstream of the diversion point has increased substantially.

Summarized below for each item discussed in the April 1996 Sanitary Survey Report and the May 2001 Update Sanitary Survey Report, both of which are attached to this 2006 Update as appendices, is an item by item description of changes.

Section II. Watershed and Water Supply System

A. Watershed:

1. Location -- No changes since 1996 and 2001 reports.
2. Land Uses -- No changes since 1996 and 2001 reports. The majority of the land within each of the watersheds is totally undeveloped, that is, it is in its natural state.
    a. Denniston Watershed. The change in land ownership of the Denniston Valley area has not resulted in any changes in land use including the number of persons and horses visiting the valley.
    b. San Vicente Watershed. There have been no changes in the land use areas, although the number of horses being boarded and grazed on the land adjacent to and upstream of the intake location point has increased.
3. Zoning -- No changes since the 1996 and 2001 reports. All of the land within the Denniston and San Vicente watersheds is zoned “PAD” (Planned Agricultural District). Permitted uses in the PAD are agriculture and non-residential development customarily considered accessory to

agricultural uses. All of the land within the Denniston and San Vicente watersheds is within the Coastal Zone planning area.

4. Land Ownership -- There was only one change of ownership within the Denniston and San Vicente watersheds: the lands formerly owned by ETOP Properties, Inc. are now owned by Penninsula Open Space Trust (POST). By e-mail dated March 6, 2006, Kellyx Nelson, conservation project manager for POST, stated that there are no proposed changes in land use within the Denniston watershed area by POST, and that within the next 2 to 3 years the Golden Gate Recreational Area is expected to purchase the property from POST at which time it will become part of a national park.
5. Population -- No changes since the 1996 and 2001 reports. There are no persons living the in Denniston watershed upstream of the diversion point at Denniston Reservoir. The number of houses in the San Vicente Reservoir remains unchanged at three.
6. Topography -- No changes since the 1996 and 2001 reports.
7. Geology -- No changes since the 1996 and 2001 reports.
8. Soils -- No changes since the 1996 and 2001 reports.
9. Landslide Susceptibility -- No changes since the 1996 and 2001 reports. As noted in the prior reports, the majority of the hillside areas are indicated as “Category II: Low susceptibility to land sliding”.
10. Seismic Information -- No changes since the 1996 and 2001 reports. The closest active fault is the Seal Cove Fault, which is located just west of the Half Moon Bay Airport (Note: the location of the Half Moon Bay Airport is shown on the watershed map included in this report).
11. Precipitation, Runoff and Flooding Potential -- No changes since the 1996 and 2001 reports.
12. Hydrology -- No changes since the 2001 report addendum.
13. Reservoir Characteristics of Denniston Reservoir -- No significant changes since the 2001 report addendum. Sedimentation continues to reduce the volume of water in the reservoir, and the District has been unsuccessful to date in its attempts to obtain a permit for dredging the area around the

intake pipes. No major water quality problems such as taste and odor problems from algae blooms have occurred within the past 5 years.

14. Wetland Characteristics -- No new information has become available since the 2001 report addendum.

15. Groundwater Recharge -- No changes since the 2001 report addendum.

B. Water Supply System:

1. History -- No changes since the 1996 and 2001 reports, including the addendum to the 2001 report.

2. Service Area Characteristics -- No changes since the 1996 and 2001 reports including the addendum to the 2001 report.

3. Water Supply Sources -- No changes since the 1996 and 2001 reports. The Denniston Project facilities include 3 water supply sources (1) surface water from Denniston Creek, (2) surface water from San Vicente Creek, and (3) groundwater from the Denniston well field. The CCWD has not utilized San Vicente Creek surface water as a supply source for over 20 years, and the majority of the facilities used at that time, a pump station and pipeline from San Vicente Reservoir to the Denniston Pump Station, have been removed (Note: See additional discussion under "4. Facilities" below.)

4. Facilities -- There have been no changes since the 1996 report and the 2001 report including the addendum to the 2001 report.

   a. Denniston Watershed Facilities -- The Denniston Creek diversion facilities consist of the intake pipelines at Denniston Reservoir, the Denniston Pump Station, and the pipeline to the Denniston treatment plant. Treated water facilities consist of the Denniston storage tank and the treated water pipeline from the treatment plant/storage tank to the northern end of the water distribution system on Bridgeport Drive. There is also a Denniston well field including a pipeline that conveys the well production to the Denniston Pump Station. All of these facilities are shown on the attached Watershed Map.

b. San Vicente Watershed Facilities -- Many years ago the District in conjunction with the landowner and tenant farmer constructed an 8-inch pipeline from a wooden diversion box at the point on San Vicente Creek described in the District's water rights permit to San Vicente Reservoir. That pipeline remains in place and is used by the tenant farmer to fill the reservoir, the water from which is used for crop irrigation. Also many years ago the District constructed a pump station at San Vicente Reservoir and an 8-inch pipeline from that pump station to the Denniston Pump Station. That pump station and pipeline have been removed. The attached Watershed Map has been revised to delete the pump station and pipeline that no longer exist.

5. Emergency Plans -- There is an updated emergency disinfection plan for the Denniston Water Treatment Plant and an updated emergency response plan for over-all District operations. The service area of the Denniston Project can also be provided water service, at least at an emergency level of service, for the District's other water supply sources.

Section III. Potential Contaminant Sources in the Watersheds

District operational personnel performed the investigation of potential contaminant sources in the Denniston watershed. The District Engineer, James Teter, performed the investigation of potential contaminant sources in the San Vicente watershed by a field investigation (windshield survey and walking) on March 22, 2006.

A. Potential Contaminant Sources – Potential contaminant sources are described as follows:

1. There are no residences in the Denniston watershed area upstream of the point of diversion at Denniston Reservoir and therefore no septic tanks that could fail (Note: there are two mobile homes below the point of diversion). There are three residences in the San Vicente watershed that do produce domestic wastewater, which is discharged to septic tanks for treatment, but because the District does not use San Vicente Creek as a

water supply source these septic tanks are not a current potential contaminant source.

2. Agricultural Crop Land Use -- There is one area of agricultural use in the Denniston watershed above the point of diversion as shown on the watershed area map. Also, the entire area of the watershed between Denniston Reservoir and Highway No. 1 (in particular the area adjacent to Denniston Creek within which the Denniston wells are located) is in agricultural use. There have been no changes in the crops grown since the 2001 and 2006 reports---brussels sprouts, peas, leaks, and other vegetables. A single tenant farmer, Cabrillo Farms Inc., has farmed all of these agricultural areas for over 40 years.
3. Grazing Animals -- There is no animal grazing in the Denniston watershed, and therefore no potential for contamination from grazing animals. During the windshield survey of the San Vicente Creek watershed, approximately 30 horses were observed being boarded and grazing in the area of the San Vicente watershed adjacent to and immediately upstream of the diversion point. Because the District does not use San Vicente Creek as a water supply source, there is no current potential for contamination from grazing animals within that watershed.
4. Pesticide/Herbicide Use -- As stated above, Cabrillo Farms Inc. has farmed the agricultural areas within the Denniston watershed area east of Highway No. 1 for at least the past 40 years. By letter dated February 28, 2006, Mr. David Lea of Cabrillo Farms stated the following:
   "As per your request I am supplying you with a list of the chemicals we use to grow our vegetable crops: Telone, Vapam, Terra Chlor, Lorsban, Pounce, Bravo, Di-methoate, Provado, Diazinon, Success, Avant, Asana XL, Dimilin, Fulfill, Thiolux, Basagran, Round-Up, Dealine M-P's, Dolomite Ag. They are used and applied in accordance with all pesticide laws under the supervision of the San Mateo County Agricultural Commissioner". Water from Denniston Creek is sampled at Denniston Reservoir, the diversion point, and analyzed in conformance with DHS drinking water requirements. Information on pesticide use within the San

Vicente watershed has not been investigated because the CCWD is currently not using San Vicente Creek as a water supply source and is not planning on doing so in the near future.

5. Vegetation and Wild Animals -- No changes since the 1996 and 2001 reports.
6. Recreational Use -- The only recreational uses of the Denniston watershed are (1) occasional equestrian use estimated by District personnel at approximately 10-15 horse-trips per week, and (2) occasional hiking use estimated by District personnel at less than 5 person-trips per week. No water-contact recreation takes place at Denniston Reservoir. Recreational use of the San Vicente watershed is also limited, but has not been investigated in detail because water from San Vicente Creek is currently being used or proposed in the near future as a water supply source by the CCWD.

B. Significance of Potential Contaminant Sources -- The report concludes that there are no significant potential contaminant sources within the Denniston watershed area, and therefore the potential for contamination of this supply source is unlikely. The increased number of horses being boarded and grazed in the area immediately upstream of the intake location within the San Vicente watershed may be a significant potential contaminant source that needs further investigation prior to a decision being made to proceed with use of San Vicente Creek as a source of water supply.

C. Anticipated Growth and Projected Changes in Sources of Contaminants -- The report concludes that there are no known changes planned for the land in either of the watersheds, and because of zoning and planning policies most types of development would be extremely difficult. No changes in sources of contaminants are anticipated for the same reasons.

Section IV. Watershed Control and Management Practices

This section contains a discussion of existing and recommended watershed management practices for protection of drinking water quality for the Denniston Watershed. As noted throughout this report, San Vicente Creek is not currently used as a water supply source and therefore there are no current District watershed control and management practices.

A. Water Agency Management Practices for the Denniston Watershed -- These practices include (1) the watershed area is posted as a drinking water supply source, (2) the farmer who leases the valley floor for agricultural use has workers in the valley six days a week who monitor visitors for suspicious activities, the sole entrance road is normally fenced and locked on Sundays, (3) the farmer's pesticide use is monitored for conformance with water supply requirements, (4) use of the valley by visitors requires permission from POST, and POST cooperates with the District to limit visitor usage to activities which will not degrade the water quality of the creek, and (5) water quality monitoring is performed by District personnel at the surface water intake point.

B. Other Agencies with Watershed Control Authority -- The primary agency that controls the watershed areas is the County of San Mateo. The County Planning Department controls development by means of zoning restrictions, and the County Department of Environmental Health monitors the water quality of both Denniston and San Vicente Creeks and controls activities detrimental to the water quality. Other agencies that influence the watersheds include the Soil Conservation Service (agricultural practices), San Mateo County Agricultural Commissioner (pesticide use), the California Department of Forestry (fire prevention and protection), the California Department of Fish and Game (fish and riparian corridor policies), and the County Sheriff's Department (trespassing).

C. Water Agency Coordination Measures -- The District coordinates its activities with those of the valley floor area landowner (POST) and farmer (Cabrillo

Farms). Coordination measures include visitor usage and activities, pesticide use, water allotments, and watershed security.

D. Recommended Control Measures -- This update report concludes that the current control measures for the Denniston watershed appear adequate. However, as with all of the District's facilities, it is recommended that the District continue to evaluate methods to decrease the susceptibility of the Denniston Project facilities to damage from natural and human causes.

Section V. Water Quality

This section contains a summary and evaluation of collected water quality data. The District monitors both the untreated and treated water in conformance with DHS monitoring schedule received in March 2005. See attached Appendix A for attached schedule.

A. Bacteriological – DHS does not require bacteriological samples collected from the Denniston or San Vicente sources at the present time. Microbiological assessments will be collected as part of the LT2SWTR requirements starting in April 2008. E.Coli, Cryptosporidium and Turbidity will be collected.

B. Turbidity – Turbidity grab samples are collected daily at Denniston WTP Influent. There has been an increasing trend in the duration of high turbidity in the last 5 years. This is attributed to the silt accumulation behind the Denniston dam. The Denniston WTP is shut down during periods of high turbidity. An on-line turbidimeter has been installed and will be monitoring the influent turbidity consistently.

C. Iron and Manganese – Plant influent and effluent are monitored daily for Iron and Manganese. Confirmation samples are collected weekly and sent to a contract lab for analysis. Raw water manganese levels average 0.1 mg/l and iron 0.59 mg/l since April 2004. Treated water manganese and iron levels average ND in the treatment plant effluent.

D. PH -- pH grab samples are collected daily at Denniston WTP influent and effluent. The pH of the untreated water ranges between 7.3 – 7.7. Effluent pH is targeted at levels over 8.0 for corrosion control using the Langelier Saturation Index.

E. Temperature – The temperature of the untreated and treated water at Denniston WTP is analyzed daily and is used for CT calculations.

F. Organic Chemicals – Please reference the submitted Monitoring chart for frequency of SOC and VOCs for the Denniston System. There have been no hits for any SOCs or VOCs in the Denniston watershed except for minute amounts of Trihalomethanes.

G. Inorganic Chemicals –General Mineral, General Physical and Inorganic constituents are monitored annually. The raw water remains easy to treat and, with the exception of Aluminum, all constituents are reduced to levels below their respective MCL at the plant effluent (if applicable). We are presently monitoring aluminum in the raw and finished waters on a quarterly basis. Recent improvements to the flash mixer in January 06 may prove to improve coagulation efficiency and result in lower effluent aluminum residuals. The latest results from samples collected in Feb 06 indicate a reduction of raw water aluminum from 0.37 mg/l to 0.17 mg/l. CCWD will petition DHS for a reduction in aluminum monitoring if the next 2 quarterly samples fall below the MCL and the influent concentration.

H. Radionuclides – All radiation monitoring is done on all raw water sources for 4 consecutive quarters every 4 years. Radionuclide levels were below the DLR in the first 2 quarters in this round of monitoring, prompting a reduction in monitoring for the final 2 quarters. Radium 228 will be monitored from all raw water sources in each quarter of 2007.

Evaluation of Ability to Meet Surface Water Treatment Regulations Requirements:

A. SWTR/IESWTR/LT1ESWTR/Stage1D-DBPR -- The Denniston WTP will be able to comply with all present Water Treatment Regulations. The addition of a filter-to-waste system, an on-line raw water turbidimeter and alarm systems, cleaning of the flash mixer, and tightening of the water quality alarm parameters will allow Denniston WTP to meet all requirements of the Enhanced Surface Water Treatment Rule. The District has installed on-line turbidimeters for all filters and is able to comply with the tightened turbidity standards. The plant capacity has been reduced from 1,150 gpm to 700 gpm to meet CT requirements.

B. DBP Rule -- There have been no changes since the last survey in the Denniston WTP's ability to meet the present DBP Rule. Tracer Studies done by CDM indicated that we have optimized our chlorine addition at the present plant configuration. Annual running average for TTHMS is 58 micrograms/liter and for HAAs is 45 micrograms/liter.

C. Filter Backwash Rule -- Although the Denniston WTP has been non-operational since mid February (due to heavy rains), provisions are in place to start return flows from the backwash recovery basins. Rule compliance will be realized by running the return pumps at approximately 5% of the plant flow 24 hours a day, 7 days a week. Nonionic polymer will be added if needed to the backwash flows to keep the return flow turbidity less than 2 ntu.

Evaluation of Ability to Meet Future Surface Water Treatment Regulations Requirements:

A. LT2SWTR -- Past monitoring for Cryptosporidium in the Denniston Watershed did not prove to show any significant levels of this protozoan. It is estimated that CCWD will move into Bin 1 once the two-year monitoring has been completed.

B. Stage2DBPR -- At the present plant configuration, the Denniston WTP will not be able to comply with this rule. The short-term plant improvements as conceptualized by CDM for this plant will more than likely allow us to comply with

the vagarities of this rule. The improvements should be completed by April 2007, when the monitoring for this rule is expected to start. If the improvements do not allow for compliance, the CDM conceptual long-term improvements will be optioned for compliance.

Water Quality Data

A. Denniston Raw Water Turbidity Values 2001-2005
B. Denniston Reservoir SOC/VOC analysis 2005
C. San Vicente SOC/VOC analysis 2005
D. Denniston Well Field Blend SOC/VOC analysis 2005
E. Denniston Reservoir Radionuclide analysis 2005
F. San Vicente Radionuclide analysis 2005
G. Denniston individual well Radionuclide analysis 2005
H. Denniston Reservoir IOC analysis 2005
J. San Vicente IOC analysis 2005
I. Denniston Wellfield Blend IOC analysis 2005

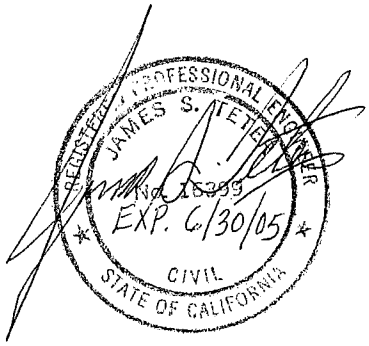
2001 Update to Watershed Sanitary Survey

Coastside County Water District

WATERSHED SANITARY SURVEY UPDATE
DENNISTON & SAN VICENTE CREEK WATERSHEDS

SAN MATEO COUNTY, CALIFORNIA

May 2001



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I. INTRODUCTION

In 1996, the CCWD prepared a watershed sanitary survey for the Denniston & San Vicente Creek watersheds in response to a written request from the State Department of Health Services (DHS). Now, 5 years later, the CCWD has prepared this watershed sanitary survey update, also in response to a written request from DHS. The Surface Water Filtration and Disinfection Treatment Regulations (SWTR), Section 64665, Title 22, California Code of Regulations (CCR) require that each supplier subject to the SWTR shall conduct a watershed sanitary survey once every five years. The CCWD currently utilizes surface water from Denniston Creek as a supply source. The CCWD currently does not utilize water from San Vicente Creek as a supply source, but might do so in an emergency.

II. SUMMARY OF INITIAL WATERSHED SANITARY SURVEY

The initial watershed sanitary survey report utilized the basic format and contained the requirements as recommended in the American Water Works Association "Watershed Sanitary Survey Guidance Manual" dated December 1993. An executive summary of the original survey report including the findings and recommendations follows.

Section II. Watershed and Water Supply System

A. Watershed:

1. Location. Denniston and San Vicente Creeks are located in an unincorporated portion of the County of San Mateo in an area east of the Half Moon Bay Airport.
2. Land Uses. The majority of the land within each of the watersheds is totally undeveloped, that is, it is in its natural state.
3. Zoning. All of the land within the Denniston and San Vicente watersheds is zoned "PAD" (Planned Agricultural District). Permitted uses in the PAD are agriculture and non-residential development customarily considered accessory to agricultural uses. All of the land within the Denniston and San Vicente watersheds is within the Coastal Zone planning area.
4. Land Ownership. Land within each watershed is owned by only several owners. The parcels and ownership are shown on the watershed map.
5. Population. There are no persons living within the Denniston watershed area; there are 3 residences within the San Vicente watershed area.
6. Topography. Each of the watersheds can be characterized as consisting primarily of relatively steep hillsides. In the lower portion of the Denniston Valley and the San Vicente Valley there is a level area adjacent to the creek.
7. Geology. Information on the geology of the Denniston and San Vicente watersheds is available from two publications of the Department of the Interior, United States Geological Survey: (1) "Preliminary Geologic Map of San Mateo County, California", compiled by Earl E. Brabb and Earl H. Pampeyan, 1972, and (2) "Description of Geologic Map Units, San Mateo County, California", 1972, compiled by Stephen Ellen, Carl M. Wentworth, Earl E. Brabb, and Earl H. Pampeyan. The hillsides of the watersheds are comprised primarily of "Kgr" which is defined as crystalline granitic rock, largely quartz diorite with some granite, medium-to-coarse-grained. The minor streambeds at midlevel elevations are comprised of "Qsr" which is defined as slope wash and ravine fill (colluvium) containing sand, silt, clay, gravel, rock fragments, and organic material, in varying proportions. The main streambed in each watershed is comprised of "Qal" which is defined as alluvium containing loose to soft and friable gravel, sand, silt, and clay in varying proportions.
8. Soils. Information on soils is available from the United States Department of Agriculture Soil Conservation document "Soil Survey, San Mateo Area, California", Series 1954, No. 13, Issued May, 1961. The hillside areas are comprised primarily of coarse sandy loam. The streambed areas are also comprised primarily of coarse sandy loam.
9. Landslide Susceptibility. Information on landslide susceptibility is available from the Department of the Interior, U.S. Geological Survey map entitled "Landslide

Susceptibility in San Mateo County, California", 1972, by Earl E. Brabb, Earl H. Pampeyan and Manuel G. Bonilla. The majorty of the hillside areas are indicated as "Category II: Low susceptibility to landsliding".

10. Seismic Information. Seismic information is available from the Department of the Interior, U.S. Geological Survey map entitled "Active Faults, Probable Active Faults, and Associated Fracture Zones, San Mateo County, California, 1972, compiled by Robert D. Brown, Jr. This map indicates no active faults, probable active faults or associated fracture zones within either the Denniston or San Vicente watershed areas. The closest active fault is the Seal Cove Fault which is located just west of the Half Moon Bay Airport.
11. Precipitation, Runoff and Flooding Potential. Mean annual precipitation at the lower elevation of the watersheds is 24 inches per year and that at the highest elevation is 38 inches per year. Mean annual runoff at the lower elevation of the watersheds is 6 inches per year and that at the highest elevation is 12 inches per year. Flooding does occur along the streambank areas of Denniston and San Vicente Creeks. The CCWD facilities located within the watershed areas suffered only minor damage during the 100-year flood in 1982, and they remained in operation throughout that period of flooding.

B. Water Supply System:
1. History. The Denniston Project facilities for surface diversion from Denniston Creek were constructed in 1972.
2. Service Area Characteristics. The Denniston Project facilities are located north of the CCWD service area. Water from the Denniston Project is distributed to the northern portion of the service area consisting of the communities of El Granada and Princeton.
3. Water Supply Sources. The Denniston Project facilities include 3 water supply sources (1) surface water from Denniston Creek, (2) surface water from San Vicente Creek, and (3) groundwater from the Denniston well field. The CCWD has not utilized San Vicente Creek surface water as a supply source during the last 10 years.
4. Facilities. The Denniston Creek diversion facilities consist of the intake pipelines at Denniston Reservoir, the Denniston Pump Station, and the pipeline to the Denniston treatment plant. The San Vicente Creek diversion facilities consist of the intake, the pipeline to San Vicente Reservoir, the pump station at San Vicente Reservoir, and the pipeline to Denniston Pump Station. Other facilities consist of the well field and the pipeline which conveys the groundwater to Denniston Pump Station, the Denniston water treatment plant, the Denniston water storage tank, and the transmission pipeline which conveys the treated water to the customer service area.
5. Emergency Plans. There is an emergency disinfection plan and an emergency operations plan. The service area of the Denniston Project can also be provided water from another supply source.

Section III. Potential Contaminant Sources in the Watersheds

The investigation of potential contaminant sources in the watershed was conducted by (1) a field investigation including both a windshield survey and walking, and (2) review of available maps, photographs, and other documents.

A. Potential Contaminant Sources. Potential contaminant sources are described as follows:

1. Wastewater. There are no residences in the Denniston watershed and therefore no wastewater. There are 3 residences in the San Vicente watershed which do produce domestic wastewater which is discharged to septic tanks for treatment.
2. Agricultural Crop Land Use. There is one area of agricultural use in the Denniston watershed as shown on the Watershed Map which is used for cultivation of brussel sprouts, peas and leaks. There are several areas in the San Vicente watershed as shown on the Watershed Map which are used for floriculture.
3. Grazing Animals. There is no animal grazing in the Denniston watershed. There are approximately 12 horses that ate grazed within the San Vicente watershed, and approximately 6 sheep are kept in a fenced area at one of the residences.
4. Pesticide/Herbicide Use. Pesticides used for agricultural in the Denniston watershed are Meta Systox, Vapam, Terra Clor 75% WP, Lorsban, Diazinon, Dimethoate, Guthion, and Lannate. Information on pesticide use within the San Vicente watershed was not obtained because the CCWD is currently not using San Vicente Creek as a water supply source.
5. Vegetation and Wild Animals. The report contains a detailed listing of vegetation and wild animals which have the potential to occur in the Denniston and San Vicente watersheds.
6. Recreational Use. The only recreational use of the Denniston watershed is occasional equestrian use estimated at approximately 12 horse-trips per week. Recreational use of the San Vicente watershed is also limited, but was not investigated in detail because water from San Vicente Creek is not currently being used as a water supply source by the CCWD.

B. Significance of Potential Contaminant Sources. The report concludes that there are no significant potential contaminant sources within either the Denniston or San Vicente watershed areas, and therefore the potential for contamination of this supply source is unlikely.

C. Anticipated Growth and Projected Changes in Sources of Contaminants. The report concludes that there are no known changes planned for the land in either of the watersheds, and because of zoning and planning policies most types of development would be extremely difficult. No changes in sources of contaminants are anticipated for the same reasons.

Section IV. Watershed Control and Management Practices

This section contains a discussion of existing and recommended watershed management practices for protection of drinking water quality.

A. Water Agency Management Practices Watershed. These practices include (1) the watershed area is posted as a drinking water supply source, (2) the sole entrance road is fenced and locked, (3) the farmer who leases the valley floor for agriculture and CCWD employees monitor for trespassers, (4) the farmer's pesticide use is monitored for conformance with water supply requirements, and (5) water quality monitoring is performed at the surface water intake point.

B. Other Agencies with Watershed Control Authority. The primary agency which controls the watersheds is the County of San Mateo; the County Planning Department controls development by means of zoning restrictions. Other agencies which influence the watersheds include the Soil conservation Service (agricultural practices), the California

Department of Forestry (fire prevention and protection), the California Department of Fish and Game (fish and riparian corridor policies), and the County Sheriff's Department (trespassing).

C. Water Agency Coordination Measures. The CCWD coordinates its activities with that of the farmer who has leased the agricultural land within the Denniston watershed continually since construction of the Denniston Project. Coordination measures include chemical use, water allotments, and watershed security.

D. Recommended Control Measures. The report concludes that the current control measures for the Denniston watershed appear adequate, and the CCWD has no recommended control measures. The CCWD has no program of control measures for the San Vicente watershed since no water has been used from this former source of supply for over 10 years and there are no plans for such utilization in the immediate future.

Section V. Water Quality. This section contains a discussion of drinking water regulations and water quality monitoring conducted by the water agency. Water quality data are compared to drinking water standards and the ability to meet the requirements of the SWTR (Surface Water Treatment Rule).

A. Drinking Water Regulations. The Surface Water Treatment Rule (SWTR) establishes water treatment and performance requirements for public water systems which use a surface water source such as Denniston Creek as a source of drinking water. The basic treatment plant requirements for compliance with the SWTR are (1) turbidity removal, (2) disinfection inactivation, (3) monitoring, and (4) reliability of treatment. In addition to the SWTR requirements, there are other drinking water regulations which establish primary standards (mandatory health-related standards) for parameters including microbiological constituents, organic chemicals, inorganic chemicals, and radionuclides. There are additional secondary standards (aesthetic standards) for parameters including chloride, color, iron, manganese, odor threshold, specific conductance, and total dissolved solids. The Environmental Protection Agency has established a maximum contaminant level (MCL) for each parameter contained in the primary and secondary standards. Most of the constituents contained in the regulations have not been found to be present in the Denniston and San Vicente watersheds in concentrations anywhere close to the MCL. Therefore, the CCWD focuses its water monitoring and treatment efforts on the following constituents: total coliform bacteria and E. coli, turbidity, Giardia and Cryptosporidium, and iron and manganese.

B. Existing Water Quality. The CCWD monitors both the untreated and treated water in conformance with State Department of Health Services regulations. The current monitoring program (sampling and laboratory analyses) consists of the following parameters: coliform bacteria, Giardia, Cryptosporidium, turbidity, iron and manganese, pH, temperature, organic chemicals, inorganic chemicals, radionuclides, and chlorine residual. The treated water from the Denniston plant conforms to all State drinking water requirements.

C. Evaluation of Ability to Meet Surface Water Treatment Regulation Requirements. The CCWD prepared and submitted a report on SWTR compliance to the State Department of Health Services in 1992. This report was reviewed and found acceptable by DHS,

and subsequent inspections of the Denniston WTP by DHS personnel have found the plant to be in full compliance with the regulations.

D. Recommendations for Water Quality Monitoring Program. The current CCWD water quality monitoring program for the Denniston watershed (untreated water) and the Denniston WTP (treated water) is in compliance with DHS requirements and is considered by the CCWD to be adequate in that there are no known significant contaminant sources within the Denniston watershed. No changes are recommended. Prior to resumption of diversions from the San Vicente watershed, a water quality monitoring program will be adopted.

D. Water Quality Data. Included in the report are data as follows: (1) average bacteriological levels for Denniston Reservoir and San Vicente Reservoir, as coliform MPN/100 ml, for the period 1991-1995, (2) Denniston Reservoir turbidity levels, as NTU, for the period 1991-1995, (3) organic chemical analyses for water collected from Denniston Reservoir on February 22, 1996, (4) general mineral, physical, & inorganic chemical analyses for water collected from Denniston Reservoir on February 22, 1996, (5) radiological chemical analyses for water collected from Denniston Reservoir on February 22, 1996, and (6) a sample evaluation report for Giardia species cyst and cryptosporidium oocyst for samples of water collected at the Denniston water treatment plant on January 24, 1995 and November 7, 1995.

Section VI. Conclusions and Recommendations

A. Conclusions:

1. Currently there are no known significant potential contaminant sources in either the Denniston or San Vicente watersheds.
2. Land use within the watersheds is not expected to change within the near future because of zoning restrictions, and therefore new significant potential contaminant sources are not anticipated.
3. Within the Denniston watershed the current watershed control and management practices, including those of the CCWD, property owner, and farmer, have been reviewed and found adequate. Current watershed control and management practices within the San Vicente watershed require additional investigation prior to the CCWD resuming diversion of water from San Vicente Creek.
4. The surface water quality of the Denniston Creek source is in compliance with all State drinking water standards MCL's (constituent maximum contaminant levels).
5. The surface water quality of the San Vicente Creek source is believed to be in compliance with all State MCL's, but the CCWD does not currently fully monitor this potential supply source because it does not divert water from it.
6. The treated water produced by the Denniston Project facilities is in compliance with Department of Health Services requirements.

B. Recommendations:

Preparation of this Watershed Sanitary Survey report for the Denniston and San Vicente watersheds has required the CCWD to closely examine the physical characteristics of the watershed, watershed control and management practices, and water quality monitoring and treatment adequacy. During this investigative work no problems or inadequacies have been discovered, and therefore no changes from current practices are recommended.

Prior to the CCWD resuming diversion of water from San Vicente Creek the CCWD should further investigate the current watershed control and management practices and should also conduct additional water quality monitoring.

III. CHANGES SINCE INITIAL SURVEY

This section will update the watershed sanitary survey report for changes which have occurred since preparation of the initial report in April 1996. The format used to discuss the changes will be that utilized for the initial survey report as shown in Section II. Summary of Initial Watershed Sanitary Survey.

Section II. Watershed and Water Supply System

A. Watershed:

1. Location. No changes from initial report.
2. Land Uses. The land uses were reviewed by field investigation by windshield survey. There were no changes in the Denniston watershed. There were 2 minor changes in the San Vicente watershed: a former pasture area is now used for floriculture, and there is a new pasture area to replace the one converted to floriculture. These land use changes have been updated on the Watershed Map.
3. Zoning. No changes.
4. Land Ownership. Land ownership was investigated at the office of the San Mateo County Assessor. There was one change: the land parcel which includes the populated portion of the San Vicente valley has changed ownership. This ownership has been updated on the Watershed Map.
5. Population. There are no persons living within the Denniston watershed. There are still the 3 residences in the San Vicente watershed which existed when the initial survey work was performed. In addition, at one of these residences it appears that one of the ranch outbuildings is now being used as a residence. The Watershed Map has been updated to indicate this additional residence.
6. Topography. No changes.
7. Geology. No changes.
8. Soils. No changes.
9. Landslide Susceptibility. No changes.
10. Seismic Information. No changes.
11. Precipitation, Runoff and Flooding Potential. No changes.

B. Water Supply System:

1. History. No changes.
2. Service Area Characteristics. No changes.
3. Water Supply Sources. No changes. Denniston Project water production by sources since preparation of the initial sanitary survey has been as follows:

Year	Denniston Creek	Denniston Wells	San Vicente Creek
1996	206.50 mg	12.11 mg	0 mg
1997	185.86	26.03	0
1998	191.38	7.66	0
1999	223.37	4.10	0
2000	181.96	21.40	0

4. Facilities. There have been no changes in the existing facilities which divert, treat, store, and convey water from Denniston Creek to the service area. The

pump station at San Vicente Reservoir has been removed, and the pipeline from San Vicente Reservoir to the Denniston Pump Station has been abandoned.

5. Emergency Plans. The emergency disinfection plan and the Denniston emergency operations plan have been updated and found to be acceptable by the State Department of Health Services.

Section III. Potential Contaminant Sources in the Watersheds. The investigation of potential contaminant sources in the watershed was conducted by a field investigation by windshield survey.

A. Potential Contaminant Sources. No significant changes. Identified potential contaminant sources were found to be the following:

1. Wastewater. There are no sources of wastewater discharge in the Denniston watershed. There are 4 residences in the San Vicente watershed which discharge wastewater to septic tanks.
2. Agricultural Crop Land Use. In the Denniston watershed there is still the same area of agricultural usage and there have been no changes is the crops grown since the initial sanitary survey. In the San Vicente watershed there are still the same small areas of floricultural land use. Since the initial sanitary survey, one area previously used for pasture has been converted to floriculture use, and a new pasture area has been created to replace the one converted to floriculture. These changes have been updated on the Watershed Map.
3. Grazing Animals. There are no changes within the Denniston watershed area; no grazing occurs. In the San Vicente watershed the number of horses grazed appears to be approximately 5 as compared to approximately 12 at the time of the initial sanitary survey, and there were no sheep observed as compared to 6 previously.
4. Pesticide/Herbicide Use. No changes have occurred in the Denniston watershed since the initial survey. No information has been gathered on pesticide/herbicide use within the San Vicente watershed because the CCWD does not use San Vicente Creek as a water supply source.
5. Vegetation and Wild Animals. No changes.
6. Recreational Use. No changes since initial survey.

B. Significance of Potential Contaminant Sources. No changes. There are no significant potential contaminant sources within either the Denniston or San Vicente watershed areas, and therefore the potential for contamination of this supply source is very low.

C. Anticipated Growth and Projected Changes in Sources of Contaminants. No changes. There are no known changes planned for the land in either of the watersheds, and because of zoning and planning policies most types of development would be extremely difficult. No changes in sources of contaminants are anticipated for the same reasons.

Section IV. Watershed Control and Management Practices

A. Water Agency Management Practices. No changes.

B. Other Agencies with Watershed Control Authority. No changes.

C. Water Agency Coordination Measures. No changes.

C. Recommended Control Measures. No changes. The current control measures for Denniston watershed appear to be adequate, and the CCWD has no recommended additional control measures. The CCWD has no program of control measures for the San Vicente watershed since no water has been used from this former source of supply for over 15 years and there are no plans for such utilization in the immediate future.

Section V. Water Quality

A. Drinking Water Regulations. No changes. There are pending new regulations, but they have not yet been imposed on the CCWD.

B. Existing Water Quality. The CCWD monitors both the untreated and treated water in conformance with State Department of Health Services regulations. Since the initial sanitary survey the CCWD has ceased monitoring the untreated water for the following constituents which are not required by DHS: coliform bacteria, Giardia, and Cryptosporidium. These constituents are no longer monitored both because of the costs involved and because the prior monitoring program provided sufficient information to demonstrate that these constituents were not present in the Denniston watershed in sufficient concentrations to constitute a significant potential contaminant.

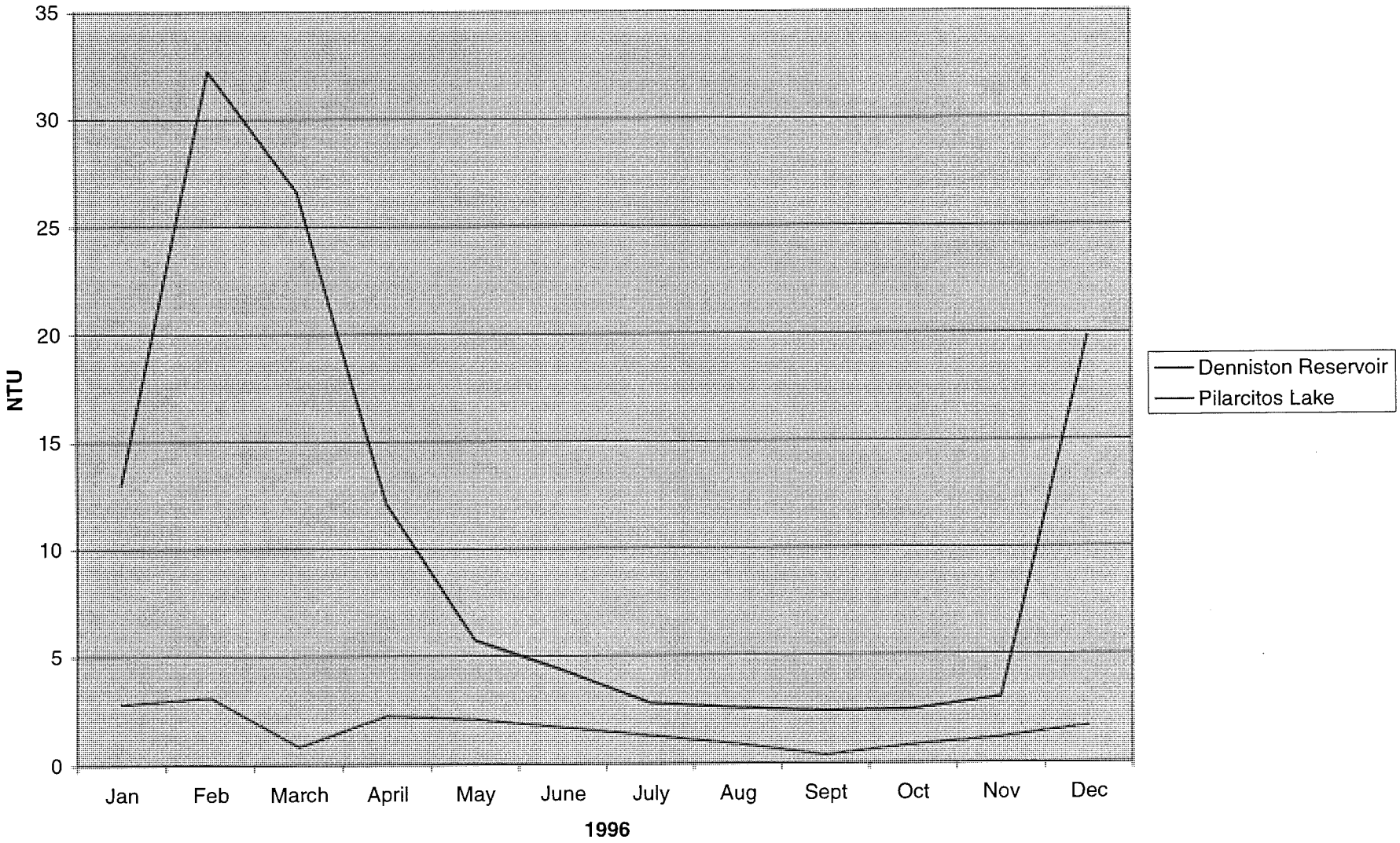
C. Evaluation of Ability to Meet Surface Water Treatment Regulation Requirements. No change. Inspections of the Denniston WTP by DHS have found the plant to be in full compliance with current regulations.

D. Recommendations for Water Quality Monitoring Program. In order to gather data required for evaluation of the treatment plant to conform with the proposed new drinking water requirements, It is recommended that monitoring of the Denniston untreated water be expanded to also include at a minimum haloacetic acids, E. coli, Giardia and Cryptosporidium. Funding is proposed for inclusion in the FY 2001-02 budget for this recommended additional monitoring work.

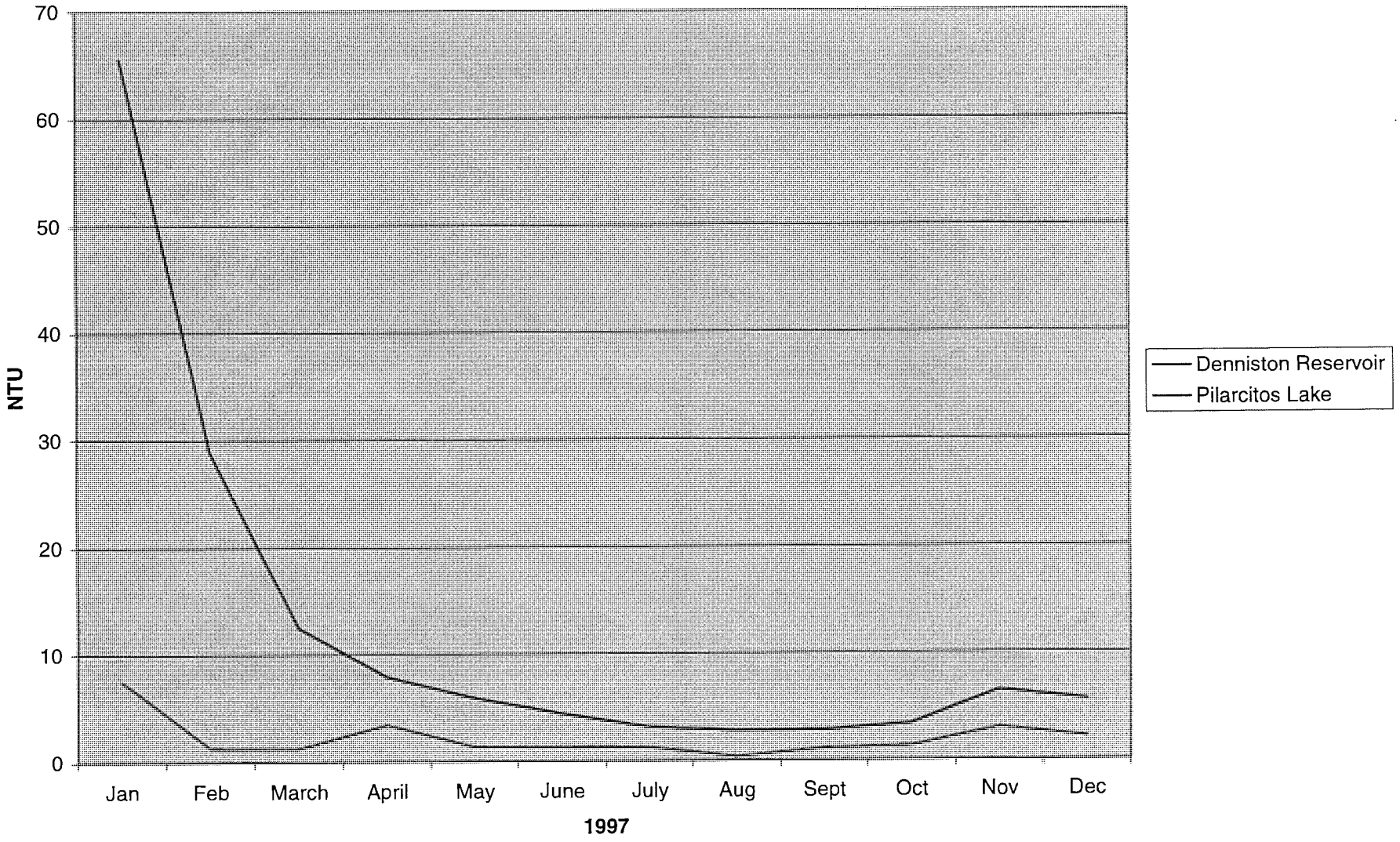
E. Water Quality Data. Included in this report is the following water quality data:
1. Denniston Reservoir Turbidity Levels, 1996-2000.
2. Denniston Reservoir & San Vicente Reservoir Raw Water Coliform Levels, 1996-1998.
3. Denniston Reservoir Raw Water Organic Chemical Analysis, 3/2/99.
4. Denniston Reservoir Raw Water General Mineral & Physical & Inorganic Analysis, 2/24/99.
5. Denniston Reservoir Raw Water Radioactivity Analysis, 3/29/01.
6. Denniston Water Treatment Plant Raw Water, Giardia & Cryptosporidium Analysis, 4/9/96.
7. Table 3-1 and 3-2 from "Final Draft, Denniston Water Treatment Plant, UF/MF Membrane Filtration, Pilot Study Report", December 2000. These tables contain data on Denniston untreated water for parameters which are not included in the normal monitoring program including heterotrophic plate count, total coliform THM Formation potential, and total organic carbon. The samples were collected during the period February 16 through May 3, 1999.

E1. Denniston Reservoir Turbidity Levels, 1996-2000

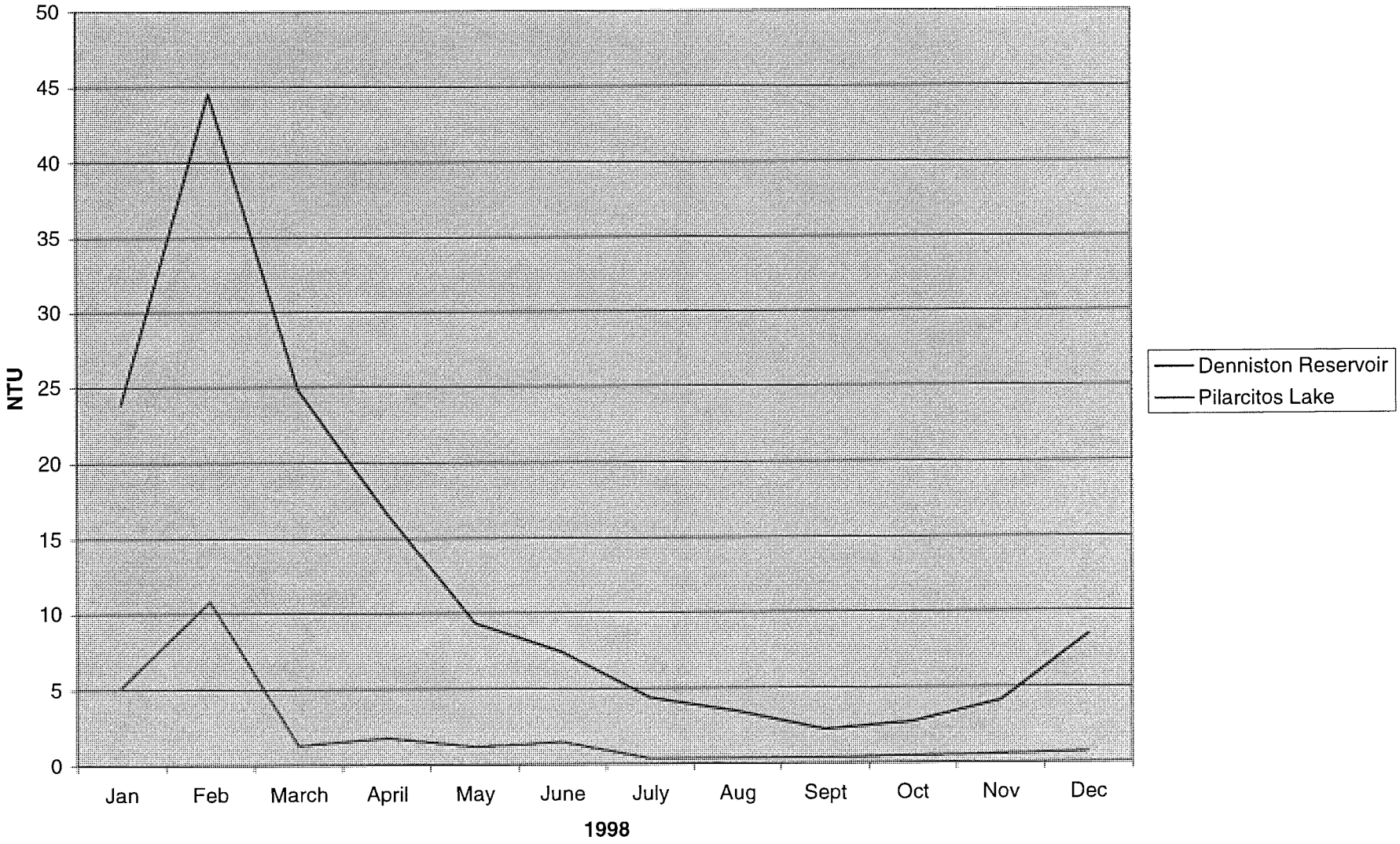
Turbidity Levels



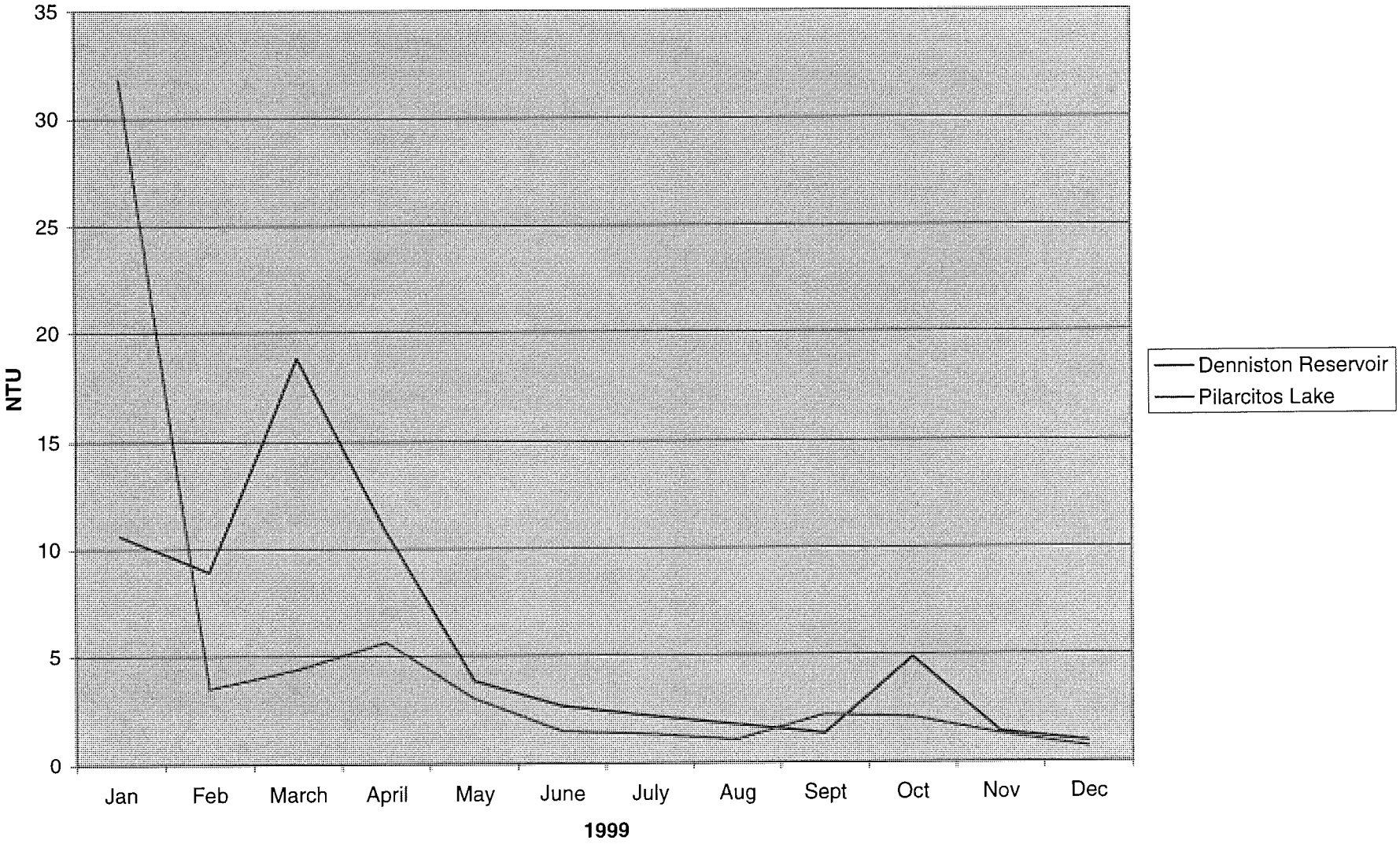
Turbidity Levels



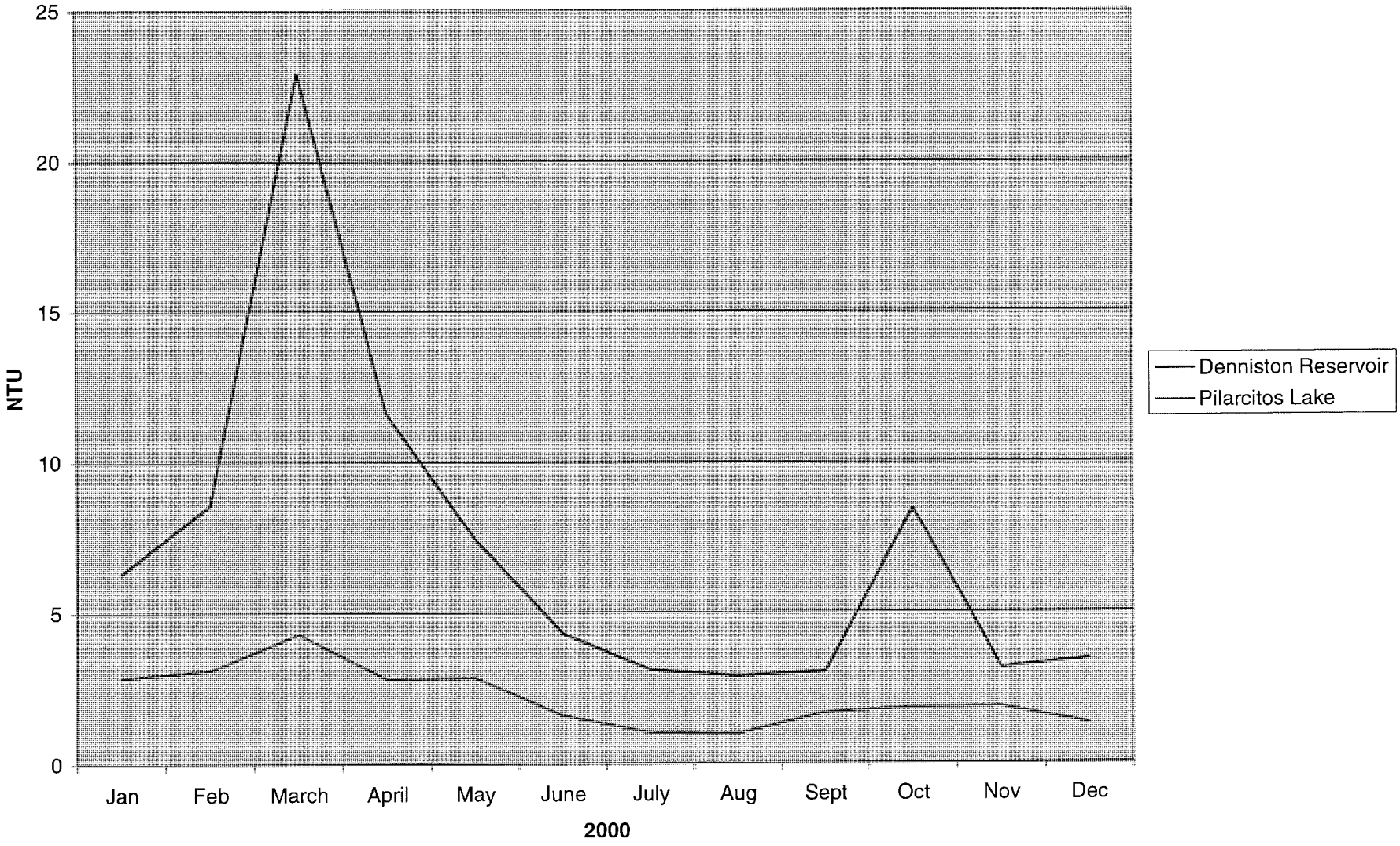
Turbidity Levels



Turbidity Levels

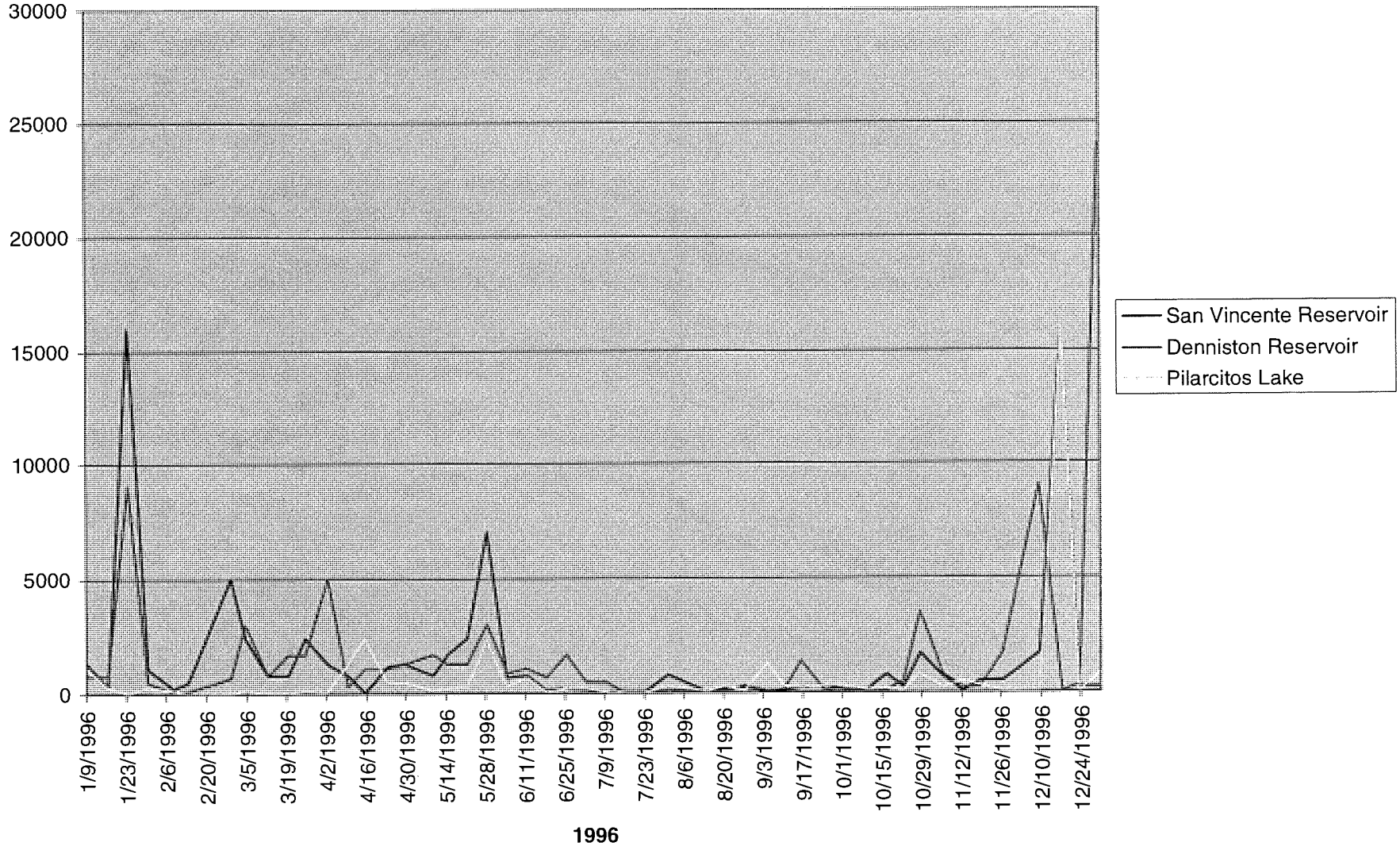


Turbidity Levels

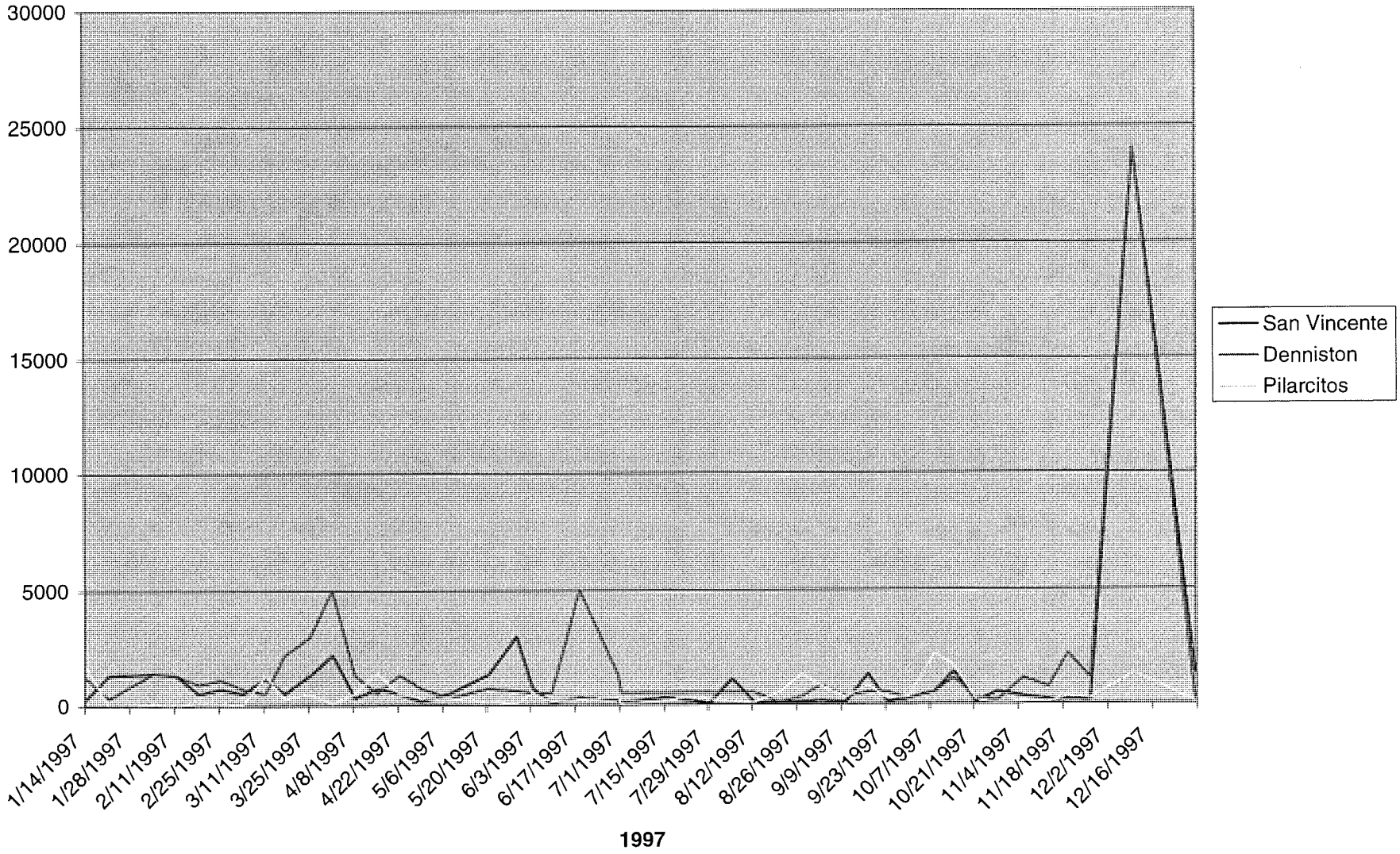


E2. Denniston Reservoir & San Vicente Reservoir Raw Water Coliform Levels, 1996-1998

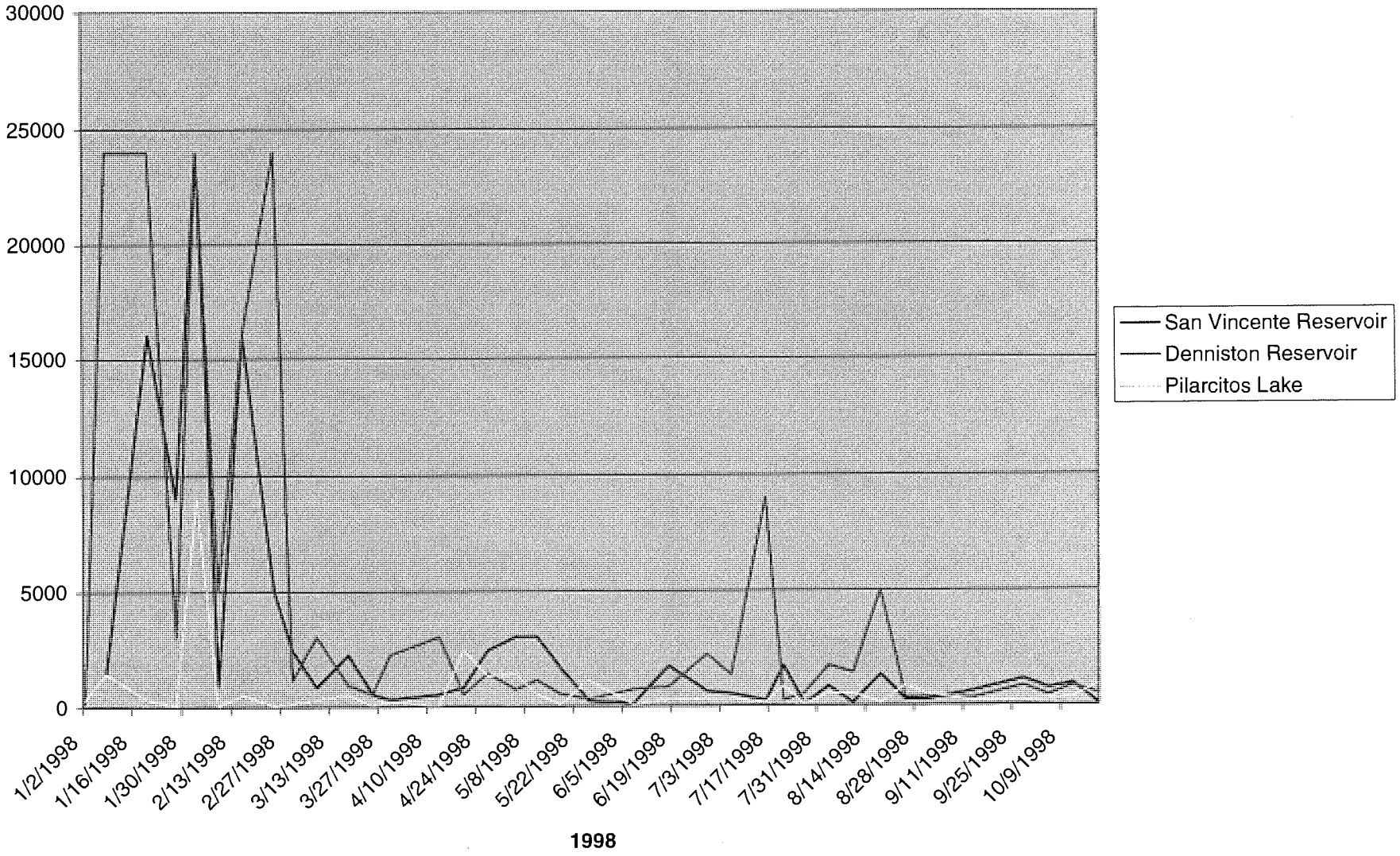
Raw Water Coliform Levels



Raw Water Coliform Levels



Raw Water Coliform Levels



E3. Denniston Reservoir Raw Water Organic Chemical Analysis, 3/2/99

SEQUOIA ANALYTICAL EDT
680 CHESAPEAKE DRIVE
REDWOOD CITY, CA 94063
ORGANIC CHEMICAL ANALYSIS (3/96)

Date of Report: 03/02/99 Sample ID No.9901C5701
Laboratory Signature Lab
Name: SEQUOIA ANALYTICAL LAB Director: _____
Name of Sampler:Dave Mier Employed By:Coastside County Water Dis
Date/Time Sample Collected: 99/01/26/1115 Date/Time Sample Received @ Lab: 99/01/26/1600 Date Analyses Completed: 99/02/04

System Name: COASTSIDE COUNTY WATER DIST
System Number: 4110011
Name or Number of Sample Source: DENNISTON RESERVOIR - RAW

* User ID: ENG
* Date/Time of Sample: |99|01|26|1115| YY MM DD TTTT
* Station Number: D41/011-DENRESV
* Laboratory Code: 5113
* Date Analysis Completed: YY MM DD |99|02|04|
* Submitted by: _____ Phone #: _____

PAGE 1 OF 3 REGULATED ORGANIC CHEMICALS Neg Def No. 524.2

TEST METHOD	CHEMICAL ALL CHEMICALS REPORTED ug/L	ENTRY #	ANALYSES RESULTS	MCL ug/L	DLR ug/L
524.2	Bromodichloromethane	32101	ND		0.5
524.2	Bromoform	32104	ND		0.5
524.2	Chloroform (Trichloromethane)	32106	ND		0.5
524.2	Dibromochloromethane	32105	ND		0.5
524.2	Total Trihalomethanes (THM'S/ TTHM)	82080	ND	100	0.5
524.2	Benzene	34030	ND	1	0.5
524.2	Carbon Tetrachloride	32102	ND	.5	0.5
524.2	1,2-Dichlorobenzene (o-DCB)	34536	ND	600	0.5
524.2	1,4-Dichlorobenzene (p-DCB)	34571	ND	5	0.5
524.2	1,1-Dichloroethane (1,1-DCA)	34496	ND	5	0.5
524.2	1,2-Dichloroethane (1,2-DCA)	34531	ND	.5	0.5
524.2	1,1-Dichloroethylene (1,1-DCE)	34501	ND	6	0.5
524.2	cis-1,2-Dichloroethylene (c-1,2-DCE)	77093	ND	6	0.5
524.2	trans-1,2-Dichloroethylene (t-1,2-DCE)	34546	ND	10	0.5
524.2	Dichloromethane (Methylene Chloride)	34423	ND	5	0.5
524.2	1,2-Dichloropropane	34541	ND	5	0.5
524.2	Total 1,3-Dichloropropene	34561	ND	.5	0.5
524.2	Ethyl Benzene	34371	ND	700	0.5
524.2	Monochlorobenzene (Chlorobenzene)	34301	ND	70	0.5
524.2	Styrene	77128	ND	100	0.5
524.2	1,1,2,2-Tetrachloroethane	34516	ND	1	0.5
524.2	Tetrachloroethylene (PCE)	34475	ND	5	0.5
524.2	Toluene	34010	ND	150	0.5
524.2	1,2,4-Trichlorobenzene	34551	ND	70	0.5
524.2	1,1,1-Trichloroethane (1,1,1-TCA)	34506	ND	200	0.5
524.2	1,1,2-Trichloroethane (1,1,2-TCA)	34511	ND	5	0.5
524.2	Trichloroethylene (TCE)	39180	ND	5	0.5
524.2	Trichlorofluoromethane (FREON 11)	34488	ND	150	5.0
524.2	Trichlorotrifluoroethane (FREON 113)	81611	ND	1200	10.0
524.2	Vinyl Chloride (VC)	39175	ND	.5	0.5

TEST METHOD	CHEMICAL ALL CHEMICALS REPORTED ug/L	ENTRY #	ANALYSES RESULTS	MCL ug/L	DLR ug/L
524.2	m,p-Xylene	A-014	ND		0.5
524.2	o-Xylene	77135	ND		0.5
524.2	Total Xylenes (m,p, & o)	81551	ND	1750	0.5
	Dibromochloropropane (DBCP)	38761		.2	0.01
	Ethylene Dibromide (EDB)	77651		.05	0.02
	Endrin	39390		2	0.10
	Lindane (gamma-BHC)	39340		.2	0.20
	Methoxychlor	39480		40	10.0
	Toxaphene	39400		3	1.0
	Chlordane	39350		.1	0.1
	Diethylhexylphthalate (DEHP)	39100		4	3.0
	Heptachlor	39410		.01	0.01
	Heptachlor Epoxide	39420		.01	0.01
	Atrazine (AATREX)	39033		3	1.0
	Molinate (ORDRAM)	82199		20	2.0
	Simazine (PRINCEP)	39055		4	1.0
	Thiobencarb (BOLERO)	A-001		70	1.0
	Alachlor (ALANEX)	77825		2	1.0
	Bentazon (BASAGRAN)	38710		18	2.0
	Benzo(a)pyrene	34247		.2	0.1
	2,3,7,8-TCDD (Dioxin)	34676		3E-5	5E-6
	2,4-D	39730		70	10.0
	2,4,5-TP (SILVEX)	39045		50	1.0
	Carbofuran (FURADAN)	81405		18	5.0
	Dalapon	38432		200	10.0
	Dinoseb (DNBP)	81287		7	2.0
	Diquat	78885		20	4.0
	Di(2-ethylhexyl) Adipate	A-026		400	5.0
	Endothall	38926		100	45.0
	Glyphosate	79743		700	25.0
	Hexachlorobenzene	39700		1	0.5
	Hexachlorocyclopentadiene	34386		50	1.0
	Oxamyl (Vydate)	38865		200	20.0
	Pentachlorophenol (PCP)	39032		1	0.2
	Picloram	39720		500	1.0
	Polychlorinated Biphenyls (Total PCB's)	39516		.5	0.5

UNREGULATED ORGANIC CHEMICALS

524.2	Bromobenzene	81555	ND		0.5
524.2	Bromochloromethane	A-012	ND		0.5
524.2	Bromomethane (Methyl Bromide)	34413	ND		0.5
524.2	n-Butylbenzene	A-010	ND		0.5
524.2	sec-Butylbenzene	77350	ND		0.5
524.2	tert-Butylbenzene	77353	ND		0.5
524.2	Chloroethane	34311	ND		0.5
524.2	2-Chloroethylvinyl Ether	34576	ND		1.0
524.2	Chloromethane (Methyl Chloride)	34418	ND		0.5
524.2	2-Chlorotoluene	A-008	ND		0.5
524.2	4-Chlorotoluene	A-009	ND		0.5
524.2	Dibromomethane	77596	ND		0.5
524.2	1,3-Dichlorobenzene (m-DCB)	34566	ND		0.5

 UNREGULATED ORGANIC CHEMICALS CONTINUED 9901C5701

TEST METHOD	CHEMICAL ALL CHEMICALS REPORTED ug/L	ENTRY #	ANALYSES RESULTS	MCL ug/L	DLR ug/L
524.2	Dichlorodifluoromethane	34668	ND		1.0
524.2	1,3-Dichloropropane	77173	ND		0.5
524.2	2,2-Dichloropropane	77170	ND		0.5
524.2	1,1-Dichloropropene	77168	ND		0.5
524.2	Hexachlorobutadiene	34391	ND		0.5
524.2	Isopropylbenzene (Cumene)	77223	ND		0.5
524.2	p-Isopropyltoluene	A-011	ND		0.5
524.2	Methyl tert-Butyl Ether (MTBE)	A-030	ND		5.0
524.2	Naphthalene	34696	ND		0.5
524.2	n-Propylbenzene	77224	ND		0.5
524.2	1,1,1,2-Tetrachloroethane	77562	ND		0.5
524.2	1,2,3-Trichlorobenzene	77613	ND		0.5
524.2	1,2,3-Trichloropropane	77443	ND		0.5
524.2	1,2,4-Trimethylbenzene	77222	ND		0.5
524.2	1,3,5-Trimethylbenzene	77226	ND		0.5
524.2	Methyl Ethyl Ketone (MEK, Butanone)	81595	ND		5.0
524.2	Methyl Isobutyl Ketone (MIBK)	81596	ND		5.0
	bis (2-Chloroethyl) Ether	34273			5.0
	Aldicarb (TEMIK)	39053			3.0
	Aldicarb Sulfone	A-020			4.0
	Aldicarb Sulfoxide	A-019			3.0
	Aldrin	39330			0.075
	Bromacil (HYVAR)	82198			10.0
	Butachlor	77860			0.38
	Carbaryl (Sevin)	77700			5.0
	Chlorothalonil (DACONIL, BRAVO)	70314			5.0
	Diazinon	39570			0.25
	Dicamba (BANVEL)	82052			1.5
	Dieldrin	39380			0.02
	Dimethoate (CYGON)	38458			10.0
	Diuron	39650			1.0
	3-Hydroxycarbofuran	A-021			3.0
	Methomyl	39051			2.0
	Metolachlor	39356			
	Metribuzin	81408			
	Prometryn (CAPAROL)	39057			2.0
	Propachlor	38533			0.5

E4. Denniston Reservoir Raw Water General Mineral & Physical & Inorganic Analysis, 2/24/99

SEQUOIA ANALYTICAL EDT
680 CHESAPEAKE DRIVE
REDWOOD CITY, CA 94063
GENERAL MINERAL & PHYSICAL, & INORGANIC ANALYSIS (4/95)

Date of Report: 02/24/99 Sample ID No.9901C5701
Laboratory Signature Lab
Name: SEQUOIA ANALYTICAL LAB Director: _____
Name of Sampler:Dave Mier Employed By:Coastside Co. Water Dist.
Date/Time Sample Collected: 99/01/26/1115 Date/Time Sample Received @ Lab: 99/01/26/1600 Date Analyses Completed: 99/02/03

System Name: COASTSIDE COUNTY WATER DIST
System Number: 4110011
Name or Number of Sample Source: DENNISTON RESERVOIR - RAW

* User ID: ENG Station Number: D41/011-DENRESV *
* Date/Time of Sample: |99|01|26|1115| (YY MM DD TTTT) Laboratory Code: 5113 *
* YY MM DD *
* Date Analysis Completed: |99|02|03| *
* Submitted by: _____ Phone #: _____ *

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Hardness (as CaCO3)	00900		
	mg/L	Calcium (Ca)	00916		
	mg/L	Magnesium (Mg)	00927		
	mg/L	Sodium (NA)	00929		
	mg/L	Potassium (K)	00937		
Total Cations		Meq/L Value: 0.0			
	mg/L	Total Alkalinity (AS CaCO3)	00410		
	mg/L	Hydroxide (OH)	71830		
	mg/L	Carbonate (CO3)	00445		
	mg/L	Bicarbonate (HCO3)	00440		
*	mg/L+	Sulfate (SO4)	00945		0.5
*	mg/L+	Chloride (Cl)	00940		
45	mg/L	Nitrate (as NO3)	71850	4.2	2.0
**	mg/L	Fluoride (F) Temp. Depend.	00951	ND	0.1
Total Anions		Meq/L Value: 0.1			
	Std.Units+	PH (Laboratory)	00403		
***	umho/cm+	Specific Conductance (E.C.)	00095		
****	mg/L+	Total Filterable Residue at 180C (TDS)	70300		
	Units	Apparent Color (Unfiltered)	00081		
	TON	Odor Threshold at 60 C	00086		
	NTU	Lab Turbidity	82079		
0.5	mg/L+	MBAS	38260		

* 250-500-600 ** 1.4-2.4 *** 900-1600-2200 **** 500-1000-1500

INORGANIC CHEMICALS

9901C5701

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
1000	ug/L	Aluminum (Al)	01105	460	50.0
6	ug/L	Antimony	01097	ND	6.0
50	ug/L	Arsenic (As)	01002	ND	2.0
1000	ug/L	Barium (Ba)	01007	ND	100.0
4	ug/L	Beryllium	01012	ND	1.0
5	ug/L	Cadmium (Cd)	01027	ND	1.0
50	ug/L	Chromium (Total Cr)	01034	ND	10.0
1000	ug/L+	Copper (Cu)	01042	ND	50.0
300	ug/L+	Iron (Fe)	01045		100.0
	ug/L	Lead (Pb)	01051	ND	5.0
50	ug/L+	Manganese (Mn)	01055		30.0
2	ug/L	Mercury (Hg)	71900	ND	1.0
100	ug/L	Nickel	01067	ND	10.0
50	ug/L	Selenium (Se)	01147	ND	5.0
100	ug/L+	Silver (Ag)	01077	ND	10.0
2	ug/L	Thallium	01059	ND	1.0
5000	ug/L	Zinc (Zn)	01092		50.0

ADDITIONAL ANALYSES

	NTU	Field Turbidity	82078		
	C	Source Temperature C	00010		
		Langelier Index Source Temp.	71814		
		Langelier Index at 60 C	71813		
	Std. Units	Field PH	00400		
		Agressiveness Index	82383		
	mg/L	Silica	00955		
	mg/L	Phosphate	00650		
	mg/L	Iodide	71865		
		Sodium Absorption Ratio	00931		
7	MFL	Asbestos	81855		0.20
	ug/L	Boron	01020	13	
10000	ug/L	Nitrate + Nitrite as Nitrogen(N)	A-029		400
1000	ug/L	Nitrite as Nitrogen(N)	00620		400
200	ug/L	Cyanide	01291	ND	100.0
	mg/L	Ammonia	00612		
	ug/L	Lithium	01132		
	mg/L	Bromide	82298		
	mg/L	Bromate	A-027		

+ Indicates Secondary Drinking Water Standards

E5. Denniston Reservoir Raw Water Radioactivity Analysis, 3/29/01

Truesdail Laboratories, Inc.
14201 Franklin Avenue
Tustin, CA 92780

RADIOACTIVITY ANALYSIS (9/99)

Date of Report: 01/04/23
Laboratory Name: TRUESDAIL LABS
Name of Sampler:unknown
Date/Time Sample Collected:01/03/29/1235

Sample ID No.:428823/MKC0701-01
Signature Lab Director:
Employed By: unknown
Date/Time Sample Received @ Lab:01/04/03/1200
Date Analyses Completed:01/04/20

System Name:COASTSIDE COUNTY WATER DISTRICT
Name or Number of Sample Source:DENNISTON RESERVOIR - RAW
System Number: 4110011

* User ID: HEN
* Date/Time of Sample: |01|03|29|1235|
* YY MM DD TTTT
* Station Number: D41/011-DENRESV *
* Laboratory Code: 9469 *
* Submitted by: Date Analysis completed: YY MM DD |01|04|20| *
* Phone #: *

MCL REPORT UNITS	CHEMICAL	STORET CODE	ANALYSES RESULTS	DLR
15 pCi/L	Total Alpha	01501	0.18	1.0
	pCi/L Total Alpha Counting Error	01502	0.31	
50 pCi/L	Total Beta	03501		4.0
	pCi/L Total Beta Counting Error	03502		
20 pCi/L	Natural Uranium	28012		2.0
	pCi/L Natural Uranium Counting Error	A-028		
	pCi/L Total Radium 226	09501		.5
	pCi/L Total Radium 226 Counting Error	09502		
	pCi/L Total Radium 228	11501		.5
	pCi/L Total Radium 228 Counting Error	11502		
5 pCi/L	Ra 226 + Ra 228	11503		
	pCi/L Ra 226 + Ra 228 Counting Error	11504		
	pCi/L Total Radon 222	82303		100.0
	pCi/L Total Radon 222 Counting Error	82302		
20000 pCi/L	Total Tritium	07000		1000
	pCi/L Total Tritium Counting Error	07001		
8 pCi/L	Total Strontium 90	13501		2.0
	pCi/L Total Strontium 90 Counting Error	13502		

E6. Denniston Water Treatment Plant Raw Water
Giardia & Cryptosporidium Analysis, 4/9/96

BioVir Laboratories, Inc.

685 Stone Road • Benicia, CA 94510 • (707) 747-5906 • 1-800-GIARDIA • FAX (707) 747-1751

REPORT OF SAMPLE EVALUATION

REPORT: R960229A

PAGE: 1 of 1

CLIENT: Coastside County Water District
766 Main Street
Half Moon Bay, CA 94109

CLIENT NO.: COA003

SAMPLE INFORMATION:

Name of Sampler:	Al Roller	Sample Date:	04/09/96
Sample Source:	Denniston Creek	Sample Time:	09:27-09:15
Sample Location:	Denniston Treatment Plant	Turbidity (NTU):	19.0
Filter Type:	Parker Hannifan, M39R10A	Temperature:	9.0 C
Sample Volume:	877 Gallons / 3,320 Liters	pH:	7.86
Comments:	Raw Water		

ASSAY RESULTS:

1. Giardia species Cyst and Cryptosporidium Oocyst
Combined Evaluation - (Information Collection Rule Method - as proposed)

Organisms Observed / 100 Liters*		
	Giardia species Cyst	Cryptosporidium Oocyst
PRESUMPTIVE	1.9	<1.9
CONFIRMED	<1.9	<1.9

* "Less than" results represent the lower detection limit for this assay.

SAMPLE EVALUATION PERFORMANCE CRITERIA: The precise rates of recovery of organisms from environmental samples cannot be determined. BioVir Laboratories has analyzed your sample(s) in accordance with the method described with each analyte above, however, due to inherent limitations of these methods organisms may avoid detection. For additional information regarding the limitations of the method(s) referred to above please call us at 1-800-GIARDIA.

COMPANY IS NOT AN INSURER: BioVir Laboratories is not an insurer or guarantor of the quality and/or purity of water, wastewater, biosolid or other material from which the sample was taken. BioVir offers no express or implied warranties whatsoever concerning the quality or purity of any water, wastewater, biosolid or other material which is ultimately consumed, distributed, applied or otherwise disposed.

4-16-96
ANALYSIS DATE

John L. Riggs
SIGNATURE/DATE
4-18-96

E7. Table 3-1 and 3-2 from "Final Draft, Denniston Water Treatment Plant, UF/MF Membrane Filtration, Pilot Study Report", December 2000

Table 3-1
UF Membrane System Pilot Plant Performance: Water Quality

Run	Dates	Flux gfd	Characteristic	Units	California DHS Standards		Source Water Quality During Pilot Testing			Koch Membrane System Treated Water Quality			Recommended Objectives for HWTP
					Primary	Secondary	Avg.	Max.	Min.	Avg.	Max.	Min.	
1	2/16/99-		GENERAL										
	03/01/1999	48.5	Color	CU	-	15	65	84	52	12	32	0	<5
			pH	units	-	6.5 - 8.5	7.0	7.3	6.4	7.0	7.5	6.3	7.0 - 8.5
	No Pretreatment		Temperature	°F	-	-	55	60	52	55	60	52	59 - 77
			Iron	mg/L	-	0.30	0.89	1.52	0.44	0.02	0.04	0.01	<0.05
			Manganese	mg/L	-	0.050	0.165	0.279	0.027	0.021	0.027	0.006	<0.02
			Conductivity	µmho/cm	-	900	222	250	190	217	250	175	<300
			Total Suspended Solids	mg/L	n/a	n/a	42	57	26	0	0	0	<0.2
			MICROBIOLOGICAL AND TURBIDITY [1]										
			Heterotrophic Plate Count	CFU/mL	-	-	390	460	320	0	0	0	<200
			Total Coliform	MPN/100 mL	-	-	140	170	110	0	0	0	0
			Turbidity	NTU	0.1	-	54	263	20	0.04	0.08	0.03	<0.1
			DISINFECTION BYPRODUCTS AND PRECURSORS										
			THM Formation Potential (THMFP)	µg/L	-	-	310	–	–	240	-	-	150
			Total Organic Carbon (TOC)	mg/L	-	-	5.4	6.0	4.7	3.9	4.9	2.9	<2
2	3/2/99-		GENERAL										
	03/08/1999	55.8	Color	CU	-	15	42	50	35	8	13	3	<5
			pH	units	-	6.5 - 8.5	7.3	7.4	7.3	7.3	7.3	7.3	7.0 - 8.5
	No Pretreatment		Temperature	°F	-	-	52	55	50	52	55	50	59 - 77
			Iron	mg/L	-	0.30	0.42	0.74	0.27	0.02	0.02	0.01	<0.05
			Manganese	mg/L	-	0.050	0.106	0.142	0.082	0.022	0.042	0.007	<0.02
			Conductivity	µmho/cm	-	900	203	210	200	199	210	180	<300
			Total Suspended Solids	mg/L	n/a	n/a	10	-	-	0	-	-	<0.2
			MICROBIOLOGICAL AND TURBIDITY [1]										
			Heterotrophic Plate Count	CFU/mL	-	-	534	-	-	6	-	-	<200
			Total Coliform	MPN/100 mL	-	-	50	-	-	0	-	-	0
			Turbidity	NTU	0.1	-	37	170	9	0.030	0.030	0.029	<0.1
			DISINFECTION BYPRODUCTS AND PRECURSORS										
			THM Formation Potential (THMFP)	µg/L	-	-	190	-	-	150	-	-	150
			Total Organic Carbon (TOC)	mg/L	-	-	7.6	-	-	7.3	-	-	<2

p:\pw-proj\1994\940524.03 CCWD pilot\pilot data\Table 3-1, 3-2.XLS
Sheet: Table 3-1

Table 3-1
UF Membrane System Pilot Plant Performance: Water Quality

Run	Dates	Flux gfd	Characteristic	Units	California DHS Standards		Source Water Quality During Pilot Testing			Koch Membrane System Treated Water Quality			Recommended Objectives for HWTP
					Primary	Secondary	Avg.	Max.	Min.	Avg.	Max.	Min.	
3	3/9/99-		GENERAL										
	03/15/1999	62.0	Color	CU	-	15	52	67	43	4	9	0	<5
			pH	units	-	6.5 - 8.5	7.4	7.5	7.3	7.1	7.3	6.8	7.0 - 8.5
	Ferric Chloride Addition		Temperature	°F	-	-	51	53	40	51	53	40	59 - 77
			Iron	mg/L	-	0.30	0.55	1.05	0.36	0.08	0.28	0.00	<0.05
			Manganese	mg/L	-	0.050	0.120	0.223	0.086	0.043	0.059	0.019	<0.02
			Conductivity	µmho/cm	-	900	200	200	200	195	200	190	<300
			Total Suspended Solids	mg/L	n/a	n/a	11	-	-	0	0	0	<0.2
			MICROBIOLOGICAL AND TURBIDITY [1]										
			Heterotrophic Plate Count	CFU/mL	-	-	500	-	-	0	-	-	<200
			Total Coliform	MPN/100 mL	-	-	30	-	-	0	-	-	0
			Turbidity	NTU	0.1	-	25	54	15	0.027	0.031	0.025	<0.1
			DISINFECTION BYPRODUCTS AND PRECURSORS										
			THM Formation Potential (THMFP)	µg/L	-	-	220	-	-	220	-	-	150
			Total Organic Carbon (TOC)	mg/L	-	-	3.6	-	-	2.8	-	-	<2
4	3/16/99-		GENERAL										
	03/22/1999	61.5	Color	CU	-	15	55	63	48	5	9	0	<5
			pH	units	-	6.5 - 8.5	7.3	7.5	7.3	7.8	8.7	7.0	7.0 - 8.5
	Ferric Chloride and Caustic Addition		Temperature	°F	-	-	55	58	53	55	58	53	59 - 77
			Iron	mg/L	-	0.30	0.51	0.96	0.04	0.01	0.01	0.00	<0.05
			Manganese	mg/L	-	0.05	0.102	0.139	0.088	0.026	0.047	0.010	<0.02
			Conductivity	µmho/cm	-	900	208	220	200	222	250	200	<300
			Total Suspended Solids	mg/L	n/a	n/a	13	-	-	0	-	-	<0.2
			MICROBIOLOGICAL AND TURBIDITY [1]										
			Heterotrophic Plate Count	CFU/mL	-	-	250	-	-	0	-	-	<200
			Total Coliform	MPN/100 mL	-	-	0	-	-	0	-	-	0
			Turbidity	NTU	0.1	-	25	84	11	0.027	0.028	0.024	<0.1
			DISINFECTION BYPRODUCTS AND PRECURSORS										
			THM Formation Potential (THMFP)	µg/L	-	-	201	-	-	158	-	-	150
			Total Organic Carbon (TOC)	mg/L	-	-	4.7	-	-	8.0	-	-	<2

Table 3-1
UF Membrane System Pilot Plant Performance: Water Quality

Run	Dates	Flux gfd	Characteristic	Units	California DHS Standards		Source Water Quality During Pilot Testing			Koch Membrane System Treated Water Quality			Recommended Objectives for HWTP
					Primary	Secondary	Avg.	Max.	Min.	Avg.	Max.	Min.	
5	3/23/99-		GENERAL										
	03/29/1999	59.9	Color	CU	-	15	63	94	45	9	17	0	<5
			pH	units	-	6.5 - 8.5	7.5	7.7	7.2	8.4	8.7	8.0	7.0 - 8.5
			Temperature	°F	-	-	49	55	20	49	55	20	59 - 77
	Ferric Chloride and		Iron	mg/L	-	0.30	0.65	1.37	0.36	0.01	0.01	0.00	<0.05
	Caustic Soda Addition		Manganese	mg/L	-	0.05	0.156	0.418	0.078	0.010	0.023	0.002	<0.02
			Conductivity	µmho/cm	-	900	200	-	-	220	-	-	<300
			Total Suspended Solids	mg/L	n/a	n/a	0	-	-	0	-	-	<0.2
			MICROBIOLOGICAL AND TURBIDITY [1]										
			Heterotrophic Plate Count	CFU/mL	-	-	171	-	-	1	-	-	<200
			Total Coliform	MPN/100 mL	-	-	80	-	-	0	-	-	0
			Turbidity	NTU	0.1	-	30	93	11	0.030	0.032	0.028	<0.1
			DISINFECTION BYPRODUCTS AND PRECURSORS										
			THM Formation Potential (THMFP)	µg/L	-	-	330	-	-	170	-	-	150
			Total Organic Carbon (TOC)	mg/L	-	-	4.8	-	-	3.2	-	-	<2
6	3/30/99-		GENERAL										
	04/05/1999	58.1	Color	CU	-	15	51	72	40	0	0	0	<5
			pH	units	-	6.5 - 8.5	7.8	7.9	7.7	7.2	7.3	6.6	7.0 - 8.5
			Temperature	°F	-	-	52	53	51	52	53	51	59 - 77
	PACl Addition		Iron	mg/L	-	0.30	0.37	0.40	0.34	0.00	0.00	0.00	<0.05
			Manganese	mg/L	-	0.05	0.086	0.103	0.073	0.004	0.008	0.001	<0.02
			Conductivity	µmho/cm	-	900	210	-	-	210	-	-	<300
			Total Suspended Solids	mg/L	n/a	n/a	0	-	-	0	-	-	<0.2
			MICROBIOLOGICAL AND TURBIDITY [1]										
			Heterotrophic Plate Count	CFU/mL	-	-	610	-	-	0	-	-	<200
			Total Coliform	MPN/100 mL	-	-	240	-	-	0	-	-	0
			Turbidity	NTU	0.1	-	14	20	10	0.023	0.024	0.022	<0.1
			DISINFECTION BYPRODUCTS AND PRECURSORS										
			THM Formation Potential (THMFP)	µg/L	-	-	250	-	-	110	-	-	150
			Total Organic Carbon (TOC)	mg/L	-	-	4.1	-	-	2.6	-	-	<2

Table 3-1
UF Membrane System Pilot Plant Performance: Water Quality

Run	Dates	Flux gfd	Characteristic	Units	California DHS Standards		Source Water Quality During Pilot Testing			Koch Membrane System Treated Water Quality			Recommended Objectives for HWTP
					Primary	Secondary	Avg.	Max.	Min.	Avg.	Max.	Min.	
7	4/6/99-		GENERAL										
	04/12/1999	52.0	Color	CU	-	15	34	42	21	1	4	0	<5
			pH	units	-	6.5 - 8.5	7.7	7.9	7.6	7.4	7.4	7.3	7.0 - 8.5
	PACl Addition		Temperature	°F	-	-	52	54	51	52	54	51	59 - 77
			Iron	mg/L	-	0.30	0.42	0.69	0.11	0.00	0.01	0.00	<0.05
			Manganese	mg/L	-	0.05	0.102	0.140	0.074	0.002	0.005	0.000	<0.02
			Conductivity	µmho/cm	-	900	200	-	-	210	-	-	<300
			Total Suspended Solids	mg/L	n/a	n/a	52	-	-	0	-	-	<0.2
			MICROBIOLOGICAL AND TURBIDITY [1]										
			Heterotrophic Plate Count	CFU/mL	-	-	1,200	-	-	0	-	-	<200
			Total Coliform	MPN/100 mL	-	-	170	-	-	0	-	-	0
			Turbidity	NTU	0.1	-	20	50	9	0.022	0.023	0.021	<0.1
			DISINFECTION BYPRODUCTS AND PRECURSORS										
			THM Formation Potential (THMFP)	µg/L	-	-	290	-	-	230	-	-	150
			Total Organic Carbon (TOC)	mg/L	-	-	2.7	-	-	1.3	-	-	<2
8	4/13/99-		GENERAL										
	04/19/1999	53.9	Color	CU	-	15	61	89	24	0	1	0	<5
			pH	units	-	6.5 - 8.5	7.7	7.8	7.6	7.3	7.3	7.3	7.0 - 8.5
	PACl Addition		Temperature	°F	-	-	55	56	53	55	56	53	59 - 77
	PAC Addition		Iron	mg/L	-	0.30	0.52	0.71	0.45	0.00	0.00	0.00	<0.05
			Manganese	mg/L	-	0.05	0.101	0.112	0.092	0.003	0.006	0.001	<0.02
			Conductivity	µmho/cm	-	900	200	-	-	200	-	-	<300
			Total Suspended Solids	mg/L	n/a	n/a	0	-	-	0	-	-	<0.2
			MICROBIOLOGICAL AND TURBIDITY [1]										
			Heterotrophic Plate Count	CFU/mL	-	-	-	-	-	-	-	-	<200
			Total Coliform	MPN/100 mL	-	-	-	-	-	-	-	-	0
			Turbidity	NTU	0.1	-	15	19	12	0.022	0.024	0.021	<0.1
			DISINFECTION BYPRODUCTS AND PRECURSORS										
			THM Formation Potential (THMFP)	µg/L	-	-	180	-	-	64	-	-	150
			Total Organic Carbon (TOC)	mg/L	-	-	6.7	-	-	1.9	-	-	<2

Table 3-1
UF Membrane System Pilot Plant Performance: Water Quality

Run	Dates	Flux gfd	Characteristic	Units	California DHS Standards		Source Water Quality During Pilot Testing			Koch Membrane System Treated Water Quality			Recommended Objectives for HWTP
					Primary	Secondary	Avg.	Max.	Min.	Avg.	Max.	Min.	
9	4/20/99-		GENERAL										
	04/26/1999	51.6	Color	CU	-	15	37	47	29	1	2	0	<5
			pH	units	-	6.5 - 8.5	7.7	7.8	7.6	7.4	7.4	7.3	7.0 - 8.5
			Temperature	°F	-	-	55	56	54	55	56	54	59 - 77
	PACl Addition		Iron	mg/L	-	0.30	0.45	0.56	0.37	0.01	0.01	0.00	<0.05
	PAC Addition		Manganese	mg/L	-	0.05	0.086	0.091	0.078	0.002	0.004	0.000	<0.02
			Conductivity	µmho/cm	-	900	200	-	-	200	-	-	<300
			Total Suspended Solids	mg/L	n/a	n/a	-	-	-	0	-	-	<0.2
			MICROBIOLOGICAL AND TURBIDITY [1]										
			Heterotrophic Plate Count	CFU/mL	-	-	-	-	-	-	-	-	<200
			Total Coliform	MPN/100 mL	-	-	-	-	-	-	-	-	0
			Turbidity	NTU	0.1	-	8	10	7	0.020	0.021	0.020	<0.1
			DISINFECTION BYPRODUCTS AND PRECURSORS										
			THM Formation Potential (THMFP)	µg/L	-	-	-	-	-	-	-	-	150
			Total Organic Carbon (TOC)	mg/L	-	-	2.7	-	-	2.0	-	-	<2
10	4/27/99-		GENERAL										
	05/03/1999	58.3	Color	CU	-	15	21	28	17	1	2	0	<5
			pH	units	-	6.5 - 8.5	7.7	7.8	7.7	7.4	7.4	7.3	7.0 - 8.5
			Temperature	°F	-	-	54	55	53	54	55	53	59 - 77
	PACl Addition		Iron	mg/L	-	0.30	0.39	0.50	0.36	0.01	0.01	0.00	<0.05
			Manganese	mg/L	-	0.05	0.087	0.097	0.080	0.005	0.007	0.004	<0.02
			Conductivity	µmho/cm	-	900	200	-	-	200	-	-	<300
			Total Suspended Solids	mg/L	n/a	n/a	-	-	-	0	-	-	<0.2
			MICROBIOLOGICAL AND TURBIDITY [1]										
			Heterotrophic Plate Count	CFU/mL	-	-	-	-	-	-	-	-	<200
			Total Coliform	MPN/100 mL	-	-	-	-	-	-	-	-	0
			Turbidity	NTU	0.1	-	6	7	5	0.021	0.021	0.020	<0.1
			DISINFECTION BYPRODUCTS AND PRECURSORS										
			THM Formation Potential (THMFP)	µg/L	-	-	-	-	-	-	-	-	150
			Total Organic Carbon (TOC)	mg/L	-	-	2.1	-	-	1.2	-	-	<2

Table 3-1
UF Membrane System Pilot Plant Performance: Water Quality

Run	Dates	Flux gfd	Characteristic	Units	California DHS Standards		Source Water Quality During Pilot Testing			Koch Membrane System Treated Water Quality			Recommended Objectives for HWTP
					Primary	Secondary	Avg.	Max.	Min.	Avg.	Max.	Min.	
11	5/4/99-		GENERAL										
	05/10/1999	61.5	Color	CU	-	15	14	19	9	0	1	0	<5
			pH	units	-	6.5 - 8.5	7.5	7.7	7.4	7.1	7.4	7.0	7.0 - 8.5
	PACl Addition		Temperature	°F	-	-	55	55	53	55	55	53	59 - 77
			Iron	mg/L	-	0.30	0.31	0.34	0.29	0.00	0.00	0.00	<0.05
			Manganese	mg/L	-	0.05	0.086	0.092	0.079	0.028	0.066	0.005	<0.02
			Conductivity	µmho/cm	-	900	250	-	-	255	-	-	<300
			Total Suspended Solids	mg/L	n/a	n/a	-	-	-	-	-	-	<0.2
			MICROBIOLOGICAL AND TURBIDITY [1]										
			Heterotrophic Plate Count	CFU/mL	-	-	1	-	-	1	-	-	<200
			Total Coliform	MPN/100 mL	-	-	2	-	-	0	-	-	0
			Turbidity	NTU	0.1	-	4	5	3	0.020	0.022	0.019	<0.1
			DISINFECTION BYPRODUCTS AND PRECURSORS										
			THM Formation Potential (THMFP)	µg/L	-	-	-	-	-	-	-	-	150
			Total Organic Carbon (TOC)	mg/L	-	-	-	-	-	-	-	-	<2
12	5/11/99-		GENERAL										
	05/17/1999	59.0	Color	CU	-	15	14	18	12	1	4	0	<5
			pH	units	-	6.5 - 8.5	7.7	7.8	7.7	7.5	7.8	7.1	7.0 - 8.5
	PACl Addition		Temperature	°F	-	-	55	55	54	55	55	54	59 - 77
	KMNO4 Addition		Iron	mg/L	-	0.30	0.32	0.36	0.30	0.00	0.01	0.00	<0.05
			Manganese	mg/L	-	0.05	0.086	0.096	0.081	0.032	0.065	0.006	<0.02
			Conductivity	µmho/cm	-	900	250	-	-	270	-	-	<300
			Total Suspended Solids	mg/L	n/a	n/a	-	-	-	-	-	-	<0.2
			MICROBIOLOGICAL AND TURBIDITY [1]										
			Heterotrophic Plate Count	CFU/mL	-	-	-	-	-	-	-	-	<200
			Total Coliform	MPN/100 mL	-	-	-	-	-	-	-	-	0
			Turbidity	NTU	0.1	-	3	4	3	0.020	0.021	0.019	<0.1
			DISINFECTION BYPRODUCTS AND PRECURSORS										
			THM Formation Potential (THMFP)	µg/L	-	-	-	-	-	-	-	-	150
			Total Organic Carbon (TOC)	mg/L	-	-	-	-	-	-	-	-	<2

Table 3-1
UF Membrane System Pilot Plant Performance: Water Quality

Run	Dates	Flux gfd	Characteristic	Units	California DHS Standards		Source Water Quality During Pilot Testing			Koch Membrane System Treated Water Quality			Recommended Objectives for HWTP
					Primary	Secondary	Avg.	Max.	Min.	Avg.	Max.	Min.	

cc 1. Giardia, Crypotosporidium and viruses were not measured during this study.

Table 3-2
MF Membrane System Pilot Plant Performance: Water Quality

Run	Dates	Flux gfd	Characteristic	Units	California DHS Standards		Source Water Quality During Pilot Testing			Memcor Membrane System Treated Water Quality			Recommended Objectives for HWTP
					Primary	Secondary	Avg.	Max.	Min.	Avg.	Max.	Min.	
1	2/16/99-		GENERAL										
	03/01/1999	58.5	Color	CU	-	15	65	84	52	11	22	6	<5
			pH	units	-	6.5 - 8.5	7.0	7.3	6.4	7.1	7.4	6.8	7.0 - 8.5
	No Pretreatment		Temperature	°F	-	-	55	60	52	55	60	52	59 - 77
			Iron	mg/L	-	0.30	0.89	1.52	0.44	0.02	0.03	0.01	<0.05
			Manganese	mg/L	-	0.050	0.165	0.279	0.027	0.025	0.029	0.020	<0.02
			Conductivity	µmho/cm	-	900	222	250	190	202	250	180	<300
			Total Suspended Solids	mg/L	n/a	n/a	42	57	26	0	0	0	<0.2
			MICROBIOLOGICAL AND TURBIDITY [1]										
			Heterotrophic Plate Count	CFU/mL	-	-	390	460	320	2	2	2	<200
			Total Coliform	MPN/100 mL	-	-	140	170	110	0	0	0	0
			Turbidity	NTU	0.1	-	54	263	20	0.03	0.05	0.02	<0.1
			DISINFECTION BYPRODUCTS AND PRECURSORS										
			THM Formation Potential (THMFP)	µg/L	-	-	310	-	-	210	-	-	150
			Total Organic Carbon (TOC)	mg/L	-	-	5.4	6.0	4.7	4.0	-	-	<2
2	3/2/99-		GENERAL										
	03/08/1999	59.4	Color	CU	-	15	42	50	35	11	17	6	<5
			pH	units	-	6.5 - 8.5	7.3	7.4	7.3	7.3	7.3	7.3	7.0 - 8.5
	No Pretreatment		Temperature	°F	-	-	52	55	50	52	55	50	59 - 77
			Iron	mg/L	-	0.30	0.42	0.74	0.27	0.02	0.02	0.01	<0.05
			Manganese	mg/L	-	0.050	0.106	0.142	0.082	0.037	0.043	0.031	<0.02
			Conductivity	µmho/cm	-	900	203	210	200	201	220	180	<300
			Total Suspended Solids	mg/L	n/a	n/a	10	-	-	0	-	-	<0.2
			MICROBIOLOGICAL AND TURBIDITY [1]										
			Heterotrophic Plate Count	CFU/mL	-	-	534	-	-	0	-	-	<200
			Total Coliform	MPN/100 mL	-	-	50	-	-	0	-	-	0
			Turbidity	NTU	0.1	-	37	170	9	0.029	0.031	0.027	<0.1
			DISINFECTION BYPRODUCTS AND PRECURSORS										
			THM Formation Potential (THMFP)	µg/L	-	-	190	-	-	140	-	-	150
			Total Organic Carbon (TOC)	mg/L	-	-	7.6	-	-	6.6	-	-	<2

Table 3-2

MF Membrane System Pilot Plant Performance: Water Quality

Run	Dates	Flux gfd	Characteristic	Units	California DHS Standards		Source Water Quality During Pilot Testing			Memcor Membrane System Treated Water Quality			Recommended Objectives for HWTP
					Primary	Secondary	Avg.	Max.	Min.	Avg.	Max.	Min.	
3	3/9/99-		GENERAL										
	03/15/1999	58.7	Color	CU	-	15	52	67	43	8	14	1	<5
			pH	units	-	6.5 - 8.5	7.4	7.5	7.3	7.2	7.4	6.9	7.0 - 8.5
	No Pretreatment		Temperature	°F	-	-	51	53	40	51	53	40	59 - 77
			Iron	mg/L	-	0.30	0.55	1.05	0.36	0.02	0.02	0.01	<0.05
			Manganese	mg/L	-	0.050	0.120	0.223	0.086	0.035	0.041	0.030	<0.02
			Conductivity	µmho/cm	-	900	200	200	200	198	210	180	<300
			Total Suspended Solids	mg/L	n/a	n/a	11	11	11	0	0	0	<0.2
			MICROBIOLOGICAL AND TURBIDITY [1]										
			Heterotrophic Plate Count	CFU/mL	-	-	500	-	-	0	-	-	<200
			Total Coliform	MPN/100 mL	-	-	30	-	-	0	-	-	0
			Turbidity	NTU	0.1	-	25	54	15	0.029	0.030	0.027	<0.1
			DISINFECTION BYPRODUCTS AND PRECURSORS										
			THM Formation Potential (THMFP)	µg/L	-	-	220	-	-	160	-	-	150
			Total Organic Carbon (TOC)	mg/L	-	-	3.6	-	-	5.1	-	-	<2
4	3/16/99-		GENERAL										
	03/22/1999	59.2	Color	CU	-	15	55	63	48	9	16	0	<5
			pH	units	-	6.5 - 8.5	7.3	7.5	7.3	7.3	7.5	7.2	7.0 - 8.5
	No Pretreatment		Temperature	°F	-	-	55	58	53	55	58	53	59 - 77
			Iron	mg/L	-	0.30	0.51	0.96	0.04	0.01	0.02	0.01	<0.05
			Manganese	mg/L	-	0.05	0.102	0.139	0.088	0.024	0.030	0.017	<0.02
			Conductivity	µmho/cm	-	900	208	220	200	210	220	200	<300
			Total Suspended Solids	mg/L	n/a	n/a	13	-	-	0	-	-	<0.2
			MICROBIOLOGICAL AND TURBIDITY [1]										
			Heterotrophic Plate Count	CFU/mL	-	-	250	-	-	16	-	-	<200
			Total Coliform	MPN/100 mL	-	-	0	-	-	0	-	-	0
			Turbidity	NTU	0.1	-	25	84	11	0.03	0.03	0.03	<0.1
			DISINFECTION BYPRODUCTS AND PRECURSORS										
			THM Formation Potential (THMFP)	µg/L	-	-	201	-	-	167	167	-	150
			Total Organic Carbon (TOC)	mg/L	-	-	4.7	-	-	4.0	-	-	<2

Table 3-2
MF Membrane System Pilot Plant Performance: Water Quality

Run	Dates	Flux gfd	Characteristic	Units	California DHS Standards		Source Water Quality During Pilot Testing			Memcor Membrane System Treated Water Quality			Recommended Objectives for HWTP
					Primary	Secondary	Avg.	Max.	Min.	Avg.	Max.	Min.	
5	3/23/99-		GENERAL										
	03/29/1999	73.0	Color	CU	-	15	63	94	45	13	19	0	<5
			pH	units	-	6.5 - 8.5	7.5	7.7	7.2	7.5	7.9	7.2	7.0 - 8.5
	No Pretreatment		Temperature	°F	-	-	49	55	20	49	55	20	59 - 77
			Iron	mg/L	-	0.30	0.65	1.37	0.36	0.02	0.02	0.01	<0.05
			Manganese	mg/L	-	0.05	0.156	0.418	0.078	0.025	0.032	0.014	<0.02
			Conductivity	µmho/cm	-	900	200	-	-	200	-	-	<300
			Total Suspended Solids	mg/L	n/a	n/a	0	-	-	0	-	-	<0.2
			MICROBIOLOGICAL AND TURBIDITY [1]										
			Heterotrophic Plate Count	CFU/mL	-	-	171	-	-	75	-	-	<200
			Total Coliform	MPN/100 mL	-	-	80	-	-	0	-	-	0
			Turbidity	NTU	0.1	-	30	93	11	0.033	0.039	0.029	<0.1
			DISINFECTION BYPRODUCTS AND PRECURSORS										
			THM Formation Potential (THMFP)	µg/L	-	-	330	-	-	200	-	-	150
			Total Organic Carbon (TOC)	mg/L	-	-	4.8	-	-	4.6	-	-	<2
6	3/30/99-		GENERAL										
	04/05/1999	71.0	Color	CU	-	15	51	72	40	2	10	0	<5
			pH	units	-	6.5 - 8.5	7.8	7.9	7.7	7.8	7.9	7.7	7.0 - 8.5
	PACl Addition		Temperature	°F	-	-	52	53	51	52	53	51	59 - 77
			Iron	mg/L	-	0.30	0.37	0.40	0.34	0.00	0.01	0.00	<0.05
			Manganese	mg/L	-	0.05	0.086	0.103	0.073	0.033	0.038	0.029	<0.02
			Conductivity	µmho/cm	-	900	210	-	-	210	-	-	<300
			Total Suspended Solids	mg/L	n/a	n/a	#DIV/0!	-	-	0	-	-	<0.2
			MICROBIOLOGICAL AND TURBIDITY [1]										
			Heterotrophic Plate Count	CFU/mL	-	-	610	-	-	0	-	-	<200
			Total Coliform	MPN/100 mL	-	-	240	-	-	0	-	-	0
			Turbidity	NTU	0.1	-	14	20	10	0.027	0.029	0.026	<0.1
			DISINFECTION BYPRODUCTS AND PRECURSORS										
			THM Formation Potential (THMFP)	µg/L	-	-	250	-	-	110	-	-	150
			Total Organic Carbon (TOC)	mg/L	-	-	4.1	-	-	1.5	-	-	<2

Table 3-2
MF Membrane System Pilot Plant Performance: Water Quality

Run	Dates	Flux			California DHS Standards		Source Water Quality During Pilot Testing			Memcor Membrane System Treated Water Quality			Recommended Objectives for HWTP
		gfd	Characteristic	Units	Primary	Secondary	Avg.	Max.	Min.	Avg.	Max.	Min.	
7	4/6/99-		GENERAL										
	04/12/1999	68.8	Color	CU	-	15	34	42	21	2	5	0	<5
			pH	units	-	6.5 - 8.5	7.7	7.9	7.6	7.7	7.8	7.7	7.0 - 8.5
	PACl Addition		Temperature	°F	-	-	52	54	51	52	54	51	59 - 77
			Iron	mg/L	-	0.30	0.42	0.69	0.11	0.00	0.02	0.00	<0.05
			Manganese	mg/L	-	0.05	0.102	0.140	0.074	0.036	0.042	0.028	<0.02
			Conductivity	µmho/cm	-	900	200	-	-	200	-	-	<300
			Total Suspended Solids	mg/L	n/a	n/a	52	-	-	0	-	-	<0.2
			MICROBIOLOGICAL AND TURBIDITY [1]										
			Heterotrophic Plate Count	CFU/mL	-	-	1,200	-	-	0	-	-	<200
			Total Coliform	MPN/100 mL	-	-	170	-	-	0	-	-	0
			Turbidity	NTU	0.1	-	20	50	9	0.026	0.027	0.021	<0.1
			DISINFECTION BYPRODUCTS AND PRECURSORS										
			THM Formation Potential (THMFP)	µg/L	-	-	290	-	-	110	-	-	150
			Total Organic Carbon (TOC)	mg/L	-	-	2.7	-	-	0.0	-	-	<2
8	4/13/99-		GENERAL										
	04/19/1999	67.6	Color	CU	-	15	61	89	24	1	3	0	<5
			pH	units	-	6.5 - 8.5	7.7	7.8	7.6	7.7	7.8	7.3	7.0 - 8.5
	PACl Addtion		Temperature	°F	-	-	55	56	53	55	56	53	59 - 77
			Iron	mg/L	-	0.30	0.52	0.71	0.45	0.00	0.01	0.00	<0.05
			Manganese	mg/L	-	0.05	0.101	0.112	0.092	0.027	0.037	0.002	<0.02
			Conductivity	µmho/cm	-	900	200	-	-	200	-	-	<300
			Total Suspended Solids	mg/L	n/a	n/a	0	-	-	0	-	-	<0.2
			MICROBIOLOGICAL AND TURBIDITY [1]										
			Heterotrophic Plate Count	CFU/mL	-	-	-	-	-	-	-	-	<200
			Total Coliform	MPN/100 mL	-	-	-	-	-	-	-	-	0
			Turbidity	NTU	0.1	-	15	19	12	0.026	0.029	0.021	<0.1
			DISINFECTION BYPRODUCTS AND PRECURSORS										
			THM Formation Potential (THMFP)	µg/L	-	-	180	-	-	70	-	-	150
			Total Organic Carbon (TOC)	mg/L	-	-	6.7	-	-	2.4	-	-	<2

Table 3-2
MF Membrane System Pilot Plant Performance: Water Quality

Run	Dates	Flux gfd	Characteristic	Units	California DHS Standards		Source Water Quality During Pilot Testing			Memcor Membrane System Treated Water Quality			Recommended Objectives for HWTP
					Primary	Secondary	Avg.	Max.	Min.	Avg.	Max.	Min.	
9	4/20/99-		GENERAL										
	04/26/1999	65.3	Color	CU	-	15	37	47	29	1	2	0	<5
			pH	units	-	6.5 - 8.5	7.7	7.8	7.6	7.4	7.7	7.3	7.0 - 8.5
	PACl Addtion		Temperature	°F	-	-	55	56	54	55	56	54	59 - 77
			Iron	mg/L	-	0.30	0.45	0.56	0.37	0.01	0.03	0.00	<0.05
			Manganese	mg/L	-	0.05	0.086	0.091	0.078	0.003	0.005	0.000	<0.02
			Conductivity	µmho/cm	-	900	200	-	-	200	-	-	<300
			Total Suspended Solids	mg/L	n/a	n/a	0	-	-	0	-	-	<0.2
			MICROBIOLOGICAL AND TURBIDITY [1]										
			Heterotrophic Plate Count	CFU/mL	-	-	-	-	-	-	-	-	<200
			Total Coliform	MPN/100 mL	-	-	-	-	-	-	-	-	0
			Turbidity	NTU	0.1	-	8	10	7	0.021	0.025	0.020	<0.1
			DISINFECTION BYPRODUCTS AND PRECURSORS										
			THM Formation Potential (THMFP)	µg/L	-	-	-	-	-	-	-	-	150
			Total Organic Carbon (TOC)	mg/L	-	-	2.7	-	-	1.6	-	-	<2
10	4/27/99-		GENERAL										
	05/03/1999	60.4	Color	CU	-	15	21	28	17	1	2	0	<5
			pH	units	-	6.5 - 8.5	7.7	7.8	7.7	7.9	8.1	7.6	7.0 - 8.5
	PACl Addtion		Temperature	°F	-	-	54	55	53	54	55	53	59 - 77
			Iron	mg/L	-	0.30	0.39	0.50	0.36	0.01	0.01	0.00	<0.05
			Manganese	mg/L	-	0.05	0.087	0.097	0.080	0.005	0.011	0.001	<0.02
			Conductivity	µmho/cm	-	900	200	-	-	184	-	-	<300
			Total Suspended Solids	mg/L	n/a	n/a	0	-	-	0	-	-	<0.2
			MICROBIOLOGICAL AND TURBIDITY [1]										
			Heterotrophic Plate Count	CFU/mL	-	-	-	-	-	-	-	-	<200
			Total Coliform	MPN/100 mL	-	-	-	-	-	-	-	-	0
			Turbidity	NTU	0.1	-	6	7	5	0.025	0.026	0.024	<0.1
			DISINFECTION BYPRODUCTS AND PRECURSORS										
			THM Formation Potential (THMFP)	µg/L	-	-	-	-	-	-	-	-	150
			Total Organic Carbon (TOC)	mg/L	-	-	2.1	-	-	1.5	-	-	<2

Table 3-2
MF Membrane System Pilot Plant Performance: Water Quality

Run	Dates	Flux			California DHS Standards		Source Water Quality During Pilot Testing			Memcor Membrane System Treated Water Quality			Recommended Objectives for HWTP
		gfd	Characteristic	Units	Primary	Secondary	Avg.	Max.	Min.	Avg.	Max.	Min.	
11	5/4/99-		GENERAL										
	05/10/1999	53.5	Color	CU	-	15	14	19	9	2	4	0	<5
			pH	units	-	6.5 - 8.5	7.5	7.7	7.4	8.0	8.2	8.0	7.0 - 8.5
	PACl Addtion		Temperature	°F	-	-	55	55	53	55	55	53	59 - 77
			Iron	mg/L	-	0.30	0.31	0.34	0.29	0.00	0.01	0.00	<0.05
			Manganese	mg/L	-	0.05	0.086	0.092	0.079	0.008	0.014	0.003	<0.02
			Conductivity	µmho/cm	-	900	250	-	-	250	-	-	<300
			Total Suspended Solids	mg/L	n/a	n/a	-	-	-	0	-	-	<0.2
			MICROBIOLOGICAL AND TURBIDITY [1]										
			Heterotrophic Plate Count	CFU/mL	-	-	1	-	-	4	-	-	<200
			Total Coliform	MPN/100 mL	-	-	2	-	-	0	-	-	0
			Turbidity	NTU	0.1	-	4	5	3	0.026	0.028	0.025	<0.1
			DISINFECTION BYPRODUCTS AND PRECURSORS										
			THM Formation Potential (THMFP)	µg/L	-	-	-	-	-	-	-	-	150
			Total Organic Carbon (TOC)	mg/L	-	-	-	-	-	-	-	-	<2
12	5/11/99-		GENERAL										
	05/17/1999	59.1	Color	CU	-	15	14	18	12	3	7	0	<5
			pH	units	-	6.5 - 8.5	7.7	7.8	7.7	7.8	8.0	7.7	7.0 - 8.5
	PACl Addtion		Temperature	°F	-	-	55	55	54	55	55	54	59 - 77
			Iron	mg/L	-	0.30	0.32	0.36	0.30	0.01	0.01	0.00	<0.05
			Manganese	mg/L	-	0.05	0.086	0.096	0.081	0.064	0.065	0.061	<0.02
			Conductivity	µmho/cm	-	900	250	-	-	250	-	-	<300
			Total Suspended Solids	mg/L	n/a	n/a	-	-	-	-	-	-	<0.2
			MICROBIOLOGICAL AND TURBIDITY [1]										
			Heterotrophic Plate Count	CFU/mL	-	-	-	-	-	-	-	-	<200
			Total Coliform	MPN/100 mL	-	-	-	-	-	-	-	-	0
			Turbidity	NTU	0.1	-	3	4	3	0.027	0.034	0.024	<0.1
			DISINFECTION BYPRODUCTS AND PRECURSORS										
			THM Formation Potential (THMFP)	µg/L	-	-	-	-	-	-	-	-	150
			Total Organic Carbon (TOC)	mg/L	-	-	-	-	-	-	-	-	<2

IV. FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

Findings and Conclusions

1. An investigation has been performed of potential contaminant sources. Currently there are no known significant potential contaminant sources in either the Denniston or San Vicente watersheds.
2. Land use within the watersheds is not expected to change within the near future because of zoning restrictions, and therefore new significant potential contaminant sources are not anticipated.
3. The current watershed control and management practices within the Denniston watershed including those of the CCWD, property owner, and farmer have been reviewed and found adequate. Current watershed control and management practices within the San Vicente watershed require additional investigation prior to the CCWD resuming diversion of water from San Vicente Creek. The CCWD has no current plans to resume diverting water from San Vicente Creek.
4. The water quality of the surface water from Denniston Creek is in compliance with all state drinking water standards MCL's (maximum contaminant levels) following treatment at the Denniston WTP. The water produced by the plant is in conformance with all current drinking water regulations.
5. The current monitoring program for untreated water from Denniston Creek and for treated water from the Denniston WTP is in conformance with current regulations.

Recommendations

1. The monitoring program for untreated water from Denniston Creek should be expanded to collect information required for evaluation of the capability of the Denniston WTP to meet the proposed new drinking water regulations. The budget for FY 2001-02 should include sufficient funds for this additional monitoring work.

Coastside County Water District

ADDENDUM TO WATERSHED SANITARY SURVEY UPDATE DENNISTON & SAN VICENTE CREEK WATERSHEDS

October 30, 2001

The Coastside County Water District prepared a report entitled *Watershed Sanitary Survey Update, Denniston & San Vicente Creek Watersheds, San Mateo County, California,* dated May 2001 as required by the State Department of Health Services. This report was reviewed by DHS, and their letter dated August 16, 2001 stated the following: "Our review shows some additional information is needed as shown on the enclosed to complete the reports. Please submit no later than November 12, 2001, an addendum to the update report that contains this additional information."

The additional information required by DHS is shown below in italics, and the additional information from CCWD is shown in non-italics:

Watershed – Existing Hydrology

1. *Stream flow characteristics:*

   Drainage area: As shown on the Watershed Map of Denniston and San Vicente Creeks included in the survey update report, the drainage area of Denniston Creek above the point of diversion is 1,980 acres and the area of San Vicente Creek is 847 acres.

   Description of major tributaries: As shown on the Watershed Map, there are 5 major unnamed tributaries which comprise Denniston Creek and 2 major unnamed tributaries which comprise San Vicente Creek. The characteristics of the watershed areas of these tributaries is described as "hillside areas" in the survey update report.

   Perennial or seasonal flow: Both Denniston and San Vicente Creeks are perennial flow creeks.

   Mean monthly flows during dry, normal, and wet years: The CCWD has installed stream gauging stations on both Denniston and San Vicente Creeks, and the staff gauge reading at each station is collected daily. However, the staff gauge data has not as yet been converted to streamflow data. Therefore, the CCWD does not at this time have available data for mean monthly flows during dry, normal, and wet years. There are no other known sources of streamflow data for either Denniston Creek or San Vicente Creek.

   Effect of reservoir operations on stream flow: There are no reservoir operations other than water diversions. Diversions from Denniston Reservoir by either the CCWD for municipal water supply use or by the farmer who leases land within the watershed areas for agricultural use decreases the flow in Denniston Creek downstream from the reservoir by the amount of water diverted.

Location and amount of in-basin diversions: Refer to the Watershed Map:

Denniston Creek: The farmer diverts water for agricultural use at 2 locations (1) Denniston Reservoir adjacent to the CCWD's point of diversion, and (2) directly from the creek approximately 1 mile upstream from the CCWD's point of diversion for irrigation of the agricultural field at that location. The amount of water diverted for irrigation usage is not metered by the farmer because he has no requirement to do so.

San Vicente Creek: The farmer diverts water for agricultural usage at the CCWD's point of diversion (it is a shared diversion facility) from which it flows into the San Vicente Reservoir shown on the Watershed Map and several other adjacent reservoirs where it is stored for use during the summer and fall months. The amount of water diverted for irrigation usage is not metered by the farmer because he has no requirement to do so.

2. *Reservoir characteristics of Denniston Reservoir (capacity, depth, seasonal effects such as lake overturn, algal blooms, color, etc).*

When the Denniston facilities were initially put into service in 1972, the surface area of Denniston Reservoir was approximately 5 acres and the average depth of water was approximately 6 feet. Since that time sedimentation has occurred during periods of high streamflow, reducing the surface area to less than ½ acre adjacent to Denniston Dam and the CCWD's Denniston Pump Station; the water depth in the area of the dam and intake is approximately 6 feet. The majority of the former reservoir area is now totally filled in with soil material and vegetation, and there is only a shallow creek channel through it. The CCWD performs an annual minor dredging project around the area of the intake pipelines to Denniston Pump Station in order to maintain operational capability. The reservoir is best described as a flow-through facility with no useful storage capacity. There are no seasonal effects such as lake overturn because of lack of depth. There are algal blooms during late summer and fall months. The water does have color. The taste effects of the algal blooms and the visual effect of the color are reduced to acceptable levels by the facilities at the Denniston water treatment plant resulting in treated water in conformance with DHS drinking water requirements.

3. *Wetlands characteristics (a real extent, proximity to intake):*

There is no known technical information describing the wetlands characteristics of the Denniston Reservoir. The CCWD's annual dredging project is the area immediately adjacent to the intake pipes to the Denniston Pump Stations removes all precipitated soils materials and vegetation from the proximity to the intake.

4. *Groundwater recharge (discussion of any areas with significant recharge of groundwater to a surface water body).*

There are no known areas with significant recharge of groundwater to Denniston Reservoir.

Water Supply System – History

1. *The history of the water supply system – was the system acquired from a previous owner, does the system have components that are old (which indicates a higher likelihood of failure) and/or abandoned, etc.*

   Water from the Denniston Project facilities is sufficient in quantity to provide service to only the northern portion (the geographic areas of El Granada, Princeton and Clipper Ridge) of the CCWD's service area. There are a few areas in El Granada served by old 2 inch galvanized steel pipelines which were acquired from Citizens Utility Company in 1949, but most of the pipelines within the El Granada area are either cast iron or ductile iron pipelines installed after 1960 and considered to be in good condition. The Princeton area is provided service by PVC pipelines installed after 1970 and considered to be in good condition. The Clipper Ridge area is provided service by ductile iron pipelines installed since 1970 and considered to be in good condition.

2. *Current data on service area characteristics – number and type of customers currently served, special water quality needs, etc.*

   Water from the Denniston Project facilities provides service to a maximum of 3,000 customers in the northern service area of the CCWD's service area. The number of customers varies depending on the amount of water available from the Denniston Project facilities. The Denniston WTP is normally not operated during winter and spring months when the untreated water turbidity is 50 NTU or greater. During other periods of the year, the production varies from approximately 150 to 700 gpm depending on available streamflow. The customers are primarily residential, but there are approximately 50 commercial customers within the Denniston Project maximum service area. None of the customers has special water quality needs.

Water Supply System – Facilities

1. *Raw water reservoirs (Denniston Reservoir) – capacity, operation of reservoir as it related to the use of treatment and other system facilities and flexibility.*

   As described above, the CCWD regards the Denniston Reservoir as a flow-through facility which means there is no significant amount of storage capacity usable for meeting peak demands or emergencies. The CCWD operates the Denniston Pump Station (and similarly the Denniston WTP) at a daily fixed flow rate which is either (1) the maximum flow rate available from the stream, during summer and fall months, or (2) the amount of water which is required for customer usage, during winter and spring months. It is not feasible to convey surplus water from the Denniston Project facilities at the northern end of the CCWD's service area to the central and southern portion of the service area because of insufficient transmission system capacity (Note: another pump station would be needed to convey water from the Denniston Project southward to the Half Moon Bay area).

Potential Contaminant Sources in the Watershed – Septic Tank Systems

1. *Areas known to have failing septic tank systems and corrective measures being taken.*

As stated in the Section III., Paragraph A.1 of the survey update report, there are no residences in the Denniston watershed, and therefore there are no existing septic tanks. There are 3 residences in the San Vicente watershed with septic tanks, but because the CCWD does not divert water from San Vicente Creek there is no reason to investigate the condition of these septic tanks.

2. *Water Quality monitoring data for surface waters near areas served by septic tanks.*

Because there are no septic tanks in the Denniston watershed, it is unnecessary to conduct a septic tank water quality monitoring program. Because the CCWD does not divert water from San Vicente Creek, it is unnecessary to conduct a septic tank water quality monitoring program.

Potential Contaminant Sources in the Watershed – Agricultural Crop Lane Use

1. *Available data related to application quantities or runoff concentrations of constituents of concern, e.g., TDS, nutrients, pesticides and herbicides, sodium, etc.*

Water from Denniston Creek is sampled at Denniston Reservoir, the diversion point, and analyzed in conformance with DHS drinking water requirements. Attached is a copy of the available data.

Potential Contaminant Sources in the Watershed – Grazing Animals

1. *The location of grazing animals on private land.*

As stated in Section III., Paragraph A.3 of the survey update report, there is no animal grazing in the Denniston watershed. Grazing of animals within the San Vicente watershed is not a concern because the CCWD does not divert water from this creek.

2. *Access of grazing animals to tributary water bodies.*

As stated in Section III., Paragraph A.3 of the survey update report, there is no animal grazing in the Denniston watershed. Grazing of animals within the San Vicente watershed is not a concern because the CCWD does not divert water from this creek.

Potential Contaminant Sources in the Watershed – Recreational Use

1. *Whether or not water-contact recreation takes place at Denniston Reservoir. If water-contact recreation occurs, discuss the number of people involved on a peak-use day.*

No water-contact recreation takes place at Denniston Reservoir.

Evaluation of Ability to Meet Surface Water Treatment Requirements

1. *The bacteriological data upon which the level of treatment analysis is made.*

   The current level of treatment is based on a letter from DHS dated October 4, 1991, not on bacteriological data.

2. *A summary of the significant sources of pathogens in the watershed (both current and anticipated future)*

   As stated in Section III., Paragraphs B and C of the survey update report, there are no significant sources of pathogens in the Denniston watershed and none are anticipated in the future.

3. *The recommended levels of removal of Giardia and viruses and an explanation of how these levels of removal were determined.*

   The current treatment requirements, which were stated in a letter from DHS dated October 4, 1991, are 99.9% (3 log) removal/inactivation of Giardia and 99.99% (4 log) removal/inactivation of viruses.

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SUBMITTED TO THE STATE
by EDT DP 8/6/01
DATED

Date of Report: Aug 02 2001 Lab Name: **Sequoia Analytical - Morgan Hill** Date/Time Sample Collected 06/19/01 08:30

Sampler Name: Dave Mier Sample ID No. **MKF0443-01** Date/Time Sample Received: 06/19/01 11:05

Employed by: Coastside County Water Dist. Date/Time Sample Completed 06/29/01 12:42

ORGANIC CHEMICAL ANALYSIS

System Name: COASTSIDE COUNTY WATER DISTRICT System Number: 4110011

Sample Name: Denniston Reservoir Sample Source: DENNISTON RESERVOIR - RAW

User ID: HEN Station Number: D41/011-DENRESV

Date/Time of Sample: 01 06 19 0830 (YY MM DD TTTT) Laboratory Code: 5113

Date Analysis Completed: 01 06 29 (YY MM DD)

Submitted by: _____ Phone #: _____

REGULATED ORGANIC CHEMICALS

Test Method	Constituent ALL CONSTITUENTS REPORTED ug/L	Entry #	Analysis Results	MCL ug/L	DLR ug/L
EPA 524.2	Bromodichloromethane	32101	ND		0.5
EPA 524.2	Bromoform	32104	ND		0.5
EPA 524.2	Chloroform (Trichloromethane)	32106	0.560		0.5
EPA 524.2	Dibromochloromethane	32105	ND		0.5
EPA 524.2	Total Trihalomethanes (THM'S/ TTHM)	82080	1.40	100	0.5
EPA 524.2	Benzene	34030	ND	1	0.5
EPA 524.2	Carbon Tetrachloride	32102	ND	0.5	0.5
EPA 524.2	1,2-Dichlorobenzene (o-DCB)	34536	ND	600	0.5
EPA 524.2	1,4-Dichlorobenzene (p-DCB)	34571	ND	5	0.5
EPA 524.2	1,1-Dichloroethane (1,1-DCA)	34496	ND	5	0.5
EPA 524.2	1,2-Dichloroethane (1,2-DCA)	34531	ND	0.5	0.5
EPA 524.2	1,1-Dichloroethylene (1,1-DCE)	34501	ND	6	0.5
EPA 524.2	cis-1,2-Dichloroethylene (c-1,2-DCE)	77093	ND	6	0.5
EPA 524.2	trans-1,2-Dichloroethylene (t-1,2-DCE)	34546	ND	10	0.5
EPA 524.2	Dichloromethane (Methylene Chloride)	34423	ND	5	0.5
EPA 524.2	1,2-Dichloropropane	34541	ND	5	0.5
EPA 524.2	Total 1,3-Dichloropropene	34561	ND	0.5	0.5
EPA 524.2	Ethyl Benzene	34371	ND	700	0.5
EPA 524.2	Monochlorobenzene (Chlorobenzene)	34301	ND	70	0.5
EPA 524.2	Styrene	77128	ND	100	0.5
EPA 524.2	1,1,2,2-Tetrachloroethane	34516	ND	1	0.5
EPA 524.2	Tetrachloroethylene (PCE)	34475	ND	5	0.5
EPA 524.2	Toluene	34010	ND	150	0.5
EPA 524.2	1,2,4-Trichlorobenzene	34551	ND	70	0.5
EPA 524.2	1,1,1-Trichloroethane (1,1,1-TCA)	34506	ND	200	0.5

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Test Method	Constituent ALL CONSTITUENTS REPORTED ug/L	Entry #	Analysis Results	MCL ug/L	DLR ug/L
EPA 524.2	1,1,2-Trichloroethane (1,1,2-TCA)	34511	ND	5	0.5
EPA 524.2	Trichloroethylene (TCE)	39180	ND	5	0.5
EPA 524.2	Trichlorofluoromethane (FREON 11)	34488	ND	150	5
	Trichlorotrifluoroethane (FREON 113)	81611		1200	10
EPA 524.2	Vinyl Chloride (VC)	39175	ND	0.5	0.5
EPA 524.2	m,p-Xylene	A-014	ND		0.5
EPA 524.2	o-Xylene	77135	ND		0.5
EPA 524.2	Total Xylenes (m,p, & o)	81551	ND	1750	0.5
EPA 504	Dibromochloropropane (DBCP)	38761	ND	0.2	0.01
EPA 504	Ethylene Dibromide (EDB)	77651	ND	0.05	0.02
	Endrin	39390		2	0.1
	Lindane (gamma-BHC)	39340		0.2	0.2
	Methoxychlor	39480		40	10
	Toxaphene	39400		3	1
	Chlordane	39350		0.1	0.1
	Diethylhexylphthalate (DEHP)	39100		4	3
	Heptachlor	39410		0.01	0.01
	Heptachlor epoxide	39420		0.01	0.01
	Atrazine (AATREX)	39033		3	1
	Molinate (ORDRAM)	82199		20	2
	Simazine (PRINCEP)	39055		4	1
	Thiobencarb (BOLERO)	A-001		70	1
	Alachlor (ALANEX)	77825		2	1
EPA 515.1	Bentazon (BASAGRAN)	38710	ND	18	2
	Benzo(a)pyrene	34247		0.2	0.1
	2,3,7,8-TCDD (Dioxin)	34676		0.00005	0.000005
EPA 515.1	2,4-D	39730	ND	70	10
EPA 515.1	2,4,5-TP (SILVEX)	39045	ND	50	1
	Carbofuran (FURADAN)	81405		18	5
EPA 515.1	Dalapon	38432	ND	200	10
EPA 515.1	Dinoseb (DNBP)	81287	ND	7	2
	Diquat	78885		20	4
	Di(2-ethylhexyl) Adipate	A-026		400	5
	Endothall	38926		100	45
	Glyphosate	79743		700	25
	Hexachlorobenzene	39700		1	0.5
	Hexachlorocyclopentadiene	34386		50	1
	Oxamyl (Vydate)	38865		200	20
EPA 515.1	Pentachlorophenol (PCP)	39032	ND	1	0.2
EPA 515.1	Picloram	39720	ND	500	1
	Polychlorinated Biphenyls (Total PCB's)	39516		0.5	0.5

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UNREGULATED ORGANIC CHEMICALS

Test Method	Constituent ALL CONSTITUENTS REPORTED ug/L	Entry #	Analysis Results	MCL ug/L	DLR ug/L
EPA 524.2	tert-Amyl Methyl Ether (TAME)	A-034	ND		3
EPA 524.2	Bromobenzene	81555	ND		0.5
EPA 524.2	Bromochloromethane	A-012	ND		0.5
EPA 524.2	Bromomethane (Methyl Bromide)	34413	ND		0.5
EPA 524.2	n-Butylbenzene	A-010	ND		0.5
EPA 524.2	sec-Butylbenzene	77350	ND		0.5
EPA 524.2	tert-Butylbenzene	77353	ND		0.5
EPA 524.2	Chloroethane	34311	ND		0.5
	2-Chloroethylvinyl Ether	34576			1
EPA 524.2	Chloromethane (Methyl Chloride)	34418	ND		0.5
EPA 524.2	2-Chlorotoluene	A-008	ND		0.5
EPA 524.2	4-Chlorotoluene	A-009	ND		0.5
EPA 524.2	Dibromomethane	77596	ND		0.5
EPA 524.2	1,3-Dichlorobenzene (m-DCB)	34566	ND		0.5
EPA 524.2	Dichlorodifluoromethane	34668	ND		1
EPA 524.2	1,3-Dichloropropane	77173	ND		0.5
EPA 524.2	2,2-Dichloropropane	77170	ND		0.5
EPA 524.2	1,1-Dichloropropene	77168	ND		0.5
	1,4-Dioxane	A-032			3
EPA 524.2	Ethyl tert-Butyl Ether (ETBE)	A-033	ND		3
EPA 524.2	Hexachlorobutadiene	34391	ND		0.5
EPA 524.2	Isopropylbenzene (Cumene)	77223	ND		0.5
EPA 524.2	p-Isopropyltoluene	A-011	ND		0.5
EPA 524.2	Methyl tert-Butyl Ether (MTBE)	A-030	ND		3
EPA 524.2	Naphthalene	34696	ND		0.5
EPA 524.2	n-Propylbenzene	77224	ND		0.5
EPA 524.2	1,1,1,2-Tetrachloroethane	77562	ND		0.5
EPA 524.2	1,2,3-Trichlorobenzene	77613	ND		0.5
EPA 524.2	1,2,3-Trichloropropane	77443	ND		0.5
EPA 524.2	1,2,4-Trimethylbenzene	77222	ND		0.5
EPA 524.2	1,3,5-Trimethylbenzene	77226	ND		0.5
EPA 524.2	Methyl Ethyl Ketone (MEK, Butanone)	81595	ND		5
EPA 524.2	Methyl Isobutyl Ketone (MIBK)	81596	ND		5
	bis (2-Chloroethyl) Ether	34273			5

	Aldicarb (TEMIK)	39053			3
	Aldicarb Sulfone	A-020			4
	Aldicarb Sulfoxide	A-019			3
	Aldrin	39330			0.075
	Bromacil (HYVAR)	82198			10
	Butachlor	77860			0.38
	Carbaryl (Sevin)	77700			5
	Chlorothalonil (DACONIL, BRAVO)	70314			5
	Diazinon	39570			0.25
EPA 515.1	Dicamba (BANVEL)	82052	ND		1.5
	Dieldrin	39380			0.02
	Dimethoate (CYGON)	38458			10

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Test Method	Constituent ALL CONSTITUENTS REPORTED ug/L	Entry #	Analysis Results	MCL ug/L	DLR ug/L
	Diuron	39650			1
	3-Hydroxycarbofuran	A-021			3
	Methomyl	39051			2
	Metolachlor	39356			
	Metribuzin	81408			
	Prometryn (CAPAROL)	39057			2
	Propachlor	38533			0.5

Note and describe any additional compounds found:

SEQUOIA ANALYTICAL

Aaron Porter
Project Manager

Watershed Sanitary Survey Denniston and San Vicente Watersheds 1996

Coastside County Water District

WATERSHED SANITARY SURVEY
DENNISTON & SAN VICENTE WATERSHEDS

SAN MATEO COUNTY, CALIFORNIA

April 1996

Table of Contents

I. INTRODUCTION

Purpose

This watershed sanitary survey has been prepared in response to a letter dated October 18, 1995 from the State Department of Health Services (DHS) stating that all water systems using surface water must submit a watershed sanitary survey to the Department by January 1, 1996. Preparation of watershed sanitary surveys is a component of the California Surface Water Treatment Rule (SWTR) which was enacted to comply with Federal Regulations which established water treatment and performance requirements for public water systems which use a surface water source for their water supply.

Sanitary Survey Requirements and Organization Format

CCWD submitted the Initial Watershed Sanitary Survey Checklist on December 1, 1996 which was the first step in the procedure. Following review of the Checklist information, DHS by letter dated March 4, 1996 provided the CCWD with a list of information which should be included in the completed Watershed Sanitary Survey for the Denniston/San Vicente Watersheds. The basic requirements and format for the report are those contained in the American Water Works Association "Watershed Sanitary Survey Guidance Manual" dated December 1993. One report was prepared for two watersheds because: (1) the watersheds are adjacent and similar, and (2) water treatment is provided by the Denniston WTP for the water diverted from each of the watersheds.

Methodology for Study

The field investigation portion of the work was performed by the CCWD District Engineer, James Teter, and Superintendent of Operations, David Mier, by windshield observation and by walking. The other information was gathered from CCWD files and outside sources which are referenced in the report. The primary preparer of the report was James Teter using data collected and documented by David Mier. The portions of the report relating to wildlife and vegetation were prepared by EIP Associates, a consulting firm specializing in comprehensive environmental and planning services.

II. WATERSHED AND WATER SUPPLY SYSTEM

WATERSHED

Location

Denniston and San Vicente Creeks are located in an unincorporated portion of the County of San Mateo in an area east of the Half Moon Bay Airport. Included with this report is a Watershed Map showing both Denniston and San Vicente Creeks, their respective watershed areas, and the developed area westerly of the watershed areas.

Land Uses

The majority of the land within each of the watersheds is totally undeveloped, that is, it is in its natural state.

- Denniston Watershed. A small portion of the Denniston watershed, as shown on the Watershed Map, is used for agriculture. In addition, the Coastside County Water District operates water supply and treatment facilities within the Denniston watershed area.

- San Vicente Watershed. Small portions of the San Vicente watershed, as shown on the Watershed Map, are used for floriculture and pasture.

Zoning

All of the land within the Denniston and San Vicente watersheds is zoned "PAD" (Planned Agricultural District). Section 6350 of the San Mateo County Zoning Regulations contains the zoning regulations for land zoned PAD. It basically states that permitted uses in the PAD are agriculture and non-residential development customarily considered accessory to agricultural uses. All of the land within the Denniston and San Vicente watersheds is within the Coastal Zone planning area.

Land Ownership

Land ownership is shown on the Watershed Map and described as follows:

Denniston Watershed. Almost all of the land within the Denniston watershed is owned by a single land owner, ETOP Properties, Inc. At the upper end of the watershed a small portion of the land is within the watershed land ownership of San Francisco Water Department. Two other parcels in the upper area of the Denniston watershed area are owned by other landowners. In addition, the Coastside County Water District owns a parcel within the Denniston watershed on which is located the Denniston Water Treatment Plant and a 1.5 million gallon water storage tank.

San Vicente Watershed. The valley floor is owned by a single owner, and the majority of the hillsides are owned by another single owner, ETOP Properties, Inc., the same landowner as for the majority of the Denniston watershed. The majority of the upper area of the watershed is owned by San Francisco Water Department, and there is a small portion of the upper area owned by a private landowner.

Population

There are no persons living within the Denniston watershed area; there are 3 residences within the San Vicente watershed area as shown on the Watershed Map.

Topography

Each of the watersheds can be characterized as consisting primarily of relatively steep hillsides. In the lower portion of the Denniston Valley and the San Vicente Valley there is a level area adjacent to the creek. See the discussion of soil types for additional information regarding topography.

Geology

Information on the geology of the Denniston and San Vicente watersheds is available from two publications of the Department of the Interior, United States Geological Survey: (1) "Preliminary Geologic Map of San Mateo County, California", compiled by Earl E. Brabb and Earl H. Pampeyan, 1972, and (2) "Description of Geologic Map Units, San Mateo County, California", 1972, compiled by Stephen Ellen, Carl M. Wentworth, Earl E. Brabb, and Earl H. Pampeyan. Information from these sources is presented below.

The hillsides of the watersheds are comprised primarily of "Kgr" which is defined as crystalline granitic rock, largely quartz diorite with some granite, medium- to coarse-grained. This rock

is unlayered, but is weakly foliated by preferred orientation of micas; tabular bodies of aplite and of pegmatite, which range from a few inches to several feet in thickness, generally parallel the foliation. Fresh granitic rock is hard and gray in color and crops out locally; elsewhere the upper 10 to as much as 100 feet is weathered to soft, granular material that is buff, red brown, or light gray in color. Fracture spacing ranges from close to wide, and in many places coherent blocks as large as 1 foot in diameter are difficult to obtain. The granitic rock extends downward many thousands of feet beneath the ground surface.

The minor streambeds at midlevel elevations are comprised of "Qsr" which is defined as slope wash and ravine fill (colluvium) containing sand, silt, clay, gravel, rock fragments, and organic material, in varying proportions. These materials are generally not sorted by size, but occur mixed together in an unbedded or indistinctly bedded mass that has accumulated by downslope movement of soil and weathered rock debris. These materials are loose to firm, generally soft and friable, and are unfractured.

The main streambed in each watershed is comprised of "Qal" which is defined as alluvium containing loose to soft and friable gravel, sand, silt, and clay in varying proportions. These materials are more or less size-sorted by running water into indistinct beds and lenses. They are generally unfractured.

Soils

Information on the soils of the watersheds is available from the United States Department of Agriculture Soil Conservation Service document "Soil Survey, San Mateo Area, California", Series 1954, No. 13, Issued May, 1961. Soils information from this source is presented below.

The Soil Association Map indicates the soils of the hillside areas (uplands) to be Miramar-Sheridan, defined as steep and very steep, dark colored, shallow to deep soils on acid igneous rocks under shrubs or forest. The soils of the streambed areas are indicated to be Tunitas-Lockwood, defined as nearly level to sloping, grayish or brownish deep soils on fans and flood plains of alluvium from various rocks; under grass with some shrubs and trees.

The more detailed maps of the watershed areas indicate the hillside areas to be comprised primarily of the following soils:

MmE2: Miramar coarse sandy loam, steep, eroded. This soil is moderately deep or deep over the bedrock. Slope ranges from

21 to 40 percent. Most of the areas are moderately eroded, and there are a few gullies. Runoff is rapid and the erosion hazard is high. It is used for range and watershed.

MmE3: Miramar coarse sandy loam, steep, severly eroded. Similar to MmE2.

MmF2: Miramar coarse sandy loam, very steep, eroded. This is the most extensive soil in the Miramar series. The subsoil contains less clay and slope is 41 percent or steeper, but the soil is otherwise the same as Miramar coarse sandy loam, steep, eroded. This soil is used for watershed.

Rb: Rough broken land. This miscellaneous land type consists of very steep rocky uplands. In most places the slope is steeper than 41 percent. Rock outcrops occupy about half the surface areas, and there is seldom more than a 10 inch thickness of soil material. The rocks are granite, Monterey shale, sandstone, or basalt. The vegetation is mainly shrubs and a few trees. This land is used as watershed.

The more detailed maps of the watershed areas indicate the streambed areas to be comprised primarily of the following soils:

FcC2: Farallone coarse sandy loam, sloping, eroded. This soil occurs in many small areas. Erosion has thinned the surface layer, but the profile is otherwise similar to that of Farallone coarse sandy loam, nearly level. Slope ranges from 4 to 10 percent. Thie soil is used for growing flowers and truck crops.

FsB: Farallone coarse sandy loam, over coarse sands, gently sloping, seeped. This soil occurs in narrow stringers. It is similar to Farallone coarse sandy loam, gently sloping, except that is is underlain by stratified layers of coarse sand at a depth of 20 to 60 inches and there is a water-disposal problem caused by seepage from higher areas. For the most part, the subsoil consists of coarse particles of quartz derived from the adjacent granitic rocks. This soil has a low water-holding capacity. Runoff is slow and the erosion hazard is slight. The peameability of the sandy subsoil and substratum is very rapid. This soil is used for growing flowers and truck crops.

Landslide Susceptibility

Information on landslide susceptibility is available from the Department of the Interior, U.S. Geological Survey map entitled "Landslide Susceptibility in San Mateo County, California", 1972,

bu Earl E. Brabb, Earl H. Pampeyan and Manuel G. Bonilla. The very steepest portions of the watershed areas are indicated as "Category I: Areas least susceptible to landsliding". The majority of the hillside areas are indicated as "Category II: Low susceptibility to landsliding". There is one small area in each watershed area which is indicated as "Category L: Highest susceptibility to landsliding".

The CCWD water treatment plant and storage tank are located below a hillside which is indicated to be Category II: Low susceptibility to landsliding. The U.S. G.S. map describes these Category II areas as ones in which a few small landslides have occurred and a few large landslides may occur.

Seismic Information

Seismic information is available from the Department of the Interior, U.S. Geological Survey map entitled "Active Faults, Probable Active Faults, and Associated Fracture Zones, San Mateo County, California, 1972, compiled by Robert D. Brown, Jr. This map indicates no active faults, probabable active faults or associated fracture zones within either the Denniston or San Vicente watershed areas. The closest active fault is the Seal Cove Fault which is located just west of the Half Moon Bay Airport (the fault parallels the runway).

No CCWD surface water diversion facilities are located on or cross over the Seal Cove Fault (Note: Well No. 9 and the groundwater collector pipeline from Well No. 9 are located in the vicinity of the fault).

Precipitation, Runoff and Flooding Potential

Data on precipitation in the watershed areas is available from the U.S. Department of the Interior, U.S. Geological Survey map entitled "Isohyetal Map of San Francisco Bay Region, California, Showing Mean Annual Precipitation", 1971, by S.E. Rantz. It indicates mean annual precipitation at the lower elevation of the watersheds to be 24 inches per year and that at the highest elevation to be 38 inches per year.

Data on runoff in the watershed areas is available from the U.S. Department of the Interior, U.S. Geological Survey map entitled "Mean Annual Runoff in the San Francisco Bay Region, California 1931-70", 1974, by S.E. Rantz. It indicates mean annual runoff at the lower elevation of the watersheds to be 6 inches per year and that at the highest elevation to be 12 inches per year.

Flooding does occur along the streambank areas of Denniston and San Vicente Creeks. The CCWD facilities located within the watershed areas suffered only minor damage during the 100-year flood in 1982, and remained in operation throughout that period of flooding.

Vegetation

See Section III of the report.

Wildlife

See Section III of the report.

WATER SUPPLY SYSTEM

Background

History. In the early 1960's, the CCWD actively began looking for a local water supply source to both supplement and be more economical than the then sole existing year-round supply source, San Francisco Water Department's Pilarcitos Lake/Stone Dam facilities. Since the CCWD's formation in 1948, it had filed for and acquired water rights permits on most of the local creeks, but had not proceeded with project construction due to lack of available funding. The District Engineer consulting firm reviewed and evaluated all of the water rights permits, and recommended that the District proceed with development of the water rights permit for direct diversion from Denniston and San Vicente Creeks. A "Conceptual Design Report, Denniston Creek Project" was prepared in 1971, design of those facilities was completed that same year, and the Denniston Project was constructed in 1972.

Service Area Characteristics. The Denniston Project facilities are located north of the CCWD service area, and therefore the Project provides water to the northern portion of the service area consisting of the communities of El Granada and Princeton. Water service to this northern area can also be provided from the southern area of the District, using either the Pilarcitos Lake/Stone Dam or the Crystal Springs Reservoir water supply sources.

Water Supply Sources. The Denniston Project facilities include 3 water supply sources: (1) surface water from Denniston Creek, (2) surface water from San Vicente Creek, and (3) groundwater from the Denniston well field. The water rights permit for Denniston Creek allows diversion of up to 2.0 cfs, but only 1.3 cfs is currently being diverted because of treatment plant and transmission pipeline flow restrictions. The water rights permit for San Vicente Creek also allows diversion of up to 2.0 cfs. However, the existing San Vicente diversion pipeline has a peak capacity of only about 0.4 cfs, and no water has been diverted from San Vicente Creek during the past 10 years because of an agreement with the property owner. The CCWD is considering resuming diversions from San Vicente Creek at sometime in the future. The Denniston well field has a limit on production as established by a Coastal Development Permit; the CCWD normally maximizes water production from this source each year with production depending on groundwater levels and the permit amount. Water production from each source during the past 10 year period was as follows:

DENNISTON PROJECT WATER PRODUCTION BY SOURCES

Year	Denniston Creek	Denniston Wells	San Vicente Creek
1985	152.2 mg	49.5 mg	0 mg
1986	184.5	60.8	0
1987	123.9	55.2	0
1988	118.9	45.7	0
1989	150.1	47.9	0
1990	125.8	53.0	0
1991	100.1	43.1	0
1992	167.5	42.7	0
1993	176.9	51.0	0
1994	135.5	42.2	0
1995	153.0	54.8	0

Surface water from Denniston Creek is diverted throughout the year to the extent that it is available and can be put to beneficial use by customers in the northern zone, except during periods of heavy precipitation when the surface diversion facilities are shut off because of the high turbidity of the water in the creek.

Groundwater production from the Denniston Wells is always maximized during the summer and fall months when the quantity of surface water is insufficient to meet customer demands in the northern service area. This groundwater is also used during the winter months when turbidity of the surface water is high.

Facilities

The Denniston Project facilities are shown on the Watershed Map and described as follows:

Denniston Creek Diversion Facilities. Water is diverted from a small reservoir above Denniston Dam by means of 2 screened intake pipelines which discharge to the Denniston Pump Station sump. The CCWD does not own Denniston Dam or Reservoir, but does have an agreement with the property owner for use of these facilities. The CCWD does perform required maintenance of Denniston Resevoir for water supply purposes.

San Vicente Creek Diversion Facilities. Water is diverted through a screened intake box, and flows by gravity through an 8 inch pipeline to San Vicente Reservoir. The San Vicente Pump Station, capacity 400 gpm, discharges through an 8 inch pipeline to the Denniston Pump Station sump.

Denniston Well Field. The well field is located downstream and westerly of the Denniston watershed area. The wells discharge to an 8 inch pipeline which conveys the well water to the Denniston Pump Station sump.

Denniston Pump Station. All source water (from Denniston Creek, San Vicente Creek and the Denniston wells) is collected in the sump of the Denniston Pump Station from where it is pumped to and through the Denniston Water Treatment Plant to the Denniston Storage Tank. The pump station consists of 2 horizontal, centrifugal pumps with a total pumping capacity of 1,000 gpm.

Denniston Water Treatment Plant. This facility provides direct filtration type treatment. Facilities included a coagulation tank, 4 pressure filters, and chemical feed systems including alum and polymer for coagulation and flocculation, potassium permanganate for iron and manganese removal, chlorine for disinfection and caustic soda for corrosion control. The treatment plant had an initial capacity of 1,000 gpm, but is currently limited to a peak flow rate of 700 gpm because of disinfection contact time requirements.

Denniston Water Storage Tank. This steel tank is located on the hillside above the treatment plant, and has a capacity of 1.5 mg.

Treated Water Distribution Facilities. Water is conveyed from the Denniston WTP and storage tank to the northern service area through a 12 inch ductile iron pipeline.

Emergency Plans

The Denniston WTP includes continuous monitoring of treated water turbidity and chlorine residual. The analyzer units initiate an alarm signal if any of the measured parameters exceed the set point. The alarm signals are transmitted to the District office by a telemetry system, and are retransmitted by an automatic dialer to the "On-Call" employee during non-office hours.

The CCWD has prepared an Emergency Plan for Disinfection Failure, a copy of which is posted at the Denniston WTP.

The CCWD has prepared an Emergency Notification and Operations Plan. This plan includes instructions to system operators to shut off the Denniston WTP if there is any type of a water quality problem.

Most important is the fact that the Denniston Project facilities can be shut off at any time, and water can be supplied to the Denniston Project service area from the south using water from the Pilarcitos Lake/Stone Dam or Crystal Springs Reservoir supply sources.

III. POTENTIAL CONTAMINANT SOURCES IN THE WATERSHEDS

This chapter contains a discussion of the methods used for the sanitary survey of the watersheds, potential contaminant sources in the watersheds, growth (development) in the watersheds, and projected changes in the sources, types, or quantities of contaminants in the future.

The survey of the watersheds consisted of 2 phases: (1) field investigation which included a windshield survey and walking, and (2) review of available maps which included U.S.G.S. maps, U.S. Department of Agriculture Soil Conservation Service maps, and County of San Mateo aerial photograph maps. Other information utilized is referrenced in the report.

POTENTIAL CONTAMINANT SOURCES

Discussed below is the listing of potential contaminant sources included in the AWWA Watershed Sanitary Survey Guidance Manual:

Wastewater

There are no residences or other type of development in the Denniston watershed wastewater, and therefore wastewater is not a potential contaminant source.

There are 3 residences in the San Vicente watershed which do produce domestic waterwater which is discharged to septic tank systems for disposal.

Reclaimed Water

There is no use of reclaimed water in either watershed, and therefore reclaimed water is not a potential contaminant source.

Urban Runoff and Industrial Area Runoff

There is no urban or industrial development within either watershed, and therefore urban and industrial area runoff is not a potential contaminant source.

Agricultural Crop Land Use

In the Denniston watershed there is one area of agricultural

activity as shown on the Watershed Map. By letter dated April 4, 1996, the following information was submitted by Cabillo Farms Inc., the firm which has farmed this area for over 30 consecutive years:

Crops. Crops raised are brussel sprouts, peas, and leaks.

Insecticides: Insecticides used are Meta Systox, Vapam, Terra Clor 75% WP, Lorsban, Diazinon, Di-methoate, Guthion, and Lannate.

Fertilizers. Fertilizers used are 15-15-15, 12-12-12, Urea, 16-20, Ammonium Nitrate, and Calcium Nitrate.

In the San Vicente watershed there is one area of agricultural activity as shown on the Watershed Map. The land is used for pasture for horses and for floriculture. The CCWD has no current information on crops, insecticides, and fertilizers because the District has not diverted water from the San Vicente source for over 10 years.

Grazing Animals

There are no areas within the Denniston watershed area used for grazing of animals, and therefore grazing animals are not a potential contaminant source.

There are approximately 12 horses that are grazed within the San Vicente watershed. Also, approximately 6 sheep are kept in a fenced area at one of the residences.

Concentrated Animal Facilities

There are no concentrated animal facilities (such as dairies or feedlots) within either of the watersheds, and therefore concentrated animal facilities are not a potential contaminant source.

Pesticide/Herbicide Use

There are no areas where pesticides or herbicides are used within either of the watersheds except for agricultural crop use as described above.

Vegetation and Wild Animals

See report by EIP Associates included as pages III-1A through

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WATERSHED SANITARY SURVEYS FOR DENNISTON/SAN VICENTE

TEXT CONTRIBUTIONS FOR CHAPTER THREE

POTENTIAL CONTAMINANT SOURCES IN THE WATERSHED

This chapter contains a description of the types of vegetation and wildlife in the watersheds, their potential effects on the quality of the raw water, and controls used, if any, to minimize those effects. Specific concerns of the DHS include turbidity control and the potential microbiological threats posed by animals.

SURVEY METHODS

The watersheds were reviewed using the following office-based survey tools:

- reference to *A Guide to Wildlife Habitats of California* for the coastal and upland portions of the Montara Mountain 7.5-minute topographic quadrangle in which the watersheds are located,
- search of the *California Native Plant Society Electronic Inventory* for the coastal and upland portions of the Montara Mountain 7.5-minute topographic quadrangle,
- search of the *California Natural Diversity Data Base* for the Montara Mountain and adjacent 7.5-minute topographic quadrangles to the north, northeast, east, southeast and south (the three western quadrangles being located in the Pacific Ocean),
- examination of aerial photos of the watersheds, and
- review of previous biological studies conducted by EIP Associates in the watersheds and their vicinities,

Plant and animal species lists were compiled from the data bases. The lists were screened to eliminate plant and animal communities (wildlife/habitat relationships) that would not occur in the watersheds under consideration. This step is necessary on the San Mateo peninsula because significant changes in geologic, topographic, and climatic conditions occur over relatively short distances. Any given 7.5-minute may contain several types of natural communities, some of which are sufficiently diverse to be mutually exclusive. For example, urban bayside and inland wildlife/habitat relationships would not apply to the coastal scrub-maritime chaparral association in the two watersheds being surveyed for this report.

Montara Mountain is composed of decomposed granite and sandstone-derived soils. This combination is quite distinct from geologic conditions elsewhere in San Mateo County, and supports the rare Montara Manzanita shrub in the maritime chaparral portions of the watersheds

(the upper reaches). The coastal scrub areas support abundant vegetation three to five feet in height, dominated by coyote brush. Occurring mainly on northwest-facing slopes, these natural communities provide a nearly continuous canopy associated with a rich array of herbaceous understory species, as may be seen in the attached plant species list. Some land clearing has occurred in the lower reaches of the watersheds for grazing, but these areas are mostly downstream from the raw water intakes.

Potential contaminant sources in the watersheds related to plant communities are limited to erosion-created turbidity. Many of the soil associations on Montara Mountain are erosion-prone when stripped of their vegetative cover. It is the District's policy that where plant communities must be disrupted by construction activity, erosion is reduced or avoided by the use of appropriate sediment transport control techniques. The most important combination of methods is to schedule construction activities for the rain-free summer months and to reseed or replant the disrupted area prior to the onset of winter storms.

The watersheds support a varied coastal and ridgeland fauna: 18 species of amphibians and reptiles, more than 100 species of birds, and nearly 4 dozen species of mammals, as may be seen in the attached animal species list. None of the species can be considered a significant threat to raw water quality. The only wild animal that poses such a threat is the beaver, which is known to carry giardia bacteria, but does not occur in this habitat. Livestock may carry coliform bacteria, but most of the grazing land in the watersheds is downstream of the raw water intakes, and fences prevent the livestock from approaching the reservoir.

The following list of plant species and animals species have the potential to occur in the Denniston and San Vicente Watersheds.

PLANTS

FERNS	
Sword Fern	*Polystichum munitum*
Wood Fern	*Dryopteris arguta*
Golden-backed Fern	*Pentagramma triangularis*
FIG-MARIGOLD FAMILY	AIZOACEAE
Iceplant	*Carpobrotus* sp.
SUMAC FAMILY	ANACARDIACEAE
Poison Oak	*Toxicodendron diversilobum*
PARSLEY FAMILY	APIACEAE
Poison Hemlock	*Conium maculatum*
Cow Parsnip	*Heracleum lanatum*
Water Parsley	*Oenanthe sarmentosa*
Pacific Sanicle	*Sanicula crassicaulis*
SUNFLOWER FAMILY	ASTERACEAE
Yarrow	*Achillea millefolium*
Pearly Everlasting	*Anaphalis margaritacea*
Coast Sagebrush	*Artemisia californica*
Mugwort	*Artemisia douglasii*
Coyote Brush	*Baccharis pilularis* var. *consanguinea*
Bull Thistle	*Cirsium vulgare*
Wooly Yarrow	*Eriophyllum lanatum*
Cudweed	*Gnaphalium* sp.
Sneezeweed, Rosilla	*Helenium puberulum*
Eat's-ear	*Hypochaeris* sp.
Bristly Ox-tongue	*Picris echiodes*
German Ivy	*Senicio mikanioides*
Milk Thistle	*Silybum marianum*
MUSTARD FAMILY	BRASSICACEAE
Wild Mustard	*Brassica nigra*
Wild Radish	*Raphanus sativa*
Few-seeded Bitter Cress	*Cardamine oligosperma*
Water Cress	*Rorippa nasturtium-aquaticum*
HONEYSUCKLE FAMILY	CAPRIFOLIACEAE
Blue Elderberry	*Sambucus mexicana*
Honeysuckle	*Lonicera hispidula* var. *vacillans*
Creeping Snowberry	*Symphoricarpos mollis*
Common Chickweed	*Stellaria media*
PINK FAMILY	CARYOPHYLLACEAE
Sand Spurry	*Spergularia* sp.
DOGWOOD FAMILY	CORNACEAE
Creek Dogwood	*Cornus* sp.

SEDGE FAMILY	CYPERACEAE
Yellow Nut Sedge	*Cyperus esquelentus*
Flat sedge	*Cyperus* sp.
California Bulrush	*Scirpus californicus*
Bulrush	*Scirpus acutus*
HORSETAIL FAMILY	EQUISETACEAE
Horsetail	*Equisetum* sp.
HEATH FAMILY	ERICACEAE
Madrone	*Arbutus menziesii*
Montara Manzanita	*Arctostaphylos montaraensis*
SPURGE FAMILY	EUPHORBIACEAE
Spurge	*Euphorbia* sp.
LEGUME FAMILY	FABACEAE
Acacia	*Acacia* sp.
Lupine	*Lupinus* sp.
Yellow Sweet Clover	*Melilotus indicus*
Rose Clover	*Trifolium hirtum*
Vetch	*Vicia sativa*
OAK FAMILY	FAGACEAE
Coast Live Oak	*Quercus agrifolia*
Scrub Oak	*Quercus berberidifolia*
GERANIUM FAMILY	GERANIACEAE
Red-stemmed Filaree	*Erodium cicutarium*
Cutleaf Geranium	*Geranium dissectum*
GOOSEBERRY FAMILY	GROSSULARIACEAE
Red Flowering Current	*Ribes sanguineum*
WATERLEAF FAMILY	HYDROPHYLACEAE
Phacelia	*Phacelia* sp.
RUSH FAMILY	JUNCACEAE
Toad Rush	*Juncus bufonius*
Iris-leaved Rush	*Juncus xiphioides*
MINT FAMILY	LAMIACEAE
Hedge nettle	*Stachys* sp.
Yerba Buena	*Satureja douglasii*
LAUREL FAMILY	LAURACEAE
California Bay-laurel	*Umbellularia californica*
DUCKWEED FAMILY	LEMNACEAE
Duckweed	*Lemna* sp.
LILY FAMILY	LILACEAE
Soap root	*Chlorogalum pomeridianum*
Fremont's Star Lily	*Zigadenus fremontii*

MALLOW FAMILY	MALVACEAE
Cheeseweed	*Malva parviflora*
MYOPORUM FAMILY	MYOPORACEAE
Myoporum	*Myoporum laetum*
MYRTLE FAMILY	MYRTACEAE
Blue Gum Euclayptus	*Eucalyptus globulus*
EVENING PRIMROSE FAMILY	ONAGRACEAE
Willow herb	*Epilobium brachycarpum*
Evening Primrose	*Oenothera hookeri*
OXALIS FAMILY	OXALIDACEAE
Bermuda Buttercup	*Oxalis pes-caprae*
PINE FAMILY	PINACEAE
Monterey Pine	*Pinus radiata*
PLANTAIN FAMILY	PLANTAGANACEAE
Cut-leaved Plaintain	*Plantago coronopus*
Narrow-leaved Plantain	*Plantago lanceolata*
Broad-leaved Plantain	*Plantago major*
GRASS FAMILY	POACEAE
Silver Hair Grass	*Aira caryophyllea*
Little Quaking Grass	*Briza minor*
California Brome	*Bromus carinatus*
Ripgut Brome	*Bromus diandrus*
Soft Chess	*Bromus hordeaceous*
Farmer's Foxtail	*Hordeum murinum* var. *leporinum*
Pamapas Grass	*Cortadaria* sp.
Italian Rye Grass	*Lolium multiflorum*
Purple needle Grass	*Nassella pulchra*
Rabbit-foot Grass	*Polypogon monspeliensis*
BUCKWHEAT FAMILY	POLYGONACEAE
Knotweed	*Polygonum arvensis*
Curly Dock	*Rumex crispus*
California Buckwheat	*Eriogonum fasiculatum*
PURSELANE FAMILY	PORTULACEAE
Miner's Lettuce	*Claytonia perfoliata*
BUTTERCUP FAMILY	RANUNCULACEAE
Columbine	*Aquilegia formosa*
Prickle-fruited buttercup	*Ranunculus muricatus*
BUCKTHORN FAMILY	RHAMNACEAE
Blue Blossom	*Ceanothus thrysiflorus*
Hairyleaf Ceanothus	*Ceanothus* oliganthus
California Coffeeberry	*Rhamnus californica*

ROSE FAMILY	ROSACEAE
California Strawberry	*Fragaria californica*
Toyon	*Heteromeles arbutifolia*
Holly-leaved Cherry	*Prunus ilicifolia*
California Blackberry	*Rubus ursinus*
Salmon Berry	*Rubus specabilis* var. *franciscanus*
WILLOW FAMILY	SALICACEAE
Arroyo Willow	*Salix lasiolepis*
Sandbar Willow	*Salix exigua*
FIGWORT FAMILY	SCROPHULARIACEAE
Sticky Monkey Flower	*Mimulus aurantiacus*
Common Monkey Flower	*Mimulus guttatus*
California Bee Plant	*Scrophularia californica*
Speedwell	*Veronica persica*
NIGHTSHADE FAMILY	SOLANACEAE
Few-flowered Nightshade	*Solanum americanum*
LEATHERWOOD FAMILY	THYMELAEACEAE
Western Leatherwood	*Dirca occidentalis*
CAT-TAIL FAMILY	TYPHACEAE
Cat-tail	*Typha latifolia*
Cat-tail	*Typha angustifolia*
NETTLE FAMILY	URTICACEAE
Stinging Nettles	*Urtica dioica*

ANIMALS

AMPHIBIANS

California Newt	*Taricha torosa*
Ensatina	*Ensatina aschscholtzi*
California Slender Salamander	*Batrachoseps attenuatus*
Arboreal Salamander	*Aneides lugubris*
Western Toad	*Bufo boreas*
Pacific Tree Frog	*Hyla regilla*

REPTILES

Western Fence Lizard	*Sceloporus occidentalis*
Western Skink	*Eumeces skittonianus*
Southern Alligator Lizard	*Gerrhonotus multicarinatus*
Northern Alligator Lizard	*Gerrhonotus coeruleus*
Ringneck Snake	*Diadophus punctatus*
Racer	*Colubar constrictor*
Gopher Snake	*Pituophis melanoleucus*
Common Garter Snake	*Thamnophis sirtalis*
Western Terrestrial Garter Snake	*Thamnophis elegans*
Western Rattlesnake	*Crotalis viridis*

BIRDS

Turkey Vulture	*Cathartes aura*
Osprey	*Pandion haliaetus*
Black-shouldered Kite	*Elanus caeruleus*
Northern Harrier	*Circus cyaneus*
Sharp-shinned Hawk	*Accipiter striatus*
Cooper's Hawk	*Accipiter cooperii*
Red-shouldered Hawk	*Buteo lineatus*
Red-tailed Hawk	*Buteo jamaicensis*
American Kestrel	*Falco sparverius*
Pegrine Falcon	*Falco peregrinus*
Merlin	*Falco columbarius*
California Quail	*Callipepla californica*
Killdeer	*Charadrius vociferus*
Mew Gull	*Larus canus*
Ring-billed Gull	*Larus delawarensis*
Clifornia Gull	*Larus californicus*
Herring Gull	*Larus argentatus*
Thayer's Gull	*Larus thayeri*
Western Gull	*Larus occidentalis*
Glaucous-winged Gull	*Larus glaucescens*
Caspian Tern	*Sterna caspia*
Rock Dove	*Columba livia*
Band-tailed Pigeon	*Columba fasciata*
Mourning Dove	*Zenaida macroura*
Common Barn Owl	*Tyto albs*
Western Screech Owl	*Otus kennicottii*
Great Horned Owl	*Bubo virginianus*
Vaux's Swift	*Chaetura vauxi*
White-throated Swift	*Aeronautes saxatalis*
Anna's Hummingbird	*Calypte anna*
Rufous Hummingbird	*Selasphorus rufus*
Allen's Hummngbird	*Selasphorus sasin*
Red-breasted Sapsucker	*Sphyrapicus ruber*
Nuttall's Woodpecker	*Picoides nutallii*
Downy Woodpecker	*Picoides pubescens*
Hairy Woodpecker	*Picoides villosus*
Northern Flicker	*Colaptes auratus*
Olive-sided Flycatcher	*Contupis borealis*
Western Wood-Pewee	*Contupis sordidulus*
Western Flycatcher	*Empidonax difficilis*
Black Phoebe	*Sayornis nigricans*
Say's Phoebe	*Sayornis saya*
Western Kingbird	*Tyrannus verticalis*
Tree Swallow	*Tachycineta bicolor*
Violet-green Swallow	*Tachycineta thalassina*
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*
Cliff Swallow	*Hirundo pyrrhonota*
Barn Swallow	*Hirundo rustica*
Steller's Jay	*Cyanocitta stelleri*
Scrub Jay	*Aphelocoma coerulescens*
Common Raven	*Corvus corax*
Chestnut-backed Chickadee	*Parus rufenscens*
Plain Titmouse	*Parus inornatus*
Bushtit	*Psaltriparus minimus*
White-breasted Nuthatch	*Sitta carolinensis*

Brown Creeper	*Certhia americana*
Bewick's Wren	*Thryomanes bewickii*
House Wren	*Troglodytes aedon*
Winter Wren	*Troglodytes troglodytes*
Golden-crowned Kinglet	*Regulus satrapa*
Ruby-crowned Kinglet	*Regulus calendula*
Blue-gray Gnatcatcher	*Polioptila caerulea*
Western Bluebird	*Sialia mexicana*
Swainson's Thrush	*Catharus ustulatus*
Hermit Thrush	*Catharus guttatus*
American Robin	*Turdus migratoriuos*
Varied Thrush	*Ixoreus naevius*
Wrentit	*Chamaea fasciata*
Northern Mockingbird	*Mimus polyglottos*
California Thrasher	*Toxostoma redivivum*
American Pipit	*Anthus rubescens*
Cedar Waxwing	*Bombycilla cedrorum*
Loggerhead Shrike	*Lanius ludovicianus*
European Starling	*Sturnus vulgaris*
Hutton's Vireo	*Vireo huttoni*
Warbling Vireo	*Vireo gilvus*
Orange-crowned Warbler	*Vermivora celata*
Nashville Warbler	*Vermivora ruficapilla*
Yellow Warbler	*Dendroica petechia*
Yellow-rumped Warbler	*Dendroica coronata*
Black-throated Gray Warbler	*Dendroica nigrescens*
Townsend's Warbler	*Dendroica townsendi*
Hermit Warbler	*Dendroica occidentalis*
Wilson's Warbler	*Wilsonia pusilla*
Western Tanager	*Piranga ludoviciana*
Black-headed Grosbeak	*Pheucticus melanocephalus*
Rufous-sided Towhee	*Pipilo erythrophthalmus*
California Towhee	*Pipilo crissalis*
Savannah Sparrow	*Passerculus sandwichensis*
Fox Sparrow	*Passerella iliaca*
Song Sparrow	*Melospiza melodia*
Lincoln's Sparrow	*Melospiza lincolnii*
White-throated Sparrow	*Zonotrichia albicollis*
Golden-crowned Sparrow	*Zonotrichia atricapilla*
White-crowned Sparrow	*Zonotrichia leucophrys*
Dark-eyed Junco	*Junco hyemalis*
Red-winged Blackbird	*Agelaius phoeniceus*
Western Meadowlark	*Sturnella neglectaq*
Brewer's Blackbird	*Euphagus cyanocephalus*
Brown-headed Cowbird	*Molothrus ater*
Northern Oriole	*Icterus galbula*
Purple Finch	*Carpodacus purpureus*
House Finch	*Carpodacus mexicanus*
Pine Siskin	*Carduelis pinus*
Lesser Goldfinch	*Carduelis psaltria*
American Goldfinch	*Carduelis tristis*
House Sparrow	*Passer domesticus*

MAMMALS

Virginia Opossum	*Didelphis virginiana*
Trowbridge Shrew	*Sorex trowbridgii*
Broad-footed Mole	*Scapanus latimanus*
Little Brown Myotis	*Myotis lucifugus*
Yuma Myotis	*Myotis Yumanensis*
Long-eared Myotis	*Myotis evotis*
Long-legged Myotis	*Myotis volans*
California Myotis	*Myotis californicus*
Fringed Myotis	*Myotis thysanodes*
Small-footed Myotis	*Myotis leibii*
Western Pipistrelle	*Pipistrellus hesperus*
Big Brown Bat	*Eptesicus fuscus*
Red Bat	*Lasiurus borealis*
Hoary Bat	*Lasiurus cinereus*
Townsend's Big-eared Bat	*Plecotus townsendii*
Pallid Bat	*Antrozous pallidus*
Brazilian Free-tailed Bat	*Tadarida brasiliensis*
Brush Rabbit	*Sylvilagus bachmani*
Merriam's Chipmunk	*Tamias merriami*
Western Gray Squirrel	*Sciurus griseus*
Fox Squirrel	*Sciurus niger*
Botta's Pocket Gopher	*Thomomys bottae*
California Pocket Mouse	*Chaetodipus californicus*
Western Harvest Mouse	*Reithrodontomys megalotis*
California Mouse	*Peromyscus californicus*
Deer Mouse	*Peromyscus maniculatis*
Brush Mouse	*Peromyscus boylii*
Pinyon Mouse	*Peromyscus truei*
Dusky-footed Woodrat	*Neotoma fuscipes*
California Vole	*Microtus californicus*
Black Rat	*Rattus rattus*
Norway Rat	*Rattus norvegicus*
House Mouse	*Mus musculus*
Coyote	*Canis latrans*
Gray Fox	*Urocyon cinereoargenteus*
Raccoon	*Procyon lotor*
Long-tailed Weasel	*Mustela frenata*
Western Spotted Skunk	*Spilogale gracillis*
Striped Skunk	*Mephitis mephitis*
Bobcat	*Felis rufus*
Mule Deer	*Odocoileus hemionus*
Black Tailed Deer	*Odocoileus hemionus*

III-9A. The EIP report concludes that (1) potential contaminant sources in the watersheds related to plant communities are limited to erosion-created turbidity --- see discusion under geologic hazards below, and (2) none of the wildlife species in the watersheds can be considered a significant threat to raw water quality.

Mine Runoff

There are no known active or inactive mines in either of the watersheds, and no mines are shown on the U.S.G.S. map of the area. Mine runoff is not a potential contaminant source.

Solid and Hazardous Waste Disposal Facilities

There are no solid or hazardous waste disposal facilities within either of the watersheds, and therefore waste disposal facilities are not a potential contaminant source.

Logging

There is no logging work within either watershed, and therefore logging is not a potential contaminant source.

Recreational Use

The accessible portions of both watersheds are under the ownership of two separate landowners, and recreational use by the general public is not permitted. However, the property owner of the Denniston watershed does allow very limited recreational use of the watersheds for equestrian use by horses stabled at the facilities in the San Vicente watershed located below the point of diversion (see Watershed Map) as described below:

> Denniston Watershed. There is an equestrian trail from the stables to the Denniston Valley, and it is estimated that approximately 12 horse-trips are made per week. The horses are restricted to the existing roadway in Denniston Valley because of the heavy undergrowth of brush in the off-road areas, and therefore do not have access to the creek. However, where the access road parallels Denniston Reservoir, the horses do have potential access to the creek above the point of diversion. There have been no occasions where horses have been observed in the creek or resevoir, and sightings of animal wate on the roadway in this area are infrequent. Because of the small number of equestrians, recreational use is not a potential significant contaminant

source.

San Vicente Reservoir. The CCWD has no current information on equestrian use within the San Vicente watershed because the District has not diverted water from this source for over 10 years.

Unauthorized Activity

There are no known locations of illegal dump sites in either watershed. Roadway access to each watershed is extremely limited, and property owner representatives are normally on-site to prevent entry of unauthorized vehicles onto the watersheds. The only roadway entry to the Denniston watershed is fenced and locked. Because of the inaccessibility of the watersheds, unauthorized activity is not a potential significant contaminant source.

Groundwater Which Influences Surface Water Quality

There are no known wells within either watershed which could have a deleterious effect on groundwater quality. Historically there have been no oil, gas geothermal or artesian water wells within either watershed. Because of the lack of known wells, groundwater from wells is not a potential contaminant source.

Seawater Intrusion

The diversion points within each watershed area are well above sea level, and therefore seawater intrusion is not a potential contaminant source.

Geologic Hazards

Geologic hazards such as earthquakes and landslides have the potential to destroy Denniston Project facilities such as pipelines, pump stations, the water treatment plant and the 1.5 mg water storage tank. They also can contribute large quantities of suspended solids to the sources of supply in a short period of time.

During heavy precipitation periods, landslides in the Denniston watershed together with erosion from the hillsides can result in periods when the turbidity of the streamflow is higher than the practical treatment limit of the Denniston WTP. During these periods the treatment plant is operated using groundwater only, and alternative surface water sources are used as required to

supply the customers in the Denniston Project service area.

Also during periods of very heavy precipitation, such as the 100-year storm in 1982, the stream transports a large volume of suspended material into Denniston Reservoir causing siltation which has the potential to plug the diversion intake pipes. Periodically the CCWD performs maintenance dredging of Denniston Reservoir to maintain its usefulness as a point of diversion.

As has been noted previously, the District has alternative water supply sources in the event of loss of availability of Denniston Project water for a period of time, and therefore the temporary problems caused by geologic hazards in the Denniston watershed are not considered a significant contaminant source because this supply source can be shut off until the problems are resolved.

Fires

There are no known incidents of fires in the Denniston or San Vicente watershed areas. However, because the hillsides contain vegetation (coastal scrub) the potential for fire exists. It is possible that the surface water from either or both of these watersheds would be unusable for a period of time after a fire. In that event, the District would use alternative water supply sources to supply the area normally supplied water from the Denniston Project. The District is not the owner of the watershed lands, and has no responsibility for fire prevention or revegetation should a fire occur. Because of the lack of known fires in the past and because the District has alternative sources of supply, the potential for contamination of the surface water sources from fire is not a major concern.

SIGNIFICANCE OF POTENTIAL CONTAMINANT SOURCES

As has been described above, there are no significant potential contaminant sources within either the Denniston or San Vicente watershed areas, and therefore the potential contamination of this supply source is not of serious concern. In addition, should contamination occur, the service area normally supplied with water from the Denniston area can be supplied with water from alternative sources until the contamination problem is corrected.

ANTICIPATED GROWTH AND PROJECTED CHANGES IN SOURCES OF CONTAMINANTS

As previously described, the entire area of both watersheds is zoned "PAD" (Planned Agricultural District). The purpose of the Planned Agricultural District is to: (1) preserve and foster existing and potential agricultural operations in San Mateo County in order to keep the maximum amount of prime agricultural land and all other lands suitable for agriculture in agricultural production, and (2) minimize conflicts between agricultural and non-agricultural land uses. Uses permitted in the PAD subject to the issuance of a Planned Agricultural Permit include single-family residences, farm labor housing, public recreation trails, multi-family residences if for affordable housing, schools, fire stations, commercial recreation, aquacultural activities, wineries, timber harvesting, onshore oil and gas exploration and production, facilities used in conjunction with agricultural products, kennels, scientific/technical research and test facilities, and roadstands for the sale of agricultural products.

In addition, the total area of both watersheds is within the Coastal Zone and subject to Local Coastal Plan planning policies. These policies do not permit the construction of new residences outside the urban/rural boundary, and the entire area of both watersheds is outside of the currently-established urban/rural boundary. The purpose of the urban/rural boundary is to require growth by infill before additional rural land is converted to urbanization.

At the current time there are no known changes planned for the land in either of the watersheds, and because of zoning and planning policies most types of development would be extremely difficult. No changes in sources of contaminants are anticipated for the same reasons.

IV. WATERSHED CONTROL AND MANAGEMENT PRACTICES

This section contains a discussion of existing and recommended watershed management practices for protection of drinking water quality.

Water Agency Management Practices

Prior sections of this report have established the following: (1) the CCWD owns no land within either watershed except those parcels upon which are located water system facilities, (2) the CCWD has not utilized water from the San Vicente watershed for over 10 years and has no immediate plans to do so, (3) access to the Denniston watershed is extremely limited, and (3) there are no significant potential contaminant sources in either watershed. For these reasons, only limited watershed control and management practices by the CCWD are feasible or believed to be necessary. Watershed and reservoir management and operations currently being practiced by the CCWD for the Denniston watershed are as follows:

- The watershed area is posted as a drinking water supply source.
- The sole entrance road is fenced and locked.
- Both the farmer who leases the valley floor for agriculture and CCWD employees monitor for trespassers. The district office of the County Sheriff's Department is located at the entrance road to the Denniston watershed (the office is at the Half Moon Bay Airport).
- The CCWD reviews the farmer's pesticide usage for conformance with drinking water requirements.
- The CCWD performs water quality testing of the water in Denniston Reservoir.
- The CCWD performs required maintenance of Denniston Reservoir to maintain its viability as a water supply source.

Other Agencies with Watershed Control Authority

The primary agency with watershed control authority relevant to watershed control and management practices is the County of San Mateo. The Planning Department controls development within each watershed as described in Section III:

Anticipated Growth and Projected Changes in Sources of Contaminants.

Other agencies which could influence the watersheds include the Soil Conservation Service (agricultural practices), the California Department of Forestry (fire prevention and protection), the California Department of Fish and Game (fish and riparian corridor policies), and the County Sheriff's Department (trespassing).

Water Agency Coordination Measures

The only current water agency coordination measure is coordination between the CCWD and the farmer who leases the agricultural field in the Denniston Valley. This same farmer has leased the land since construction of the Denniston Project, and he cooperates fully with the CCWD in matters such as chemical use, water allotments, and watershed security.

Recommended Control Measures

The CCWD's current control measures for the Denniston watershed appear adequate, and the CCWD has no recommended additional control measures.

The CCWD currently has no program of control measures for the San Vicente watershed since no water has been used from this former source of supply for over 10 years and there are no plans for such utilization in the immediate future. The CCWD is currently investigating the feasibility of resuming diversions of water from San Vicente Creek several years from now, and prior to such diversions a watershed control program should be adopted and implemented.

V. WATER QUALITY

This sections contains a discussion of drinking water regulations and water quality monitoring conducted by the water agency. Water quality data are compared to drinking water standards and the ability to meet the requirements of the SWTR (Surface Water Treatment Rule).

Drinking Water Regulations

Primary Standards, Secondary Standards and Other Related Drinking Water Parameters

The California Surface Water Treatment Rule (SWTR) establishes water treatment and performance requirements for public water systems which use a surface water source for their water supply. The SWTR requires that these suppliers ensure the consumer's safety from pathogenic bacteria, viruses and Giardia cysts by providing multibarrier treatment which achieves a total of 99.9 percent (3 log) removal and inactivation of Giardia cysts, and a total of 99.99 percent (4 log) removal and inactivation of enteric viruses. Filtration and disinfection are required to achieve these requirements. The basic treatment plant requirements for compliance with the SWTR are: (1) turbidity removal, (2) disinfection inactivation, (3) monitoring, and (4) reliability of treatment.

In addition to the SWTR requirements, there are other drinking water regulations which establish primary standards (mandatory health-related standards) for parameters including microbiological constituents, organic chemicals, inorganic chemicals, and radionuclides. There are additional secondary standards (aesthetic standards) for parameters including chloride, color, iron, manganese, odor threshold, specific conductance, and total dissolved solids. For the primary and secondary standards, a maximum contaminant level (MCL) has been established for each parameter by the Environmental Protection Agency.

Other constituents monitored for which there are water quality guidelines (recommended levels by the State Department of Health Services and American Water Works Association) but not MCL's include alkalinity, calcium, chlorine, hardness, magnesium, pH potassium, silica, and sodium.

During the past several years monitoring of another microorganism Cryptosporidium, has become a topic of concern. Cryptosporidium

week at each location. Four treated water samples are taken once a week at the sampling locations on a rotating basis (a total of 16 samples per month, one at each sampling location). Each sample is analyzed by a qualified laboratory.

- Giardia and Cryptosporidium. A sample of the untreated water is collected at Denniston Reservoir quarterly (4 samples per year). The samples are analyzed by a qualified laboratory. The CCWD does not sample and analyze the treated water because of the low concentrations of Cryptosporidium found on the untreated water. Should these concentrations increase, the CCWD will also sample and analyze the treated water from the Denniston WTP to assure adequate removal/inactivation.

- Turbidity. Untreated water entering the Denniston WTP is analyzed once per day by treatment plant operators. Treated water is analyzed continuously using a turbidity analyzer unit.

- Iron and Manganese. Untreated water entering the Denniston WTP and treated water leaving the plant are analyzed once daily for iron and manganese by the treatment plant operator.

- pH. The pH of the untreated and treated water at the Denniston WTP is analyzed once per day by the treatment plant operator.

- Temperature. The temperature of the untreated and treated water at the Denniston WTP is analyzed once per day by the treatment plant operator.

- Organic Chemicals. A sample of the untreated water from Denniston Reservoir is collected once per year. The sample is analyzed by a qualified laboratory.

- Inorganic Chemicals. A sample of the untreated water from Denniston Reservoir is collected once per year. The sample is analyzed by a qualified laboratory.

- Radionuclides. A sample of the untreated water from Denniston Reservoir is collected once per year. The sample is analyzed by a qualified laboratory.

- Chlorine Residual. The chlorine residual of the treated water at the Denniston WTP is analyzed continuously using a residual chlorine analyzer unit.

Evaluation of Monitoring Data

Bacteriological Monitoring. Included as Figure V-1 are 5 years of untreated water bacteriological data. There are no apparent trends over time. During this same 5 year period all treated water analyses have indicated a total coliform bacteria concentration of less than 1.1 MPN/100 ml. which is the State drinking water standard of acceptability (Note: results received from the laboratory do not indicate actual values).

Turbidity Monitoring. Included as Figure V-2 are 5 years of untreated water turbidity data. The data indicates that the turbidity is highest during the winter months when precipitation is greatest, and lowest during the summer and fall months when precipitation normally does not occur. The DHS drinking water standard (MCL) for treated water turbidity is that it not exceed 0.5 NTU during 90% of the operating time of the treatment plant. The Denniston WTP is operated so that the filters automatically backwash when the treated water turbidity reaches 0.1 NTU. Therefore, during normal operating periods the treated water turbidity never exceeds 0.1 NTU. However, for a short duration following filter backwash the turbidity exceeds 0.5 but not 1.0 NTU; this turbidity "spike" following filter backwash is acceptable under DHS regulations.

Iron and Manganese Monitoring. The iron concentration of the untreated water at the Denniston Reservoir is normally approximately 4 mg/L and the manganese concentration approximately 0.1 mg/L (Note: the water supply to the plant includes both surface water and groundwater; the groundwater supply contains higher concentrations of iron and manganese). The MCL (maximum contaminant level) for iron is 0.3 mg/L and for manganese 0.05 mg/L. Following treatment, the concentration of iron is non-detectable and the concentration of manganese is approximately 0.02 mg/L.

pH Monitoring. The pH of the untreated water is approximately 7.8 to 8.0 , and the pH of the treated water is 8.1. The pH of the treated water is raised to 8.1 for corrosion control purposes.

Temperature Monitoring. This data is used in calculations relating to disinfection.

Organic Chemical Monitoring. The most recent set of analyses, for water collected at Denniston Reservoir on March 11, 1996, is included as Figure V-3. Each of the analysis results is below the MCL for that constituent.

Inorganic Chemical Monitoring. The most recent set of analyses, for water collected at Denniston Reservoir on March 11, 1996, is

included as Figure V-4. Several of the constituents in this untreated water sample are above the MCL, namely color, turbidity, iron and manganese. The Denniston WTP reduces the concentration of each of these constituents to a level that their concentration in the treated water leaving the plant is below the MCL.

Radionuclides Monitoring. The most recent set of analyses, for water collected at Denniston Reservoir on March 11, 1996, is included as Figure V-5. Each of the analysis results is below the MCL for that constituent.

Giardia and Cryptosporidium Monitoring. Included as Figure V-6 are analyses results from samples of untreated water collected on November 7, 1995 and January 24, 1996.

Evaluation of Ability to Meet Surface Water Treatment Regulation Requirements

The CCWD prepared and submitted a report on SWTR compliance to the Department of Health Services in 1992. This report was reviewed and found acceptable by DHS, and subsequent inspections of the Denniston WTP by DHS personnel have found the plant to be in full compliance. The primary components of SWTR compliance are as follows:

1. Filtration. The Denniston WTP provides filtration using pressure type filters. The filtered water is consistently in compliance with the MCL for turbidity.

2. Disinfection. Disinfection is accomplished with chlorine as the disinfectant. Both prechlorination and postchlorination are utilized to provide sufficient disinfection contact time for compliance with the SWTR requirement for 99.9% (3 log) removal/inactivation of Giardia and 99.99% (4 log) removal/inactivation of viruses. This required contact time limits the peak capacity of the plant to 700 gpm.

3. Monitoring. Analyzer units have been installed at the Denniston WTP for continuous monitoring of turbidity and chlorine residual. Additional manual monitoring includes water temperature and pH for SWTR compliance.

4. Treatment Reliability. Redundant equipment units and an alarm system for operator notification of plant problems assure treatment reliability.

Recommendations for Water Quality Monitoring Program

The current CCWD water quality monitoring program for the Denniston watershed (untreated water) and the Denniston WTP (treated water) is in compliance with DHS requirements and is considered by the CCWD to be adequate in that there are no known significant contaminant sources within the Denniston watershed. No changes are recommended.

The current CCWD water quality monitoring program for the San Vicente watershed is minimal because the CCWD has not utilized water from this supply source for over 10 years and has no plans on doing so in the immediate future. Prior to resumption of diversions from the San Vicente watershed, a more detailed water quality monitoring program should be adopted.

Average Bacteriological Levels
1991

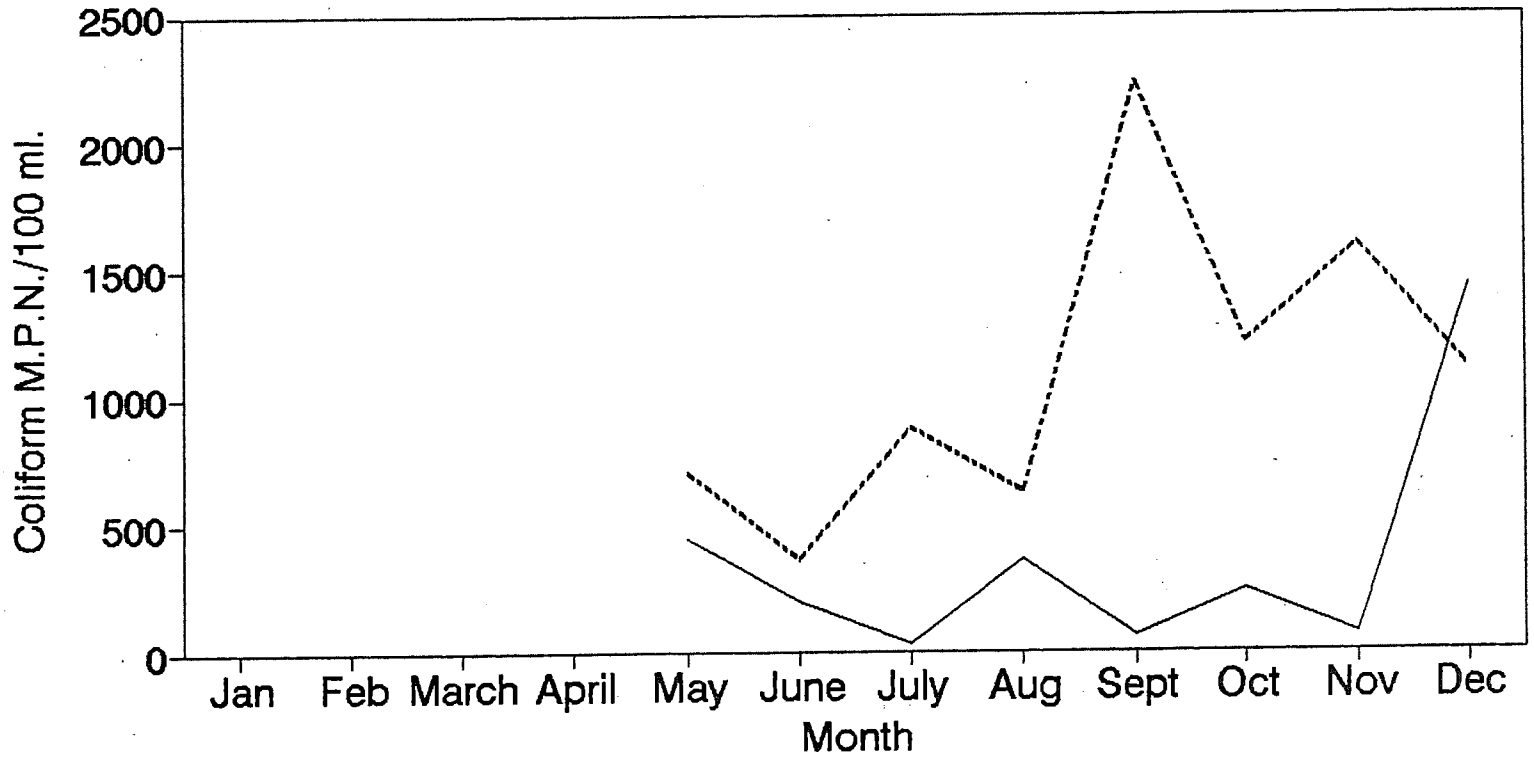

FIGURE V-1

Average Bacteriological Levels
1992

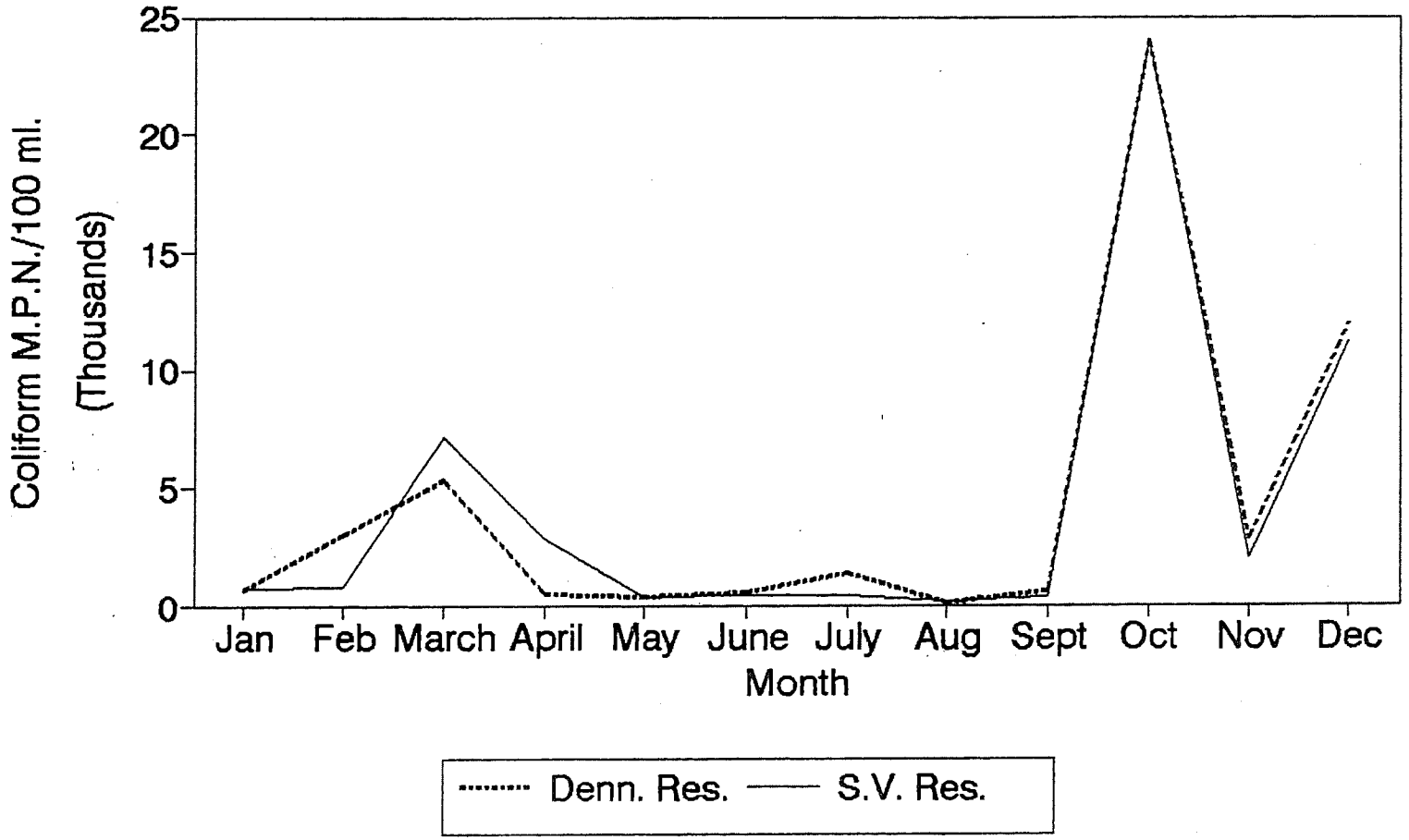

FIGURE V-1

Average Bacteriological Levels

1993

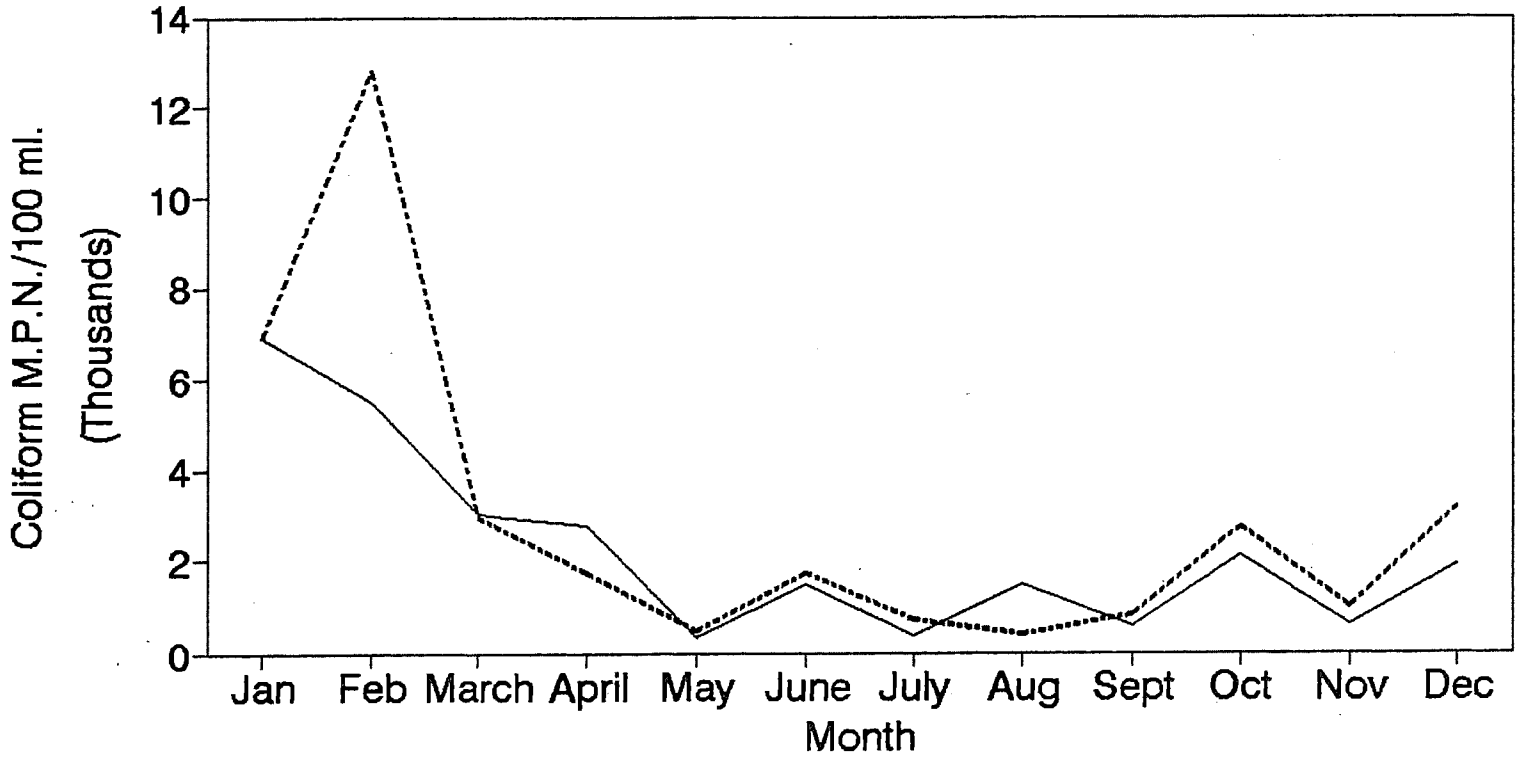

FIGURE V-1

Average Bacteriological Levels
1994

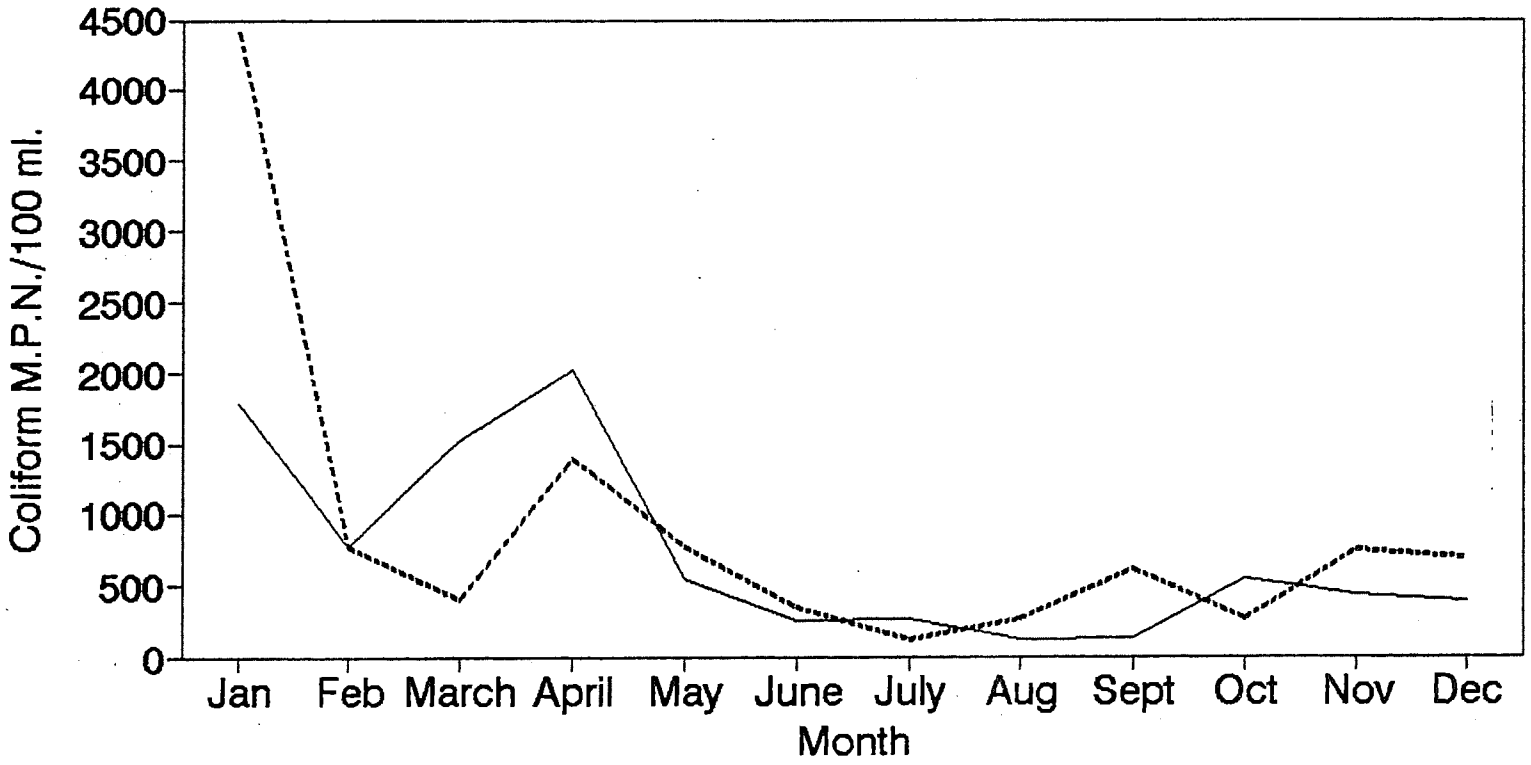

FIGURE V-1

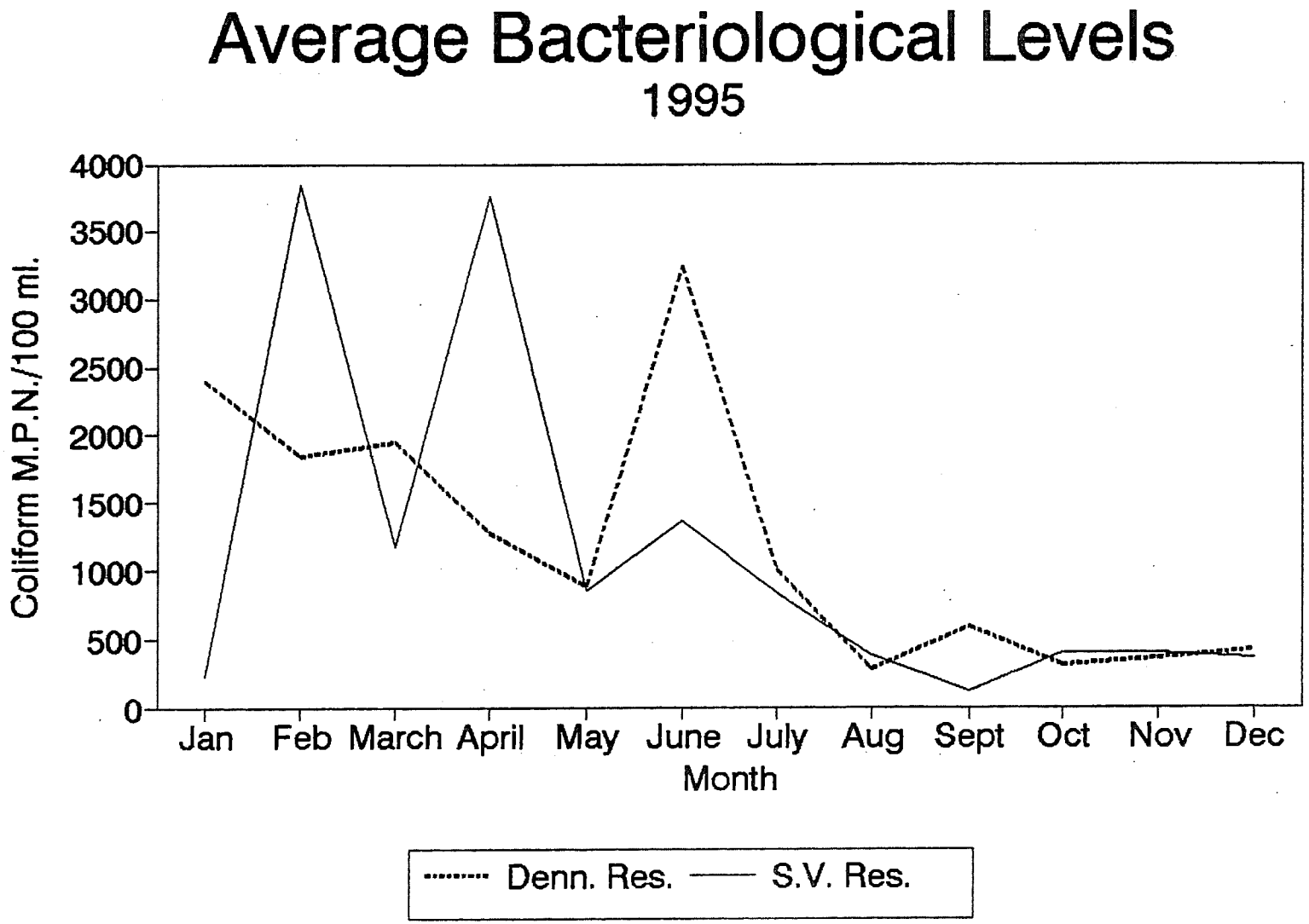
Average Bacteriological Levels
1995
Coliform M.P.N./100 ml.
4000
3500
3000
2500
2000
1500
1000
500
0
Jan
Feb
March
April
May
June
July
Aug
Sept
Oct
Nov
Dec
Month
Denn. Res.
S.V. Res.

FIGURE V-1

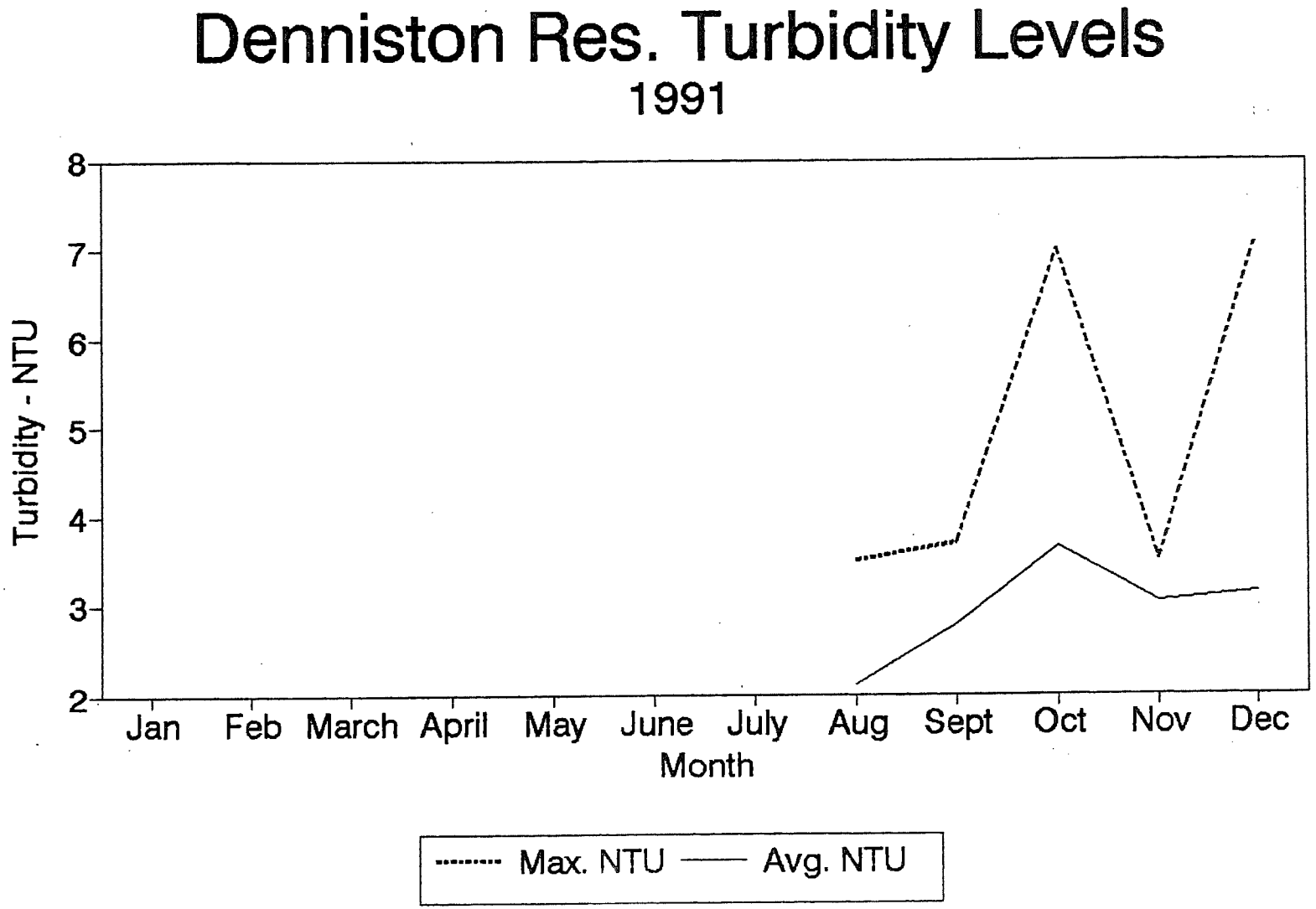
Denniston Res. Turbidity Levels
1991
Turbidity - NTU
8
7
6
5
4
3
2
Jan
Feb
March
April
May
June
July
Aug
Sept
Oct
Nov
Dec
Month
Max. NTU
Avg. NTU

FIGURE V-2

Denniston Res. Turbidity Levels
1992

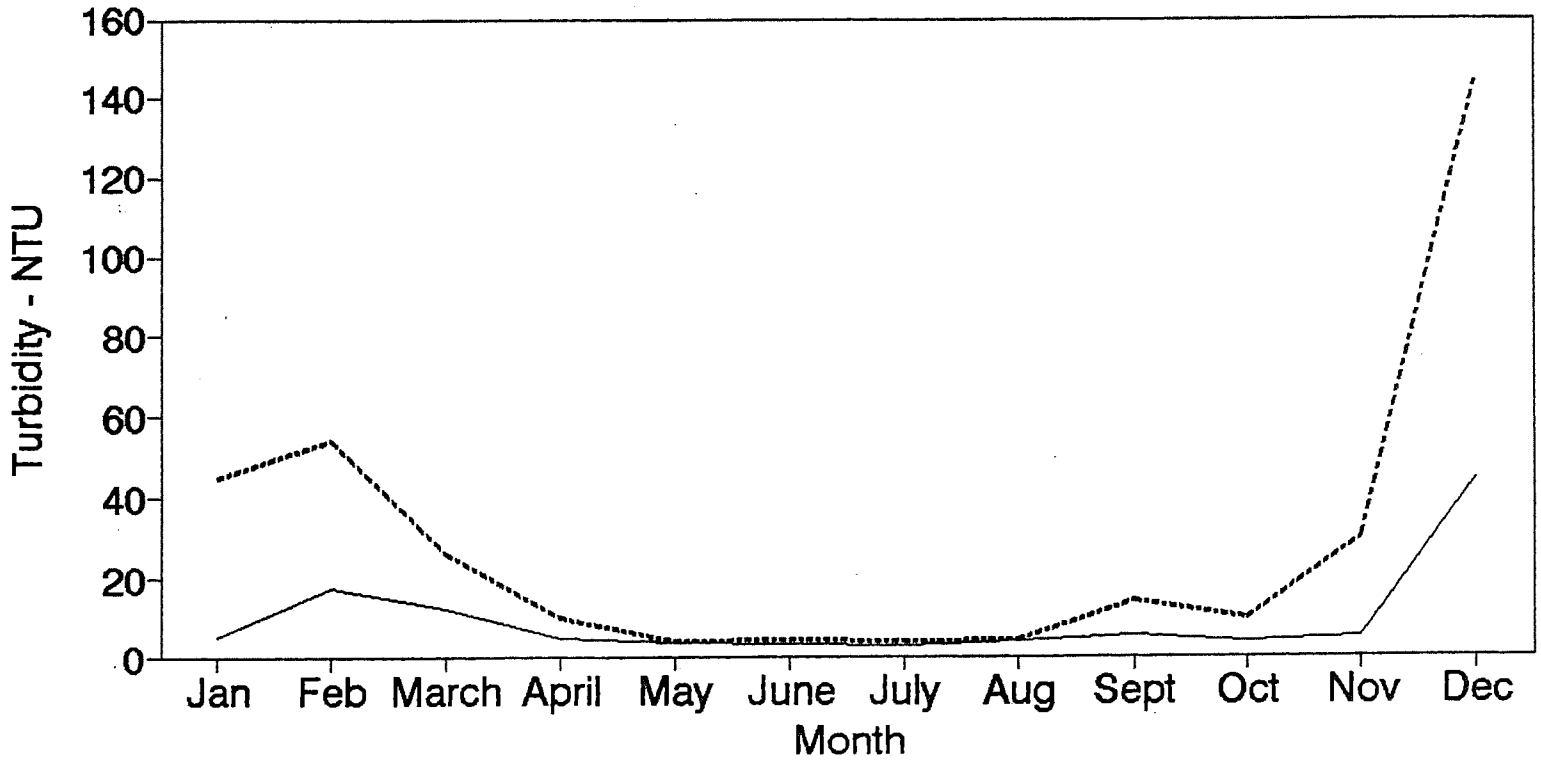

FIGURE V-2

Denniston Res. Turbidity Levels
1993

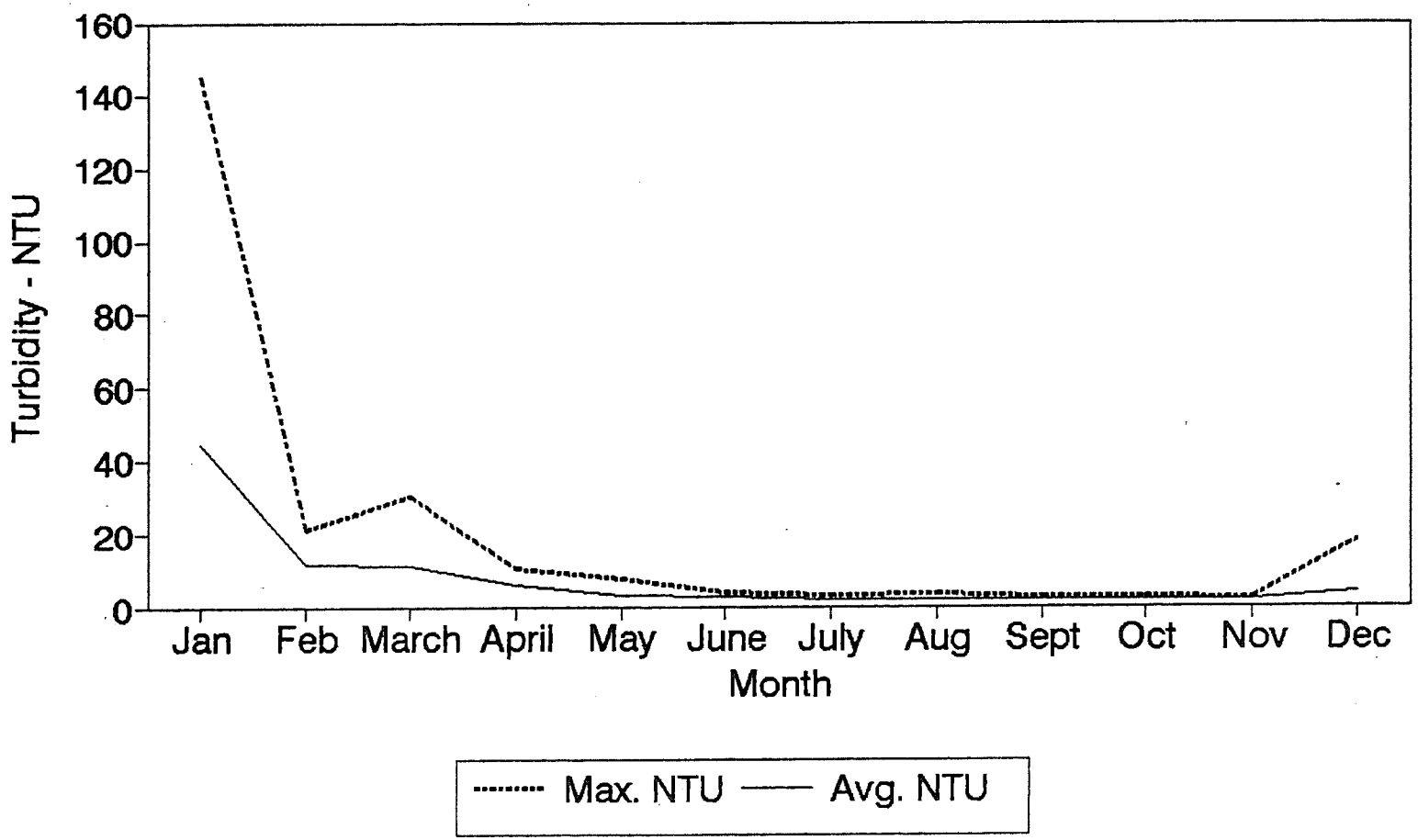

FIGURE V-2

Denniston Res. Turbidity Levels
1994

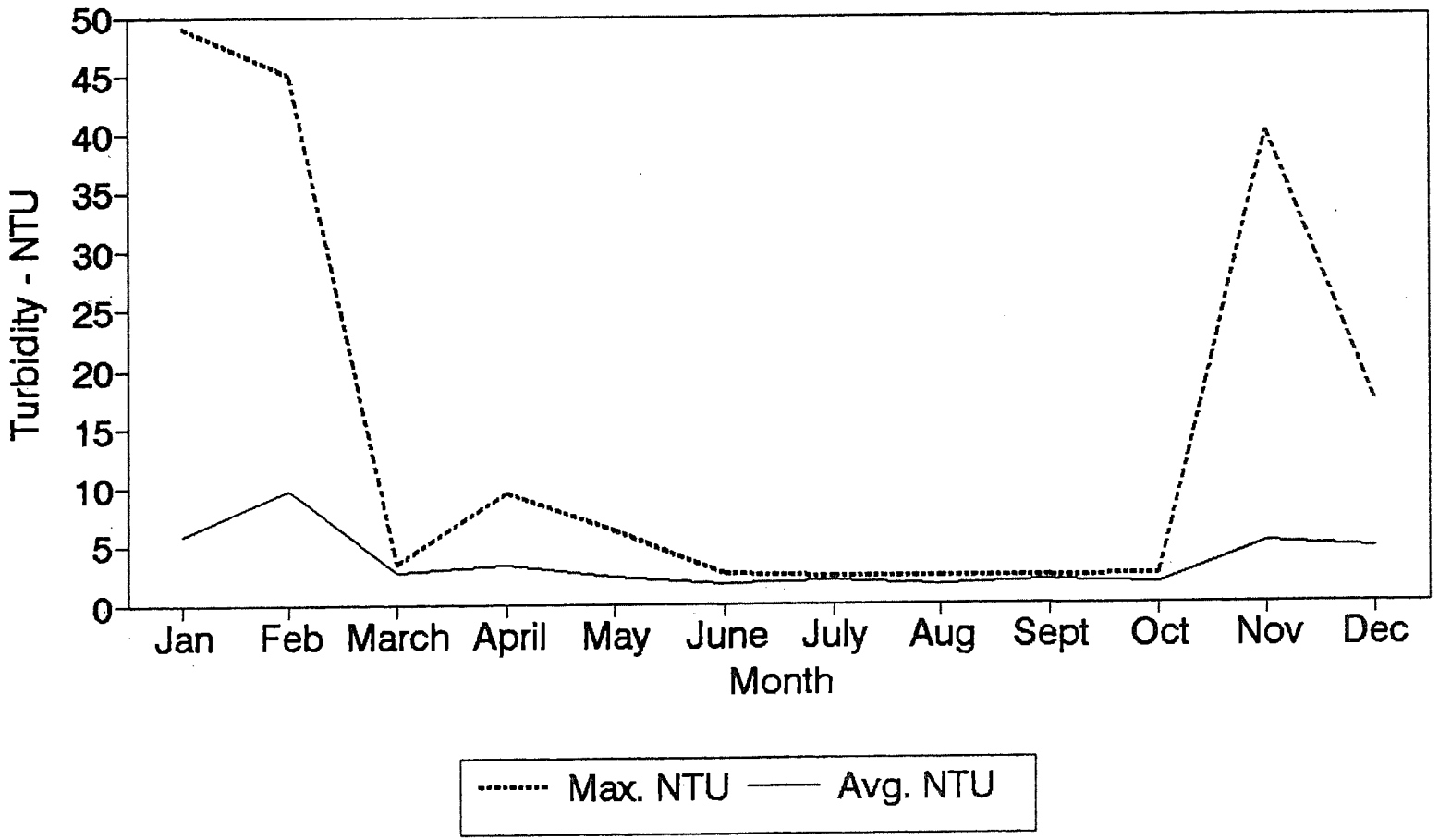

FIGURE V-2

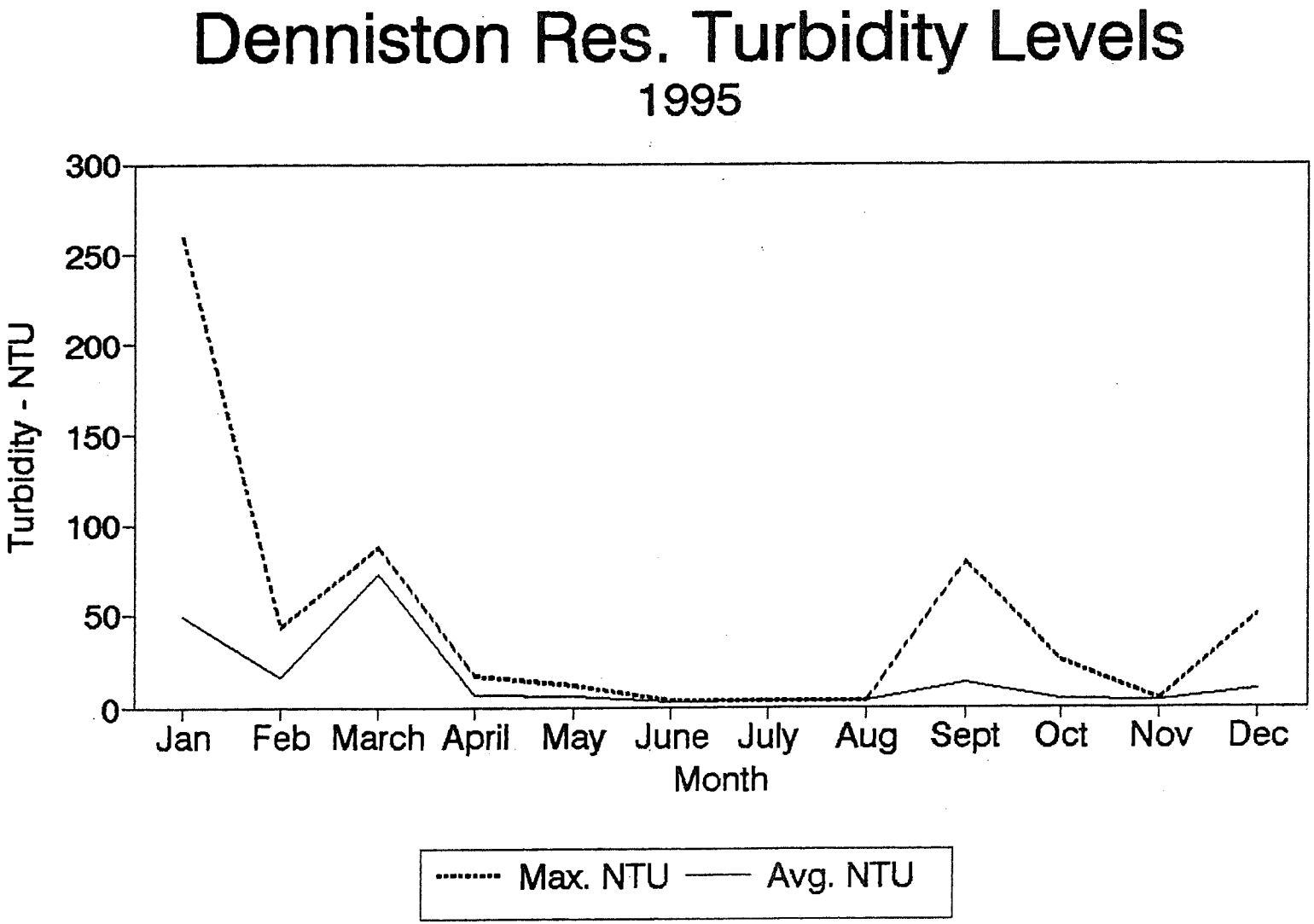
Denniston Res. Turbidity Levels
1995
Turbidity - NTU
300
250
200
150
100
50
0
Jan
Feb
March
April
May
June
July
Aug
Sept
Oct
Nov
Dec
Month
Max. NTU
Avg. NTU

FIGURE V-2

Sequoia Analytical

680 Chesapeake Drive, Redwood City, CA 94063, (415) 364-9600, FAX (415) 364-9233
404 N. Wiget Lane, Walnut Creek, CA 94598, (510) 988-9600, FAX (510) 988-9673
819 Striker Avenue, Suite 8, Sacramento, CA 95834, (916) 921-9600, FAX (916) 921-0100

Date of Report: Mar 11, 1996	Sampler Name: S. Wright	Date/Time Sample Collected:	2/22/96 9:50 AM
Lab Name: Sequoia Analytical	Employed by: Sequoia Analytical		
		Date/Time Sample Received @ Lab:	2/22/96 2:05 PM
	Sample ID No.: 9602E39-04	Date Analyses Completed:	Mar 6, 1996

ORGANIC CHEMICAL ANALYSES (EPA 502.2, 505, 507, 515.1)

System Name: Coastside County Water District System Number: _____
Name/No. of Sample Source: Denniston Res.

User ID: |___|___|___| Station Number: |___|___|___|___|___|___|___|___|___|___|___|___|___|___|___|

Date/Time of Sample: |_9_|_6_|_0_|_2_|_2_|_2_|___|_9_|_5_|_0_| (Y Y M M D D T T T T) Laboratory Code: |_5_|_1_|_1_|_3_|

Date Analyses Completed: |_9_|_6_|_0_|_3_|_0_|_6_| (Y Y M M D D)

Submitted by: _____ Phone #: _____

REGULATED ORGANIC CHEMICALS

Test Method	Constituent (ALL CONSTITUENTS REPORTED µg/L)	Entry #	Analyses Results	MCL µg/L	* DLR µg/L
EPA 502.2	Bromodichloromethane	32101	30	- -	0.50
EPA 502.2	Bromoform	32104	9.2	- -	0.50
EPA 502.2	Chloroform (Trichloromethane)	32106	24	- -	0.50
EPA 502.2	Dibromochloromethane	32105	29	- -	0.50
EPA 502.2	Total Trihalomethanes (THM'S/TTHM)	82080	92	100	0.50
EPA 502.2	Benzene	34030	- -	1	0.50
EPA 502.2	Carbon Tetrachloride	32102	- -	0.5	0.50
EPA 502.2	1,2-Dichlorobenzene (o-DCB)	34536	- -	600	0.50
EPA 502.2	1,4-Dichlorobenzene (p-DCB)	34571	- -	5	0.50
EPA 502.2	1,1-Dichloroethane (1,1-DCA)	34496	- -	5	0.50
EPA 502.2	1,2-Dichloroethane (1,2-DCA)	34531	- -	0.5	0.50
EPA 502.2	1,1-Dichloroethylene (1,1-DCE)	34501	- -	6	0.50
EPA 502.2	cis-1,2-Dichloroethylene (c-1,2-DCE)	77093	- -	6	0.50
EPA 502.2	trans-1,2-Dichloroethylene (t-1,2-DCE)	34546	- -	10	0.50
EPA 502.2	Dichloromethane (Methylene Chloride)	34423	- -	5	0.50
EPA 502.2	1,2-Dichloropropane	34541	- -	5	0.50
EPA 502.2	Total 1,3-Dichloropropene	34561	- -	0.5	0.50
EPA 502.2	Ethyl Benzene	34371	- -	700	0.50
EPA 502.2	Monochlorobenzene (Chlorobenzene)	34301	- -	70	0.50
EPA 502.2	Styrene	77128	- -	100	0.50
EPA 502.2	1,1,2,2-Tetrachloroethane	34516	- -	1	0.50
EPA 502.2	Tetrachloroethylene (PCE)	34475	- -	5	0.50

* Detection Limit for Reporting Purposes

FIGURE V-3

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819 Striker Avenue, Suite 8, Sacramento, CA 95834, (916) 921-9600, FAX (916) 921-0100

REGULATED ORGANIC CHEMICALS CONTINUED

Test	Constituent	Entry	Analyses	MCL	* DLR
EPA 502.2	Toluene	34010	- -	150	0.50
EPA 502.2	1,2,4-Trichlorobenzene	34551	- -	70	0.50
EPA 502.2	1,1,1-Trichloroethane (1,1,1-TCA)	34506	- -	200	0.50
EPA 502.2	1,1,2-Trichloroethane (1,1,2-TCA)	34511	- -	5	0.50
EPA 502.2	Trichloroethylene (TCE)	39180	- -	5	0.50
EPA 502.2	Trichlorofluoromethane (Freon 11)	34488	- -	150	5.0
EPA 502.2	Trichlorotrifluoroethane (Freon 113)	81611	- -	1200	10
EPA 502.2	Vinyl Chloride (VC)	39175	- -	0.50	0.50
EPA 502.2	m,p-Xylene	A-014	- -	- -	0.50
EPA 502.2	o-Xylene	77135	- -	- -	0.50
EPA 502.2	Total Xylenes (m,p, & o)	81551	- -	1750	0.50
EPA 504	Dibromochloropropane (DBCP)	38761	- -	0.2	0.010
EPA 504	Ethylene Dibromide (EDB)	77651	- -	0.05	0.020
EPA 505	Endrin	39390	N.D.	2	0.10
EPA 505	Lindane (gamma-BHC)	39340	N.D.	0.2	0.20
EPA 505	Methoxychlor	39480	N.D.	40	10
EPA 505	Toxaphene	39400	N.D.	3	1.0
EPA 505	Chlordane	39350	N.D.	0.10	0.10
EPA 525.2	Diethylhexylphthalate (DEHP)	39100	- -	4	3.0
EPA 505	Heptachlor	39410	N.D.	0.010	0.010
EPA 505	Heptachlor epoxide	39420	N.D.	0.010	0.010
EPA 507	Atrazine (AATREX)	39033	N.D.	3	1.0
EPA 507	Molinate (ORDRAM)	82199	N.D.	20	2.0
EPA 507	Simazine (PRINCEP)	39055	N.D.	4	1.0
EPA 507	Thiobencarb (BOLERO)	A-001	N.D.	70	1.0
EPA 505	Alachlor (ALANEX)	77825	N.D.	2	1.0
EPA 515.1	Bentazon (BASAGRAN)	38710	N.D.	18	2.0
EPA 550	Benzo (a) pyrene	34247	- -	0.2	0.10
EPA 550	2,3,7,8-TCDD (Dioxin)	34676	- -	3E-5	5E-6
EPA 515.1	2,4-D	39730	N.D.	70	10
EPA 515.1	2,4,5-TP (SILVEX)	39045	N.D.	50	1.0
EPA 531.1	Carbofuran (FURADAN)	81405	- -	18	5.0
EPA 515.1	Dalapon	38432	N.D.	200	10
EPA 515.1	Dinoseb (DNBP)	81287	N.D.	7.0	2.0
EPA 549	Diquat	78885	- -	20	4.0
EPA 525.2	Di (2-ethylhexyl) adipate	A-026	- -	400	5.0
EPA 548	Endothall	38926	- -	100	45
EPA 547	Glyphosate	79743	- -	700	25
EPA 505	Hexachlorobenzene	39700	N.D.	1.0	0.50
EPA 505	Hexachlorocyclopentadiene	34386	N.D.	50	0.50
EPA 531.1	Oxamyl (Vydate)	38865	- -	200	20
EPA 515.1	Pentachlorophenol (PCP)	39032	N.D.	1.0	0.20
EPA 515.1	Picloram	39720	N.D.	500	1.0
EPA 505	Polychlorinated Biphenyls (Total PCB's)	39516	N.D.	0.50	0.50

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UNREGULATED ORGANIC CHEMICALS CONTINUED

Test Method	Constituent ALL CONSTITUENTS REPORTED µg/L	Entry #	Analyses Results	MCL µg/L	* DLR µg/L
EPA 502.2	Bromobenzene	81555	--	--	0.50
EPA 502.2	Bromochloromethane	A-012	--	--	0.50
EPA 502.2	Bromomethane (Methyl Bromide)	34413	--	--	0.50
EPA 502.2	n-Butylbenzene	A-010	--	--	0.50
EPA 502.2	sec-Butylbenzene	77350	--	--	0.50
EPA 502.2	tert-Butylbenzene	77353	--	--	0.50
EPA 502.2	Choroethane	34311	--	--	0.50
EPA 502.2	2-Chloroethylvinyl Ether	34576	--	--	1.0
EPA 502.2	Chloromethane (Methyl Chloride)	34418	--	--	0.50
EPA 502.2	2-Chlorotoluene	A-008	--	--	0.50
EPA 502.2	4-Chlorotoluene	A-009	--	--	0.50
EPA 502.2	Dibromomethane	77596	--	--	0.50
EPA 502.2	1,3-Dichlorobenzene (m-DCB)	34566	--	--	0.50
EPA 502.2	Dichlorodifluoromethane	34668	--	--	1.0
EPA 502.2	1,3-Dichloropropane	77173	--	--	0.50
EPA 502.2	2,2-Dichloropropane	77170	--	--	0.50
EPA 502.2	1,1-Dichloropropene	77168	--	--	0.50
EPA 502.2	Hexachlorobutadiene	34391	--	--	0.50
EPA 502.2	Isopropylbenzene (Cumene)	77223	--	--	0.50
EPA 502.2	p-Isopropyltoluene	A-011	--	--	0.50
EPA 524.2	Naphthalene	34696	--	--	0.50
EPA 502.2	n-Propylbenzene	77224	--	--	0.50
EPA 502.2	1,1,1,2-Tetrachloroethane	77562	--	--	0.50
EPA 502.2	1,2,3-Trichlorobenzene	77613	--	--	0.50
EPA 502.2	1,2,3-Trichloropropane	77443	--	--	0.50
EPA 502.2	1,2,4-Trimethylbenzene	77222	--	--	0.50
EPA 502.2	1,3,5-Trimethylbenzene	77226	--	--	0.50
EPA 524.2	Methyl ethyl ketone (MEK, Butanone)	81595	--	--	5.0
EPA 524.2	Methyl isobutyl ketone (MIBK)	81596	--	--	5.0
EPA 525.2	bis (2-Chloroethyl) ether	34273	--	--	5.0
EPA 531.1	Aldicarb (TEMIK)	39053	--	--	3.0
EPA 531.1	Aldicarb Sulfone	A-020	--	--	4.0
EPA 531.1	Aldicarb Sulfoxide	A-019	--	--	3.0
EPA 505	Aldrin	39330	N.D.	--	0.075
EPA 507	Bromacil (HYVAR)	82198	N.D.	--	10
EPA 507	Butachlor	77860	N.D.	--	0.38
EPA 531.1	Carbaryl (Sevin)	77700	--	--	5.0
EPA 508	Chlorothalonil (DACONIL, BRAVO)	70314	--	--	5.0

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UNREGULATED ORGANIC CHEMICALS CONTINUED

Test Method	Constituent ALL CONSTITUENTS REPORTED µg/L	Entry #	Analyses Results	MCL µg/L	* DLR µg/L
EPA 507	Diazinon	39570	N.D.	--	0.25
EPA 515.1	Dicamba (BANVEL)	82052	N.D.	--	0.081
EPA 505	Dieldrin	39380	N.D.	--	0.020
EPA 507	Dimethoate (CYGON)	38458	N.D.	--	10
EPA 632	Diuron	39650	--	--	1.0
EPA 531.1	3-Hydroxycarbofuran	A-021	--	--	3.0
EPA 531.1	Methomyl	39051	--	--	2.0
EPA 507	Metolachlor	39356	N.D.	--	--
EPA 507	Metribuzin	81408	N.D.	--	--
EPA 507	Prometryn (CAPAROL)	39057	N.D.	--	2.0
EPA 505	Propachlor	38533	N.D.	--	0.50

** New or revised MCL is pending

Note and describe any additional compounds found: _____

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Project Manager

FIGURE V-3

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819 Striker Avenue, Suite 8, Sacramento, CA 95834, (916) 921-9600, FAX (916) 921-0100

Date of Report: Mar 11, 1996 | Sampler Name: S. Wright | Date/Time Sample Collected: 2/22/96 9:50 AM
Lab Name: Sequoia Analytical | Employed by: Sequoia Analytical
Date/Time Sample Received @ Lab: 2/22/96 2:05 PM
Sample ID No.: 9602E39-04 | Date Completed: Mar 1, 1996

GENERAL MINERAL, PHYSICAL, & INORGANIC CHEMICAL ANALYSES (4/95)

System Name: Coastside County Water District | System Number: _____
Name/No. of Sample Source: Denniston Res.

User ID: |___|___|___| Station Number: |___|___|___|___|___|___|___|___|___|___|___|___|___|___|___|___|

Date/Time of Sample: |_9_|_6_|_0_|_2_|_2_|_2_|___|_9_|_5_|_0_| (Y Y M M D D T T T T) Laboratory Code: |_5_|_1_|_1_|_3_|

Date Analyses Completed: |_9_|_6_|_0_|_3_|_0_|_1_| (Y Y M M D D)

Submitted by: _____ Phone #: _____

MCL/Reporting Units	Constituent	Entry #	Analyses Results	DLR
mg/L	Total Hardness (as CaC03)	00900	340	5.0
mg/L	Calcium (Ca)	00916	14	0.50
mg/L	Magnesium (Mg)	00927	5.4	0.10
mg/L	Sodium (Na)	00929	19	0.50
mg/L	Potassium (K)	00937	N.D.	1.0
Total Cations	meq/L Value: - -			
mg/L	Total Alkalinity (as CaC03)	00410	50	2.0
mg/L	Hydroxide (OH)	71830	N.D.	0.10
mg/L	Carbonate (CO3)	00445	N.D.	2.0
mg/L	Bicarbonate (HC03)	00440	- -	- -
* mg/L +	Sulfate (S04)	00945	12	0.50
* mg/L +	Chloride (Cl)	00940	28	2.0
45 mg/L	Nitrate (NO3)	71850	- -	2.0
1.4-2.4 mg/L	Fluoride (F) Temp. Depend.	00951	- -	0.10
Total Anions	meq/L Value: - -			
Std Units	pH (Laboratory)	00403	8.0	N/A
** µmho/cm +	Specific Conductance (E.C.)	00095	200	1.0
*** mg/L +	Total Filterable Residue at 180 C (TDS)	70300	130	1.0
15 UNITS	Apparent Color (Unfiltered)	00081	200	5.0
3.0 TON	Odor Threshold at 60 C	00086	N.D.	1.0
5.0 NTU	Lab Turbidity	82079	54	0.10
0.50 mg/L	MBAS	38260	N.D.	0.025

* 250-500-600 ** 900-1600-2200 *** 500-1000-1500

FIGURE V-4

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INORGANIC CHEMICALS

MCL/Reporting Units	Constituent	Entry #	Analyses Results	DLR
1000 µg/L	Aluminum (Al)	01105	--	50
6.0 µg/L	Antimony	01097	--	6.0
50 µg/L	Arsenic (As)	01002	--	2.0
1000 µg/L	Barium (Ba)	01007	--	100
4.0 µg/L	Beryllium	01012	--	1.0
5.0 µg/L	Cadmium (Cd)	01027	--	1.0
50 µg/L +	Chromium (Total Cr)	01034	--	10
1000 µg/L +	Copper (Cu)	01042	N.D.	50
300 µg/L	Iron (Fe)	01045	3700	100
µg/L	Lead (Pb)	01051	--	5.0
50 µg/L	Manganese (Mn)	01055	67	30
2.0 µg/L	Mercury (Hg)	71900	--	1.0
100 µg/L	Nickel	01067	--	10
50 µg/L	Selenium (Se)	01147	--	5.0
100 µg/L	Silver (Ag)	01077	--	10
2.0 µg/L	Thallium	01059	--	1.0
5000 µg/L	Zinc (Zn)	01092	N.D.	50

ADDITIONAL ANALYSES

NTU	Field Turbidity	82078	--	--
C	Source Temperature	00010	--	--
	Langelier Index Source Temp.	71814	--	--
	Langelier Index at 60 C	71813	--	--
Std. Units	Field pH	00400	--	--
	Aggressiveness Index	82383	--	--
mg/L	Silica	00955	--	--
mg/L	Phosphate	00650	--	--
mg/L	Iodide	71865	--	--
	Sodium Absorption Ratio	00931	--	--
7 MFL	Asbestos (*)	81855	--	0.20
	Boron	01020	--	--
1,000 µg/L	Nitrate as N (Nitrogen)	00618	--	400
10,000 µg/L	Nitrate + Nitrite as N	A-029	--	400
1,000 µg/L	Nitrite as N (Nitrogen)	00620	--	400
200 µg/L	Cyanide	01291	--	100
mg/L	Ammonia	00612	--	--
µg/L	Lithium	01132	--	--
mg/L	Bromide	82298	--	--
mg/L	Bromate	A-027	--	--

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Sheila Flynn
Project Manager

+ indicates Secondary Drinking Water Standards

* Detection Limit for Reporting Purposes

FIGURE V-4

Sequoia Analytical

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819 Striker Avenue, Suite 8, Sacramento, CA 95834, (916) 921-9600, FAX (916) 921-0100

Date of Report: Mar 11, 1996	Sampler Name: S. Wright	Date/Time Sample Collected:	2/22/96 9:50 AM
Lab Name: Sequoia Analytical	Employed by: Sequoia Analytical		
		Date/Time Sample Received @ Lab:	2/22/96 2:05 PM
	Sample ID No.: 9602E39-04	Date Analyses Completed:	Mar 5, 1996

RADIOLOGICAL CHEMICAL ANALYSES

System Name: Coastside County Water District System Number: _____
Name/No. of Sample Source: Denniston Res.

Water Type (G/S): |__| Station Number: |__|__|__|__|__|__|__|__|__|__|__|__|__|__|

Date/Time of Sample: |_9_|_6_|_0_|_2_|_2_|_2_|___|_9_|_5_|_0_| User ID: |__|__|__|
Y Y M M D D T T T T

Analyzing Agency Code: |_5_|_1_|_1_|_3_| Date Analyses Completed: |_9_|_6_|_0_|_3_|_0_|_5_|
Y Y M M D D

Submitted to SWQIS By: _____ Phone #: _____

RADIOLOGICAL ANALYSES

MCL/Reporting Units		Constituent	Entry #	Analyses Results
15	pCi/l	Total Alpha	01501	-1.5
	pCi/l	Total Alpha Counting Error	01502	1.5
50	pCi/l	Total Beta	03501	-0.20
	pCi/l	Total Beta Counting Error	03502	1.5
20	pCi/l	Natural Uranium	28012	- -
	pCi/l	Total Radium 226	09501	- -
	pCi/l	Total Radium 226 Counting Error	09502	- -
	pCi/l	Total Radium 228	11501	- -
	pCi/l	Total Radium 228 Counting Error	11502	- -
5	pCi/l	Ra 226 + Ra 228	11503	- -
	pCi/l	Ra 226 + Ra 228 Counting Error	11504	- -
	pCi/l	Radon 222	82303	- -
	pCi/l	Radon 222 Counting Error	82302	- -
20,000	pCi/l	Total Tritium	07000	- -
	pCi/l	Total Tritium Counting Error	07001	- -
8	pCi/l	Total Strontium-90	13501	- -
	pCi/l	Total Strontium-90 Counting Error	13502	- -

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Sheila Flynn
Project Manager

FIGURE V-5

BioVir Laboratories, Inc.

685 Stone Road • Benicia, CA 94510 • (707) 747-5906 • 1-800-GIARDIA • FAX (707) 747-1751

REPORT OF SAMPLE EVALUATION

REPORT: R951054B

PAGE: 1 of 1

CLIENT: Coastside County Water District
766 Main Street
Half Moon Bay, CA 94109

CLIENT NO.: COA003

SAMPLE INFORMATION:

Name of Sampler:	Al Rolleri	Sample Date:	11/07/95
Sample Source:	Denniston Creek	Sample Time:	14:48-15:54
Sample Location:	Denniston Treatment Plant	Turbidity (NTU):	2.6
Filter Type:	Parker Hannifan, M39R10A	Temperature:	13.5 C
Sample Volume:	70 Gallons / 263 Liters	pH:	7.11
Comments:	Raw Water		

ASSAY RESULTS:

1. Giardia species Cyst and Cryptosporidium Oocyst
Combined Evaluation - (Information Collection Rule Method - as proposed)

Organisms Observed / 100 Liters*		
	Giardia species Cyst	Cryptosporidium Oocyst
PRESUMPTIVE	<3.8	<3.8
CONFIRMED	<3.8	<3.8

* "Less than" results represent the lower detection limit for this assay.

SAMPLE EVALUATION PERFORMANCE CRITERIA: The precise rates of recovery of organisms from environmental samples cannot be determined. BioVir Laboratories has analyzed your sample(s) in accordance with the method described with each analyte above, however, due to inherent limitations of these methods organisms may avoid detection. For additional information regarding the limitations of the method(s) referred to above please call us at 1-800-GIARDIA.
COMPANY IS NOT AN INSURER: BioVir Laboratories is not an insurer or guarantor of the quality and/or purity of water, wastewater, biosolid or other material from which the sample was taken. BioVir offers no express or implied warranties whatsoever concerning the quality or purity of any water, wastewater, biosolid or other material which is ultimately consumed, distributed, applied or otherwise disposed of.

11-15-95
ANALYSIS DATE

John L. Riggs
SIGNATURE/DATE
11-16-95

FIGURE V-6

BioVir Laboratories, Inc.

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REPORT OF SAMPLE EVALUATION

REPORT: R950212B

PAGE: 1 of 1

CLIENT: Coastside County Water
766 Main Street
Half Moon Bay, CA 94019

CLIENT NO.: COA003

SAMPLE INFORMATION:

Name of Sampler:	Al Rolleri	Sample Date:	01/24/95
Sample Source:	Denniston Creek	Sample Time:	09:22
Sample Location:	Denniston Treatment Plant	Turbidity (NTU):	60.0
Filter Type:	Parker Hannifan, M39R10A	Temperature:	12.3 C
Sample Volume:	108 Gallons / 409 Liters	pH:	7.26
Comments:	Raw Water		

ASSAY RESULTS:

1. Giardia species Cyst and Cryptosporidium Oocyst
Combined Evaluation - (Information Collection Rule Method - as proposed)

Organisms Observed / 100 Liters*		
	Giardia species Cyst	Cryptosporidium Oocyst
PRESUMPTIVE	17.5	< 11.5
CONFIRMED	< 11.5	< 11.5

* "Less than" results represent the lower detection limit for this assay.

SAMPLE EVALUATION PERFORMANCE CRITERIA: The precise rates of recovery of organisms from environmental samples cannot be determined. BioVir Laboratories has analyzed your sample(s) in accordance with the method described with each analyte above, however, due to inherent limitations of these methods organisms may avoid detection. For additional information regarding the limitations of the method(s) referred to above please call us at 1-800-GIARDIA.

COMPANY IS NOT AN INSURER: BioVir Laboratories is not an insurer or guarantor of the quality and/or purity of water, wastewater, biosolid or other material from which the sample was taken. BioVir offers no express or implied warranties whatsoever concerning the quality or purity of any water, wastewater, biosolid or other material which is ultimately consumed, distributed, applied or otherwise disposed of.

1-31-95
ANALYSIS DATE

John L. Riggs
SIGNATURE/DATE
2-02-95

FIGURE V-6

VI. CONCLUSIONS AND RECOMMENDATIONS

Conclusions:

1. Currently there are no known significant potential contaminant sources in either the Denniston or San Vicente watersheds.

2. Land use within the watersheds in not expected to change within the near future because of zoning restrictions, and therefore new significant potential contaminant sources are not anticipated.

3. Within the Denniston watershed, the current watershed control and management practices, including those of the CCWD, property owner, and farmer, have been reviewed and found adequate. Current watershed control and management practices within the San Vicente watershed require additional investigation prior to the CCWD's resuming diversion of water from San Vicente Creek.

4. The surface water quality of the Denniston Creek source is in compliance with all State drinking water standard MCL's (constituent maximum contaminant levels).

5. The surface water quality of the San Vicente Creek source is believed to be in compliance with all State MCL's, but the CCWD does not currently fully monitor this potential supply source because it does not divert water from it.

6. The treated water produced by the Denniston Project facilities is in compliance with the SWTR.

7. The water quality monitoring program for the Denniston Project facilities is in compliance with Department of Health Services requirements.

Recommendations

Preparation of this Sanitary Survey report for the Denniston and San Vicente watersheds has required the CCWD to closely examine the physical characteristics of the watershed, watershed control and management practices, and water quality monitoring and treatment adequacy. During this investigative work no problems or inadequacies have been discovered, and therefore no changes from current practices are recommended.

Prior to the CCWD resuming diversion of water from San Vicente Creek, the CCWD should further investigate the current watershed control and management practices and should also conduct additional water quality monitoring.

Appendix I: Water Denniston WTP CT Calculation

CT Compliance for Giardia Lamblia Cysts by Free Chlorine
Denniston Water Treatment Plant

Month and Year: January 2024

Required Giardia Log Reduction: 0.50

Segment 1
Pre-chlorination Pipeline and Coagulation Tank

Pipeline Diameter (ft):	1.00
Pipeline Length (ft):	123
Pipeline Volume (gallons):	723
Pipeline Short Circuiting Factor (t10/T):	1.00
Coagulation Tank Diameter (ft):	8.00
Coagulation Tank Length (ft):	30.00
Coagulation Tank Volume (gallons):	11,280
Coagulation Tank Short Circuiting Factor (t10/T):	0.40

Segment 2
Filters and Filter Effluent Piping

Total Filters Online (0 to 3):	3
# Filters For CT Calculations (0 to 3):	3
Filter Diameter (ft):	8.00
Filter Length (ft):	20.00
Total Volume per Filter (gallons):	7,520
2% Lost Volume for Filter Bottoms (gallons):	-150
Lost Volume for Media- 42" depth, 55% solids (gallons):	-2,370
Net Volume Per Filter (gallons):	5,000
8-inch Pipeline Diameter (ft):	0.67
8-inch Pipeline Length fore Each Filter (ft):	9.00
8-inch Pipeline Volume for Each Filter (gallons):	35
12-inch Pipeline Diameter (ft):	1.00
Pipeline Length (ft):	6.00
12- inch Pipeline Volume (gallons):	70
Filter Short Circuiting Factor (t10/T):	0.75
Pipeline Short Circuiting Factor (t10/T):	1.00

Segment 3
Treated Water Pipeline

Volume in Gallons:	17,352
Pipeline Short Circuiting Factor (t10/T):	1.00
12-inch Pipeline Diameter (ft):	1.00
Pipeline Length from Plant to Storage Tank (ft):	465
'ipeline Length from Tank to Plant Bypass (ft):	375
Pipeline Length from Plant Bypass to First Service (ft):	2060
Total Pipeline Length Plant to First Service (ft):	2900
8-inch Pipeline Diameter (ft):	0.67
Pipeline from BW bypass to tank inlet	123

Date	Low Tank Level	Tank Volume at Lowest Level	Credited Volume (0.1)	Plant Flow Rate (gpm)	Effective Contact Time "t10" (min)	Temp (°C)	pH (units)	Chlorine Residual "C" (mg/L)	Ct REQUIRED (mg-min/L)	Calculated Ct10 (mg-min/L)	Inactivation Ratio Ct10/ CtREQUIRED	No. Filters Online (N)	No. Filters for Ct	Effective Contact Time "t10" (minutes)	Temp (°C)	pH (units)	Chlorine Residual "C" (mg/L)	Ct REQUIRED (mg-min/L)	Calculated Ct10 (mg-min/L)	Inactivation Ratio Ct10/CtREQ	Effective Contact Time "t10" (min)	Temp (°C)	pH (units)	Chlorine Residual "C" (mg/L)	Ct REQUIRED (mg-min/L)	Calculated Ct10 (mg-min/L)	Inactivation Ratio Ct10/CtREQ	Cumulative Giardia Inactivation Ratio Ct10/CtREQ	Cumulative Giardia Inactivation (log)
	ft	gal	ft																										
1																													
2																													
3																													
4	30.00	999,990	99,999	400																	293.4								
5	29.23	974,324	97,432	300																	382.6	12.0	8.20	0.46	44.5	176.0	4.0	4.0	4.0
6	33.50	1,116,656	111,666	350																	368.6	11.8	8.18	0.32	43.9	118.0	2.7	2.7	2.7
7	34.12	1,137,322	113,732	600																	218.5	12.3	8.05	0.55	42.6	120.2	2.8	2.8	2.8
8	33.68	1,122,655	112,266	500																	259.2	9.7	8.19	0.71	55.5	184.1	3.3	3.3	3.3
9	38.61	1,286,987	128,699	400																	365.1	11.3	8.16	1.01	51.9	368.8	7.1	7.1	7.1
10	36.82	1,227,321	122,732	350																	400.2	10.7	8.12	0.96	53.0	384.2	7.3	7.3	7.3
11	37.26	1,241,988	124,199	300																	471.8	10.8	8.09	0.87	51.3	410.5	8.0	8.0	8.0
12	36.43	1,214,321	121,432	300																	462.6	10.4	8.08	0.74	51.3	342.3	6.7	6.7	6.7
13																													
14																													
15																													
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30																													
31																													

Segment 3 Average: 5.2

CT Compliance for Giardia Lamblia Cysts by Free Chlorine
Denniston Water Treatment Plant

Month and Year: March 2024

Required Giardia Log Reduction: 0.50

Segment 1
Pre-chlorination Pipeline and Coagulation Tank

Pipeline Diameter (ft):	1.00
Pipeline Length (ft):	123
Pipeline Volume (gallons):	723
Pipeline Short Circuiting Factor (t10/T):	1.00
Coagulation Tank Diameter (ft):	8.00
Coagulation Tank Length (ft):	30.00
Coagulation Tank Volume (gallons):	11,280
Coagulation Tank Short Circuiting Factor (t10/T):	0.40

Segment 2
Filters and Filter Effluent Piping

Total Filters Online (0 to 3):	3
# Filters For CT Calculations (0 to 3):	3
Filter Diameter (ft):	8.00
Filter Length (ft):	20.00
Total Volume per Filter (gallons):	7,520
2% Lost Volume for Filter Bottoms (gallons):	-150
Lost Volume for Media- 42" depth, 55% solids (gallons):	-2,370
Net Volume Per Filter (gallons):	5,000
8-inch Pipeline Diameter (ft):	0.67
8-inch Pipeline Length fore Each Filter (ft):	9.00
8-inch Pipeline Volume for Each Filter (gallons):	35
12-inch Pipeline Diameter (ft):	1.00
Pipeline Length (ft):	6.00
12- inch Pipeline Volume (gallons):	70
Filter Short Circuiting Factor (t10/T):	0.75
Pipeline Short Circuiting Factor (t10/T):	1.00

Segment 3
Treated Water Pipeline

Volume in Gallons:	17,352
Pipeline Short Circuiting Factor (t10/T):	1.00
12-inch Pipeline Diameter (ft):	1.00
Pipeline Length from Plant to Storage Tank (ft):	465
'ipeline Length from Tank to Plant Bypass (ft):	375
Pipeline Length from Plant Bypass to First Service (ft):	2060
Total Pipeline Length Plant to First Service (ft):	2900
8-inch Pipeline Diameter (ft):	0.67
Pipeline from BW bypass to tank inlet	123

Date	Low Tank Level	Tank Volume at Lowest Level	Credited Volume (0.1)	Plant Flow Rate (gpm)	Effective Contact Time "t10" (min)	Temp (°C)	pH (units)	Chlorine Residual "C" (mg/L)	Ct REQUIRED (mg-min/L)	Calculated Ct10 (mg-min/L)	Inactivation Ratio Ct10/ CtREQUIRED	No. Filters Online (N)	No. Filters for Ct	Effective Contact Time "t10" (minutes)	Temp (°C)	pH (units)	Chlorine Residual "C" (mg/L)	Ct REQUIRED (mg-min/L)	Calculated Ct10 (mg-min/L)	Inactivation Ratio Ct10/CtREQ	Effective Contact Time "t10" (min)	Temp (°C)	pH (units)	Chlorine Residual "C" (mg/L)	Ct REQUIRED (mg-min/L)	Calculated Ct10 (mg-min/L)	Inactivation Ratio Ct10/CtREQ	Cumulative Giardia Inactivation Ratio Ct10/CtREQ	Cumulative Giardia Inactivation (log)
	ft	gal	ft																										
1																													
2																													
3																													
4																													
5																													
6																													
7																													
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10																													
11																													
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14																													
15																													
16																													
17																													
18	24.86	828,658	82,866	300																	334.1								
19	24.22	807,325	80,733	300																	326.9	14.7	8.19	0.50	37.2	163.5	4.4	4.4	4.4
20	32.67	1,088,989	108,899	300																	420.8	14.0	8.18	0.82	42.0	345.1	8.2	8.2	8.2
21	32.80	1,093,322	109,332	300																	422.3	15.0	8.12	0.20	34.5	84.5	2.5	2.5	2.5
22	31.31	1,043,656	104,366	300																	405.7	13.7	8.13	0.90	42.7	365.2	8.5	8.5	8.5
23																													
24																													
25	29.39	979,657	97,966	300																	384.4								
26	29.27	975,657	97,566	300																	383.1	13.1	8.14	0.66	42.7	252.8	5.9	5.9	5.9
27	34.61	1,153,655	115,366	300																	442.4	13.0	8.12	0.65	42.6	287.6	6.8	6.8	6.8
28	33.54	1,117,989	111,799	300																	430.5	12.7	8.12	0.63	43.3	271.2	6.3	6.3	6.3
29	33.89	1,129,655	112,966	300																	434.4	13.8	8.08	0.57	39.0	247.6	6.4	6.4	6.4
30																													
31																													

Segment 3 Average: 6.1

CT Compliance for Giardia Lamblia Cysts by Free Chlorine
Denniston Water Treatment Plant

Month and Year: April 2024

Required Giardia Log Reduction: 0.50

Segment 1 — Pre-chlorination Pipeline and Coagulation Tank

Pipeline Diameter (ft):	1.00
Pipeline Length (ft):	123
Pipeline Volume (gallons):	723
Pipeline Short Circuiting Factor (t10/T):	1.00
Coagulation Tank Diameter (ft):	8.00
Coagulation Tank Length (ft):	30.00
Coagulation Tank Volume (gallons):	11,280
Coagulation Tank Short Circuiting Factor (t10/T):	0.40

Segment 2 — Filters and Filter Effluent Piping

Total Filters Online (0 to 3):	3
# Filters For CT Calculations (0 to 3):	3
Filter Diameter (ft):	8.00
Filter Length (ft):	20.00
Total Volume per Filter (gallons):	7,520
2% Lost Volume for Filter Bottoms (gallons):	-150
Lost Volume for Media- 42" depth, 55% solids (gallons):	-2,370
Net Volume Per Filter (gallons):	5,000
8-inch Pipeline Diameter (ft):	0.67
8-inch Pipeline Length fore Each Filter (ft):	9.00
8-inch Pipeline Volume for Each Filter (gallons):	35
12-inch Pipeline Diameter (ft):	1.00
Pipeline Length (ft):	6.00
12- inch Pipeline Volume (gallons):	70
Filter Short Circuiting Factor (t10/T):	0.75
Pipeline Short Circuiting Factor (t10/T):	1.00

Segment 3 — Treated Water Pipeline

Volume in Gallons:	17,352
Pipeline Short Circuiting Factor (t10/T):	1.00
12-inch Pipeline Diameter (ft):	1.00
Pipeline Length from Plant to Storage Tank (ft):	465
Pipeline Length from Tank to Plant Bypass (ft):	375
Pipeline Length from Plant Bypass to First Service (ft):	2060
Total Pipeline Length Plant to First Service (ft):	2900
8-inch Pipeline Diameter (ft):	0.67
Pipeline from BW bypass to tank inlet	123

Date	Low Tank Level	Tank Volume at Lowest Level	Credited Volume (0.1)	Plant Flow Rate (gpm)	Effective Contact Time "t10" (min)	Temp (°C)	pH (units)	Chlorine Residual "C" (mg/L)	Ct REQUIRED (mg-min/L)	Calculated Ct10 (mg-min/L)	Inactivation Ratio Ct10/ CtREQUIRED	No. Filters Online (N)	No. Filters for Ct	Effective Contact Time "t10" (minutes)	Temp (°C)	pH (units)	Chlorine Residual "C" (mg/L)	Ct REQUIRED (mg-min/L)	Calculated Ct10 (mg-min/L)	Inactivation Ratio Ct10/CtREQ	Effective Contact Time "t10" (min)	Temp (°C)	pH (units)	Chlorine Residual "C" (mg/L)	Ct REQUIRED (mg-min/L)	Calculated Ct10 (mg-min/L)	Inactivation Ratio Ct10/CtREQ	Cumulative Giardia Inactivation Ratio Ct10/CtREQ	Cumulative Giardia Inactivation (log)
	ft	gal	ft																										
1	23.00	766,659	76,666	400																	235.0	15.5	7.86						
2	22.67	755,659	75,566	400																	232.3	12.9	8.10	0.23	39.6	53.4	1.3	1.3	1.3
3	29.21	973,657	97,366	300																	382.4	14.1	8.08	0.75	39.8	286.8	7.2	7.2	7.2
4	32.78	1,092,656	109,266	300																	422.1	12.6	8.07	0.65	43.1	274.3	6.4	6.4	6.4
5	29.10	969,990	96,999	400																	285.9	12.2	8.09	0.61	44.1	174.4	4.0	4.0	4.0
6	33.74	1,124,655	112,466	400																	324.5	12.5	8.03	0.61	42.4	198.0	4.7	4.7	4.7
7	34.03	1,134,322	113,432	400																	327.0	12.4	8.08	0.91	46.1	297.5	6.5	6.5	6.5
8	35.20	1,173,322	117,332	300																	448.9	11.7	8.03	0.92	47.6	413.0	8.7	8.7	8.7
9	33.10	1,103,322	110,332	400																	319.2	13.0	7.99	0.99	43.4	316.0	7.3	7.3	7.3
10	32.72	1,090,656	109,066	300																	421.4	13.5	8.02	0.93	42.0	391.9	9.3	9.3	9.3
11	28.90	963,324	96,332	400																	284.2	12.7	8.05	1.01	45.4	287.1	6.3	6.3	6.3
12	29.04	967,990	96,799	300																	380.5	13.8	8.08	0.98	42.3	372.9	8.8	8.8	8.8
13	32.54	1,084,656	108,466	300																	419.4	13.3	8.11	0.89	43.6	373.3	8.6	8.6	8.6
14	35.73	1,190,988	119,099	300																	454.8	12.1	8.10	0.79	46.4	359.3	7.7	7.7	7.7
15																													
16	27.31	910,324	91,032	400																	271.0								
17	27.91	930,324	93,032	300																	367.9	13.1	7.99	0.85	42.2	312.8	7.4	7.4	7.4
18	32.17	1,072,323	107,232	300																	415.3	13.8	8.03	0.72	39.7	299.0	7.5	7.5	7.5
19	32.45	1,081,656	108,166	300																	418.4	13.9	8.06	0.94	41.5	393.3	9.5	9.5	9.5
20	29.25	974,990	97,499	300																	382.8	13.5	8.06	0.99	43.0	379.0	8.8	8.8	8.8
21	33.47	1,115,656	111,566	300																	429.7	14.1	8.05	0.97	40.9	416.8	10.2	10.2	10.2
22	33.92	1,130,655	113,066	300																	434.7	14.7	8.03	0.83	38.1	360.8	9.5	9.5	9.5
23	32.54	1,084,656	108,466	400																	314.5	14.1	8.07	1.01	41.5	317.7	7.7	7.7	7.7
24	35.80	1,193,321	119,332	300																	455.6	14.3	8.05	0.85	39.6	387.3	9.8	9.8	9.8
25	33.50	1,116,656	111,666	300																	430.1	14.2	8.09	0.87	40.5	374.2	9.2	9.2	9.2
26	34.17	1,138,989	113,899	300																	437.5	14.9	8.12	0.91	39.3	398.1	10.1	10.1	10.1
27	32.30	1,076,656	107,666	300																	416.7	14.7	8.10	0.94	39.7	391.7	9.9	9.9	9.9
28	33.05	1,101,656	110,166	300																	425.1	14.5	8.12	0.97	40.8	412.3	10.1	10.1	10.1
29	33.13	1,104,322	110,432	300																	425.9	14.1	8.12	0.92	41.6	391.9	9.4	9.4	9.4
30	31.50	1,049,990	104,999	300																	407.8	13.7	8.14	0.92	43.0	375.2	8.7	8.7	8.7

Segment 3 Average: 7.9

CT Compliance for Giardia Lamblia Cysts by Free Chlorine
Denniston Water Treatment Plant

Month and Year: May 2024

Required Giardia Log Reduction: 0.50

Segment 1 — Pre-chlorination Pipeline and Coagulation Tank

Pipeline Diameter (ft):	1.00
Pipeline Length (ft):	123
Pipeline Volume (gallons):	723
Pipeline Short Circuiting Factor (t10/T):	1.00
Coagulation Tank Diameter (ft):	8.00
Coagulation Tank Length (ft):	30.00
Coagulation Tank Volume (gallons):	11,280
Coagulation Tank Short Circuiting Factor (t10/T):	0.40

Segment 2 — Filters and Filter Effluent Piping

Total Filters Online (0 to 3):	3
# Filters For CT Calculations (0 to 3):	3
Filter Diameter (ft):	8.00
Filter Length (ft):	20.00
Total Volume per Filter (gallons):	7,520
2% Lost Volume for Filter Bottoms (gallons):	-150
Lost Volume for Media- 42" depth, 55% solids (gallons):	-2,370
Net Volume Per Filter (gallons):	5,000
8-inch Pipeline Diameter (ft):	0.67
8-inch Pipeline Length fore Each Filter (ft):	9.00
8-inch Pipeline Volume for Each Filter (gallons):	35
12-inch Pipeline Diameter (ft):	1.00
Pipeline Length (ft):	6.00
12- inch Pipeline Volume (gallons):	70
Filter Short Circuiting Factor (t10/T):	0.75
Pipeline Short Circuiting Factor (t10/T):	1.00

Segment 3 — Treated Water Pipeline

Volume in Gallons:	17,352
Pipeline Short Circuiting Factor (t10/T):	1.00
12-inch Pipeline Diameter (ft):	1.00
Pipeline Length from Plant to Storage Tank (ft):	465
'ipeline Length from Tank to Plant Bypass (ft):	375
Pipeline Length from Plant Bypass to First Service (ft):	2060
Total Pipeline Length Plant to First Service (ft):	2900
8-inch Pipeline Diameter (ft):	0.67
Pipeline from BW bypass to tank inlet	123

Date	Low Tank Level	Tank Volume at Lowest Level	Credited Volume (0.1)	Plant Flow Rate (gpm)	Effective Contact Time "t10" (min)	Temp (°C)	pH (units)	Chlorine Residual "C" (mg/L)	Ct REQUIRED (mg-min/L)	Calculated Ct10 (mg-min/L)	Inactivation Ratio Ct10/ CtREQUIRED	No. Filters Online (N)	No. Filters for Ct	Effective Contact Time "t10" (minutes)	Temp (°C)	pH (units)	Chlorine Residual "C" (mg/L)	Ct REQUIRED (mg-min/L)	Calculated Ct10 (mg-min/L)	Inactivation Ratio Ct10/CtREQ	Effective Contact Time "t10" (min)	Temp (°C)	pH (units)	Chlorine Residual "C" (mg/L)	Ct REQUIRED (mg-min/L)	Calculated Ct10 (mg-min/L)	Inactivation Ratio Ct10/CtREQ	Cumulative Giardia Inactivation Ratio Ct10/CtREQ	Cumulative Giardia Inactivation (log)
	ft	gal	ft																										
1	32.40	1,079,989	107,999	300																	417.8	12.9	8.10	0.91	44.8	380.2	8.5	8.5	8.5
2	31.91	1,063,656	106,366	300																	412.4	13.2	8.11	0.80	43.2	329.9	7.6	7.6	7.6
3	34.23	1,140,989	114,099	300																	438.2	13.9	8.11	0.92	42.0	403.1	9.6	9.6	9.6
4	33.04	1,101,322	110,132	300																	424.9	14.1	8.10	0.92	41.3	391.0	9.5	9.5	9.5
5																													
6																													
7																													
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16																													
17																													
18																													
19																													
20	25.40	846,658	84,666	300																	340.1								
21	25.37	845,658	84,566	300																	339.7	13.8	8.16	0.73	41.5	248.0	6.0	6.0	6.0
22	31.87	1,062,323	106,232	300																	411.9	15.2	7.99	0.79	36.0	325.4	9.0	9.0	9.0
23	34.40	1,146,655	114,666	300																	440.1	14.0	8.04	0.76	39.6	334.4	8.4	8.4	8.4
24	34.50	1,149,989	114,999	300																	441.2	14.1	8.02	0.77	39.1	339.7	8.7	8.7	8.7
25	30.13	1,004,323	100,432	300																	392.6	14.0	8.08	0.69	39.6	270.9	6.8	6.8	6.8
26	33.73	1,124,322	112,432	300																	432.6	13.9	8.01	0.69	38.9	298.5	7.7	7.7	7.7
27	34.81	1,160,322	116,032	300																	444.6	14.1	8.06	0.69	39.0	306.8	7.9	7.9	7.9
28	34.90	1,163,322	116,332	300																	445.6	14.3	8.15	0.74	40.1	329.8	8.2	8.2	8.2
29	34.20	1,139,989	113,999	300																	437.8	14.7	8.15	0.73	38.9	319.6	8.2	8.2	8.2
30	35.25	1,174,988	117,499	300																	449.5	14.1	8.05	0.81	39.8	364.1	9.1	9.1	9.1
31	35.70	1,189,988	118,999	300																	454.5	14.0	8.10	0.84	41.0	381.8	9.3	9.3	9.3

Segment 3 Average: 8.3

CT Compliance for Giardia Lamblia Cysts by Free Chlorine
Denniston Water Treatment Plant

Month and Year: June 2024

Required Giardia Log Reduction: 0.50

Segment 1 — Pre-chlorination Pipeline and Coagulation Tank

Pipeline Diameter (ft):	1.00
Pipeline Length (ft):	123
Pipeline Volume (gallons):	723
Pipeline Short Circuiting Factor (t10/T):	1.00
Coagulation Tank Diameter (ft):	8.00
Coagulation Tank Length (ft):	30.00
Coagulation Tank Volume (gallons):	11,280
Coagulation Tank Short Circuiting Factor (t10/T):	0.40

Segment 2 — Filters and Filter Effluent Piping

Total Filters Online (0 to 3):	3
# Filters For CT Calculations (0 to 3):	3
Filter Diameter (ft):	8.00
Filter Length (ft):	20.00
Total Volume per Filter (gallons):	7,520
2% Lost Volume for Filter Bottoms (gallons):	-150
Lost Volume for Media- 42" depth, 55% solids (gallons):	-2,370
Net Volume Per Filter (gallons):	5,000
8-inch Pipeline Diameter (ft):	0.67
8-inch Pipeline Length fore Each Filter (ft):	9.00
8-inch Pipeline Volume for Each Filter (gallons):	35
12-inch Pipeline Diameter (ft):	1.00
Pipeline Length (ft):	6.00
12- inch Pipeline Volume (gallons):	70
Filter Short Circuiting Factor (t10/T):	0.75
Pipeline Short Circuiting Factor (t10/T):	1.00

Segment 3 — Treated Water Pipeline

Volume in Gallons:	17,352
Pipeline Short Circuiting Factor (t10/T):	1.00
12-inch Pipeline Diameter (ft):	1.00
Pipeline Length from Plant to Storage Tank (ft):	465
'ipeline Length from Tank to Plant Bypass (ft):	375
Pipeline Length from Plant Bypass to First Service (ft):	2060
Total Pipeline Length Plant to First Service (ft):	2900
8-inch Pipeline Diameter (ft):	0.67
Pipeline from BW bypass to tank inlet	123

Date	Low Tank Level	Tank Volume at Lowest Level	Credited Volume (0.1)	Plant Flow Rate (gpm)	Effective Contact Time "t10" (min)	Temp (°C)	pH (units)	Chlorine Residual "C" (mg/L)	Ct REQUIRED (mg-min/L)	Calculated Ct10 (mg-min/L)	Inactivation Ratio Ct10/ CtREQUIRED	No. Filters Online (N)	No. Filters for Ct	Effective Contact Time "t10" (minutes)	Temp (°C)	pH (units)	Chlorine Residual "C" (mg/L)	Ct REQUIRED (mg-min/L)	Calculated Ct10 (mg-min/L)	Inactivation Ratio Ct10/CtREQ	Effective Contact Time "t10" (min)	Temp (°C)	pH (units)	Chlorine Residual "C" (mg/L)	Ct REQUIRED (mg-min/L)	Calculated Ct10 (mg-min/L)	Inactivation Ratio Ct10/CtREQ	Cumulative Giardia Inactivation Ratio Ct10/CtREQ	Cumulative Giardia Inactivation (log)
	ft	gal	ft																										
1	33.76	1,125,322	112,532	400																	324.7	15.2	8.12	0.88	38.3	285.7	7.5	7.5	7.5
2	35.90	1,196,655	119,665	400																	342.5	14.6	8.10	1.02	40.5	349.4	8.6	8.6	8.6
3	37.66	1,255,321	125,532	400																	357.2	14.9	8.08	1.02	39.4	364.4	9.2	9.2	9.2
4	35.80	1,193,321	119,332	400																	341.7	14.0	7.89	0.92	38.7	314.4	8.1	8.1	8.1
5	36.11	1,203,655	120,365	400																	344.3	15.7	8.14	0.96	37.7	330.5	8.8	8.8	8.8
6	33.84	1,127,989	112,799	300																	433.8	14.3	8.16	1.10	42.7	477.2	11.2	11.2	11.2
7	33.91	1,130,322	113,032	300																	434.6	15.2	8.15	1.08	39.9	469.4	11.8	11.8	11.8
8	32.73	1,090,989	109,099	300																	421.5	15.5	8.10	1.06	38.3	446.8	11.7	11.7	11.7
9																													
10	25.50	849,992	84,999	300																	341.2								
11	25.50	849,992	84,999	300																	341.2	15.0	8.19	1.03	40.7	351.4	8.6	8.6	8.6
12	30.83	1,027,656	102,766	300																	400.4	15.0	8.15	1.00	39.9	400.4	10.0	10.0	10.0
13	32.00	1,066,656	106,666	300																	413.4	15.2	8.23	0.96	40.2	396.9	9.9	9.9	9.9
14																													
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26																													
27	24.65	821,658	82,166	300																	331.7								
28	26.55	884,991	88,499	300																	352.8	16.4	8.27	0.85	36.8	299.9	8.2	8.2	8.2
29	33.37	1,112,322	111,232	300																	428.6	17.2	8.27	0.80	34.5	342.9	9.9	9.9	9.9
30	35.18	1,172,655	117,265	300																	448.7	15.8	8.26	0.98	39.1	439.8	11.3	11.3	11.3

Segment 3 Average: 9.6

CT Compliance for Giardia Lamblia Cysts by Free Chlorine
Denniston Water Treatment Plant

Month and Year: July 2024

Required Giardia Log Reduction: 0.50

Segment 1 — Pre-chlorination Pipeline and Coagulation Tank

Pipeline Diameter (ft):	1.00
Pipeline Length (ft):	123
Pipeline Volume (gallons):	723
Pipeline Short Circuiting Factor (t10/T):	1.00
Coagulation Tank Diameter (ft):	8.00
Coagulation Tank Length (ft):	30.00
Coagulation Tank Volume (gallons):	11,280
Coagulation Tank Short Circuiting Factor (t10/T):	0.40

Segment 2 — Filters and Filter Effluent Piping

Total Filters Online (0 to 3):	3
# Filters For CT Calculations (0 to 3):	3
Filter Diameter (ft):	8.00
Filter Length (ft):	20.00
Total Volume per Filter (gallons):	7,520
2% Lost Volume for Filter Bottoms (gallons):	-150
Lost Volume for Media- 42" depth, 55% solids (gallons):	-2,370
Net Volume Per Filter (gallons):	5,000
8-inch Pipeline Diameter (ft):	0.67
8-inch Pipeline Length fore Each Filter (ft):	9.00
8-inch Pipeline Volume for Each Filter (gallons):	35
12-inch Pipeline Diameter (ft):	1.00
Pipeline Length (ft):	6.00
12- inch Pipeline Volume (gallons):	70
Filter Short Circuiting Factor (t10/T):	0.75
Pipeline Short Circuiting Factor (t10/T):	1.00

Segment 3 — Treated Water Pipeline

Volume in Gallons:	17,352
Pipeline Short Circuiting Factor (t10/T):	1.00
12-inch Pipeline Diameter (ft):	1.00
Pipeline Length from Plant to Storage Tank (ft):	465
'ipeline Length from Tank to Plant Bypass (ft):	375
Pipeline Length from Plant Bypass to First Service (ft):	2060
Total Pipeline Length Plant to First Service (ft):	2900
8-inch Pipeline Diameter (ft):	0.67
Pipeline from BW bypass to tank inlet	123

Date	Low Tank Level	Tank Volume at Lowest Level	Credited Volume (0.1)	Plant Flow Rate (gpm)	Effective Contact Time "t10" (min)	Temp (°C)	pH (units)	Chlorine Residual "C" (mg/L)	Ct REQUIRED (mg-min/L)	Calculated Ct10 (mg-min/L)	Inactivation Ratio Ct10/ CtREQUIRED	No. Filters Online (N)	No. Filters for Ct	Effective Contact Time "t10" (minutes)	Temp (°C)	pH (units)	Chlorine Residual "C" (mg/L)	Ct REQUIRED (mg-min/L)	Calculated Ct10 (mg-min/L)	Inactivation Ratio Ct10/CtREQ	Effective Contact Time "t10" (min)	Temp (°C)	pH (units)	Chlorine Residual "C" (mg/L)	Ct REQUIRED (mg-min/L)	Calculated Ct10 (mg-min/L)	Inactivation Ratio Ct10/CtREQ	Cumulative Giardia Inactivation Ratio Ct10/CtREQ	Cumulative Giardia Inactivation (log)
	ft	gal	ft																										
1	34.15	1,138,322	113,832	300																	437.3	16.1	8.23	1.00	38.0	437.3	11.5	11.5	11.5
2	32.05	1,068,323	106,832	400																	310.5	16.4	8.19	0.96	36.5	298.0	8.2	8.2	8.2
3	34.41	1,146,989	114,699	400																	330.1	16.1	8.13	0.91	36.3	300.4	8.3	8.3	8.3
4	34.49	1,149,655	114,966	300																	441.1	16.7	8.13	0.92	34.8	405.8	11.6	11.6	11.6
5	35.11	1,170,322	117,032	300																	447.9	16.6	8.20	0.85	35.5	380.8	10.7	10.7	10.7
6	34.51	1,150,322	115,032	400																	331.0	18.4	8.19	0.84	31.1	278.0	8.9	8.9	8.9
7	36.79	1,226,321	122,632	400																	350.0	17.5	8.17	0.91	33.3	318.5	9.6	9.6	9.6
8	32.50	1,083,323	108,332	400																	314.2	16.9	8.22	0.94	35.5	295.4	8.3	8.3	8.3
9	33.00	1,099,989	109,999	300																	424.5	17.8	8.27	0.92	33.8	390.5	11.6	11.6	11.6
10	33.00	1,099,989	109,999	300																	424.5	16.6	8.26	0.88	36.4	373.6	10.3	10.3	10.3
11	32.60	1,086,656	108,666	350																	360.1	16.9	8.24	0.89	35.4	320.4	9.0	9.0	9.0
12	35.20	1,173,322	117,332	300																	448.9	18.3	8.20	0.89	31.7	399.6	12.6	12.6	12.6
13	34.00	1,133,322	113,332	300																	435.6	17.4	8.11	0.94	33.1	409.5	12.4	12.4	12.4
14	34.70	1,156,655	115,666	300																	443.4	17.1	8.24	0.90	35.0	399.1	11.4	11.4	11.4
15	35.17	1,172,322	117,232	300																	448.6	16.4	8.23	0.88	36.5	394.8	10.8	10.8	10.8
16	32.88	1,095,989	109,599	400																	317.4	16.1	8.18	0.88	36.7	279.3	7.6	7.6	7.6
17	33.89	1,129,655	112,966	300																	434.4	16.6	8.15	0.92	35.3	399.6	11.3	11.3	11.3
18	34.60	1,153,322	115,332	300																	442.3	17.1	8.20	0.93	34.7	411.3	11.8	11.8	11.8
19	23.64	787,992	78,799	300																	320.5	19.1	8.17	0.87	29.6	278.8	9.4	9.4	9.4
20																													
21																													
22																													
23	25.71	856,991	85,699	300																	343.5								
24	26.78	892,658	89,266	300																	355.4	17.8	8.16	0.69	31.2	245.2	7.9	7.9	7.9
25	32.38	1,079,323	107,932	300																	417.6	17.3	8.23	0.87	34.2	363.3	10.6	10.6	10.6
26	34.02	1,133,989	113,399	400																	326.9	16.9	8.23	0.96	35.7	313.8	8.8	8.8	8.8
27	32.82	1,093,989	109,399	400																	316.9	17.0	8.20	0.94	35.0	297.9	8.5	8.5	8.5
28	33.62	1,120,655	112,066	500																	258.8	16.4	8.24	0.91	36.8	235.5	6.4	6.4	6.4
29	33.76	1,125,322	112,532	400																	324.7	15.7	8.25	0.91	38.8	295.5	7.6	7.6	7.6
30	37.49	1,249,654	124,965	300																	474.4	16.8	8.26	0.99	36.5	469.6	12.9	12.9	12.9
31	35.40	1,179,988	117,999	300																	451.2	16.6	8.23	0.96	36.5	433.1	11.9	11.9	11.9

Segment 3 Average: 10.0

CT Compliance for Giardia Lamblia Cysts by Free Chlorine
Denniston Water Treatment Plant

Month and Year: August 2024

Required Giardia Log Reduction: 0.50

Segment 1 — Pre-chlorination Pipeline and Coagulation Tank

Pipeline Diameter (ft):	1.00
Pipeline Length (ft):	123
Pipeline Volume (gallons):	723
Pipeline Short Circuiting Factor (t10/T):	1.00
Coagulation Tank Diameter (ft):	8.00
Coagulation Tank Length (ft):	30.00
Coagulation Tank Volume (gallons):	11,280
Coagulation Tank Short Circuiting Factor (t10/T):	0.40

Segment 2 — Filters and Filter Effluent Piping

Total Filters Online (0 to 3):	3
# Filters For CT Calculations (0 to 3):	3
Filter Diameter (ft):	8.00
Filter Length (ft):	20.00
Total Volume per Filter (gallons):	7,520
2% Lost Volume for Filter Bottoms (gallons):	-150
Lost Volume for Media- 42" depth, 55% solids (gallons):	-2,370
Net Volume Per Filter (gallons):	5,000
8-inch Pipeline Diameter (ft):	0.67
8-inch Pipeline Length fore Each Filter (ft):	9.00
8-inch Pipeline Volume for Each Filter (gallons):	35
12-inch Pipeline Diameter (ft):	1.00
Pipeline Length (ft):	6.00
12- inch Pipeline Volume (gallons):	70
Filter Short Circuiting Factor (t10/T):	0.75
Pipeline Short Circuiting Factor (t10/T):	1.00

Segment 3 — Treated Water Pipeline

Volume in Gallons:	17,352
Pipeline Short Circuiting Factor (t10/T):	1.00
12-inch Pipeline Diameter (ft):	1.00
Pipeline Length from Plant to Storage Tank (ft):	465
'ipeline Length from Tank to Plant Bypass (ft):	375
Pipeline Length from Plant Bypass to First Service (ft):	2060
Total Pipeline Length Plant to First Service (ft):	2900
8-inch Pipeline Diameter (ft):	0.67
Pipeline from BW bypass to tank inlet	123

Date	Low Tank Level	Tank Volume at Lowest Level	Credited Volume (0.1)	Plant Flow Rate (gpm)	Effective Contact Time "t10" (min)	Temp (°C)	pH (units)	Chlorine Residual "C" (mg/L)	Ct REQUIRED (mg-min/L)	Calculated Ct10 (mg-min/L)	Inactivation Ratio Ct10/ CtREQUIRED	No. Filters Online (N)	No. Filters for Ct	Effective Contact Time "t10" (minutes)	Temp (°C)	pH (units)	Chlorine Residual "C" (mg/L)	Ct REQUIRED (mg-min/L)	Calculated Ct10 (mg-min/L)	Inactivation Ratio Ct10/CtREQ	Effective Contact Time "t10" (min)	Temp (°C)	pH (units)	Chlorine Residual "C" (mg/L)	Ct REQUIRED (mg-min/L)	Calculated Ct10 (mg-min/L)	Inactivation Ratio Ct10/CtREQ	Cumulative Giardia Inactivation Ratio Ct10/CtREQ	Cumulative Giardia Inactivation (log)
	ft	gal	ft																										
1	35.30	1,176,655	117,665	400																	337.5	16.7	8.22	0.91	35.8	307.2	8.6	8.6	8.6
2	37.09	1,236,321	123,632	400																	352.5	16.9	8.22	0.90	35.3	317.2	9.0	9.0	9.0
3	35.02	1,167,322	116,732	400																	335.2	18.1	8.22	0.89	32.4	298.3	9.2	9.2	9.2
4	34.13	1,137,655	113,766	400																	327.8	17.1	8.23	0.89	34.8	291.7	8.4	8.4	8.4
5	35.51	1,183,655	118,365	300																	452.4	16.2	8.25	0.80	36.7	361.9	9.9	9.9	9.9
6	33.68	1,122,655	112,266	300																	432.1	15.9	8.29	0.78	37.8	337.0	8.9	8.9	8.9
7	34.81	1,160,322	116,032	300																	444.6	18.0	8.25	0.72	31.9	320.1	10.0	10.0	10.0
8	35.90	1,196,655	119,665	300																	456.7	16.3	8.22	0.71	35.5	324.3	9.1	9.1	9.1
9	34.86	1,161,988	116,199	400																	333.9	17.3	8.23	0.72	33.3	240.4	7.2	7.2	7.2
10	35.83	1,194,321	119,432	400																	342.0	16.6	8.24	0.71	35.0	242.8	6.9	6.9	6.9
11	35.66	1,188,655	118,865	500																	272.4	16.4	8.23	0.93	36.8	253.4	6.9	6.9	6.9
12	38.07	1,268,987	126,899	400																	360.6	16.0	8.25	0.95	38.2	342.6	9.0	9.0	9.0
13	37.80	1,259,987	125,999	400																	358.4	15.7	8.23	0.94	38.7	336.9	8.7	8.7	8.7
14	36.80	1,226,654	122,665	400																	350.0	16.4	8.25	0.94	37.1	329.0	8.9	8.9	8.9
15	34.06	1,135,322	113,532	300																	436.3	16.3	8.23	0.91	36.9	397.0	10.7	10.7	10.7
16	34.49	1,149,655	114,966	400																	330.8	16.4	8.25	0.97	37.3	320.9	8.6	8.6	8.6
17	32.26	1,075,323	107,532	400																	312.2	17.1	8.26	1.00	35.8	312.2	8.7	8.7	8.7
18	33.41	1,113,656	111,366	400																	321.8	17.1	8.28	1.02	36.1	328.2	9.1	9.1	9.1
19	35.11	1,170,322	117,032	300																	447.9	16.6	8.28	0.89	36.7	398.7	10.9	10.9	10.9
20	33.14	1,104,656	110,466	300																	426.1	16.5	8.20	0.89	36.0	379.2	10.5	10.5	10.5
21	35.16	1,171,988	117,199	400																	336.4	16.8	8.25	0.84	35.5	282.6	8.0	8.0	8.0
22	34.14	1,137,989	113,799	400																	327.9	17.3	8.25	0.87	34.5	285.3	8.3	8.3	8.3
23	30.36	1,011,990	101,199	400																	296.4	17.9	8.24	0.87	33.0	257.8	7.8	7.8	7.8
24	31.59	1,052,989	105,299	400																	306.6	17.5	8.25	0.93	34.3	285.2	8.3	8.3	8.3
25	37.02	1,233,988	123,399	400																	351.9	17.8	8.24	0.87	33.2	306.1	9.2	9.2	9.2
26	38.71	1,290,320	129,032	300																	487.9	16.1	8.22	0.84	36.9	409.9	11.1	11.1	11.1
27	36.24	1,207,988	120,799	400																	345.4	17.0	8.19	0.79	34.0	272.8	8.0	8.0	8.0
28	30.99	1,032,990	103,299	400																	301.6	16.7	8.18	0.72	34.1	217.2	6.4	6.4	6.4
29	30.48	1,015,990	101,599	400																	297.4	16.9	8.25	0.72	34.4	214.1	6.2	6.2	6.2
30	33.14	1,104,656	110,466	300																	426.1	17.0	8.25	0.89	35.3	379.2	10.7	10.7	10.7
31	33.17	1,105,656	110,566	400																	319.8	17.8	8.24	0.88	33.2	281.4	8.5	8.5	8.5

Segment 3 Average: 8.8