

# **Drinking Water Source Assessment**

## **Del Valle Water Treatment Plant Intake on South Bay Aqueduct**

**Source Name – DEL VALLE WTP-RAW-INLET  
Source Number - 0110010-002**

**Zone 7 Water Agency of the  
Alameda County Flood Control and Water  
Conservation District**

**Prepared by  
Archibald & Wallberg Consultants**

**December 2002**

## **INTRODUCTION**

Zone 7 Water Agency of the Alameda County Water Conservation and Flood Control District provides drinking water to about 174,000 customers (approximately 53,000 service connections), mostly through 26 turnouts to four retailer water systems (California Water Service Company, City of Livermore, City of Pleasanton, and Dublin San Ramon Services District) in eastern Alameda County. Zone 7 Water Agency also provides drinking water to 13 direct users, including a local vineyard, hospital, and park. This drinking water source assessment was conducted for Zone 7 Water Agency's Del Valle Water Treatment Plant (WTP) intake on the South Bay Aqueduct (SBA).

The SBA is part of the State Water Project (SWP) system that pumps water from the Sacramento-San Joaquin Delta (Delta) at the Harvey O. Banks Pumping Plant (Banks Pumping Plant). Water flows a short distance down the California Aqueduct to Bethany Reservoir. Bethany Reservoir is essentially a wide spot on the California Aqueduct with a capacity of 5070 acre-feet (AF). Water is pumped into the SBA at the South Bay Pumping Plant on Bethany Reservoir. The first three miles of the SBA are an enclosed pipeline, with a capacity of 330 cubic feet per second (cfs). This is followed by two miles of open canal, a tunnel under Interstate 580, and another two miles of open canal between the tunnel and Patterson Reservoir. Patterson Reservoir is a 100 AF facility adjacent to the SBA that is used to divert a portion of the SBA water to Zone 7 Water Agency's Patterson Pass WTP's intake. Water in the SBA continues to flow seven miles in an open canal to mileage point 16.38. From there the water flows in an enclosed pipeline to the Del Valle WTP intake at mileage point 19.2. At mileage point 18.63, SBA water can be pumped into Lake Del Valle and Lake Del Valle water can be released into the SBA.

The Department of Water Resources (DWR) conducted a detailed sanitary survey of the watershed of the SWP in 2001. This source water assessment is based largely on the information presented in the sanitary survey. The potential contaminant sources in the watershed that the Del Valle WTP is most vulnerable to are identified in this source water assessment. Zone 7 Water Agency is working with the other SBA Contractors to identify potential watershed management practices that could improve water quality and reduce the significance of the potential contaminant sources.

## **ASSESSMENT PROCEDURES**

This source water assessment of the SBA watershed was conducted by Archibald & Wallberg Consultants, under contract to the SBA Contractors. The following sources of information were used:

- California State Water Project Watershed Sanitary Survey Update Report 2001
- Aerial photographs taken by Alameda County Water District in the spring of 2002
- Detailed field survey notes from 1990 Sanitary Survey of the State Water Project
- Interviews with staff from agencies treating SBA water

- Interviews with staff from DWR's Delta Field Division and Operations and Maintenance Division

In addition, a field survey of Bethany Reservoir, the open canal sections of the SBA, and Lake Del Valle was conducted on March 21, 2002.

## **DELINEATION OF PROTECTION ZONES**

The watershed for the Del Valle WTP intake includes the Sacramento River, San Joaquin River, and Delta drainage areas, in addition to the land that drains to the California Aqueduct between the Banks Pumping Plant and Bethany Reservoir, Bethany Reservoir, and the open canal sections of the SBA. When water is released from Lake Del Valle into the SBA, the Del Valle WTP watershed is expanded to include the watershed of the reservoir. Based on the 2001 Sanitary Survey Update, the Department of Health Services (DHS) staff worked with the SBA Contractors to determine the appropriate geographic area to be covered by this source water assessment. It was determined that the source water assessments for the SBA water treatment plant intakes should include Bethany Reservoir, the open canal sections of the SBA, and for the intakes downstream of Lake Del Valle, the Lake Del Valle watershed. Based on this guidance, the following protection zones were established for the watershed draining to the Del Valle WTP intake:

Zone A – This is the zone that has the most potential to impact water quality at the intake of the Del Valle WTP. It includes the land draining to the open canal sections of the SBA upstream of the intake, Bethany Reservoir, the land that drains to Bethany Reservoir that is within 400 feet of the reservoir shoreline, and the land within 400 feet of an ephemeral stream that flows into Bethany Reservoir near the South Bay Pumping Plant. It also includes the area within 2500 feet of the intake on Lake Del Valle and the land within 400 feet of the reservoir shoreline that drains to that area.

Zone B – This zone includes the remainder of the watershed of Bethany Reservoir and the portion of the Lake Del Valle watershed that drains directly to the reservoir that is not included in Zone A.

Zone C – The remainder of the Lake Del Valle watershed that drains to the tributary streams and the SWP watershed are included in this zone. The Delta watershed is treated as a point source input to Bethany Reservoir in Zone A.

## **POSSIBLE CONTAMINATING ACTIVITIES**

The possible contaminating activities (PCAs) in the watershed of the Del Valle WTP intake on the SBA were identified in the 2001 Sanitary Survey Update and were further investigated for this source water assessment. The source of contaminants to the WTP is quite complex due to the fact that water is derived from the Delta and from

Lake Del Valle. In addition, Delta water is stored in Lake Del Valle so water released from Lake Del Valle is at times, a blend of water from the Delta and water from the Lake Del Valle watershed. The Delta is the primary source of water to the Del Valle WTP; however, Zone 7 Water Agency can receive 100 percent Del Valle water, 100 percent Delta water, and any blend of the two. For these reasons, the PCAs in the two watersheds are described separately in Tables 1 and 2. Table 1 lists the PCAs that have been identified in Zones A and B of the South Bay Aqueduct/Bethany Reservoir watershed. Table 2 lists the PCAs in Zones A and B of the Lake Del Valle watershed. The Delta is treated as a point source discharge to Bethany Reservoir in this assessment. The water quality challenges faced at the WTP are described in Table 3. Each of the contaminant sources is qualitatively ranked as being of high, medium, or low significance based on the potential for that contaminant source to contribute to the water quality challenges identified in Table 3. Factors considered in assigning the ranking include the volume of discharge, timing of discharge relative to the timing of water quality problems, proximity of the contaminant source to the WTP intakes, and the types of contaminants present in the discharge. Although there are a number of PCAs in both watersheds, the Delta is the primary source of contaminants to the Del Valle WTP.

## **VULNERABILITY ANALYSIS**

The SBA source water for the Del Valle WTP is most vulnerable to contaminants entering the SBA from the Delta. As shown in Table 3, many of the contaminants, such as pathogens, organic carbon, and nutrients, detected in the water supply originate in the Sacramento and San Joaquin watersheds and the Delta. There are many sources of contaminants, including agricultural drainage, wastewater treatment plant discharges, and urban runoff. Recreational usage of the water also contributes contaminants to the Delta. In addition seawater intrusion contributes salt and bromide to the water supply.

The source water is also vulnerable to cattle grazing in the watersheds of Bethany Reservoir and along the open canal sections of the aqueduct. There are several areas along the aqueduct where drainage from cattle grazing land is discharged directly into the aqueduct in drainage pipes. Cattle have direct access to the western shore of Bethany Reservoir and may be a source of pathogens and other contaminants. The relative amounts or loads of pathogens and other contaminants coming from cattle and runoff from cattle grazing land compared to the amounts coming from the Delta are unknown. The Delta likely supplies the majority of the contaminant loads because it is the primary source of water to the SBA. During storm events runoff from cattle grazing land that enters the SBA and Bethany Reservoir near the South Bay Pumping Plant may also be a significant source of contaminants for short periods of time. Cattle grazing in the watershed near Lake Del Valle may be a significant source of contaminants when water is released from the reservoir to the SBA.

An increasing amount of land along the open canal sections of the SBA downstream from Patterson Reservoir is being converted from grazing land to

vineyards. The drainage from most vineyards is routed over or under the canal but there are some areas where vineyard drainage enters the canal. This may become an increasingly important source of contaminants as more land is converted to vineyards in the future.

**Table 1. Possible Contaminating Activities in Bethany Reservoir and the South Bay Aqueduct Watershed**

<b>Contaminating Activity</b>	<b>Location</b>	<b>Contaminants of Concern</b>	<b>Comments</b>	<b>Significance of Source</b>
Delta	Zone A – Input to Bethany Reservoir & SBA	TOC Bromide Pathogens Nutrients Sediment Algae Pharmaceuticals Personal care products	The Delta is the major source of water to the WTP, however Lake Del Valle is also a source at certain times of the year (see Table 2). The volume of drainage from Bethany Reservoir and open canal watersheds is minor compared to the Delta.	High
Runoff from grazing land	Zones A & B - Bethany Reservoir & open canal sections of SBA	Pathogens TOC Nutrients Sediment	Due to proximity to intake, runoff from grazing land may contribute pathogens and other contaminants during storm events.	Medium
Grazing animals with access to water	Zone A – Bethany Reservoir	Pathogens TOC Nutrients Sediment	Cattle have access to western shore of Bethany Reservoir and have been observed in the water. This allows direct input of animal droppings to the reservoir.	Medium
Runoff from agricultural land, primarily vineyards	Zone A - Open canal sections of SBA downstream of Patterson Resv.	TOC Sediment Nutrients Pesticides	Due to proximity to intake, runoff and irrigation flows may contribute contaminants to SBA. Vineyard acreage is rapidly increasing.	Medium
Roadside drainage from public & farm bridges	Zone A – Open canal sections of SBA	Hazardous materials Pathogens TOC Nutrients	No history of spills from vehicle accidents on bridges. Farm bridges have been improved to eliminate direct inputs from cattle. Runoff during storm events still enters SBA and may affect water quality.	Medium
Body contact recreation	Zone A – Bethany Reservoir	Pathogens	Relative contribution of recreation and other sources is unknown but the Delta is likely the major source.	Low
Non-body contact recreation	Zone A – Bethany Reservoir & in future, open canal sections of SBA	Sediment MTBE & other petroleum products	No evidence that minor amount of boating in Bethany Reservoir is problematic. Impacts of potential trail along SBA unknown and warrant further investigation.	Low
Wild animals	Zone A – Bethany Reservoir & open canal sections	Pathogens	Contribution of wild animals relative to other sources is unknown.	Low
Right-of-way road drainage	Zone A – Open canal sections of SBA	Sediment	Right-of-way is traveled only by DWR and is well maintained.	Low
Pipelines	Zone A – Open canal sections of SBA	Petroleum products	No history of spills from pipelines crossing SBA	Low
Aquatic herbicide use	Zone A – Bethany Reservoir & open canal sections	Copper sulfate Komeen	Copper sulfate is used for algal control in SBA. Komeen is used to control aquatic weeds in Bethany Reservoir.	Low
Fires	Zones A & B – Bethany & SBA watersheds	Sediment	No history of fires. Watershed is accessible for fire suppression if a fire starts.	Low

**Table 2. Possible Contaminating Activities in Lake Del Valle Watershed**

<b>Contaminant Source</b>	<b>Location</b>	<b>Contaminants of Concern</b>	<b>Comment</b>	<b>Significance of Source</b>
Delta	Zone A – Input to Lake Del Valle	TOC Bromide Pathogens Nutrients Sediment Algae Pharmaceuticals Personal care products	Delta water is pumped into Lake Del Valle throughout the summer months to maintain the water level required for recreational usage.	High
Runoff from grazing land	Zones A, B, & C - North, east, south-east shores of lake & Arroyo Valle.	Pathogens TOC Nutrients Sediment	Due to proximity to intake, runoff from grazing land may contribute pathogens and other contaminants during storm events.	Medium
Grazing animals with access to water	Zones A & C – Northeastern shore of lake and Arroyo Valle	Pathogens TOC Nutrients Sediment	Cattle have access to the northeastern shore of the lake and Arroyo Valle. This allows direct input of animal droppings to lake and creek.	Medium
Body contact recreation	Zones A & B -Lake Del Valle	Pathogens	Relative contribution of recreation unknown but the Delta is likely the major source.	Low
Non-body contact recreation	Zones A, B, & C - Lake Del Valle & watershed near lake	Sediment MTBE & petroleum products	MTBE levels have declined following elimination of MTBE fuel at Del Valle marina.	Low
Wastewater treatment plant & sewer lines	Zone B – Near shore of Lake Del Valle	Pathogens Nutrients	No discharge of wastewater into lake. The collection system and treatment facilities have been upgraded to prevent spills	Low
Septic tanks	Zone C – Remote areas of watershed	Pathogens Nutrients	Septic tanks in remote areas of watershed and on large parcels of land. Not known if any are near creeks that drain into lake.	Low
Runoff from recreation areas	Zone B – Near shoreline of lake	Sediment Pathogens	Relatively few acres of watershed devoted to campgrounds and horse camp	Low
Runoff from undeveloped areas of watershed	Zones A, B, & C – Throughout watershed	Sediment TOC	Erodible soils in watershed have resulted in significant amounts of sediment deposited in lake, however lake acts as a sedimentation basin and prevents high turbidity in water entering SBA.	Low
Wild animals	Zones A, B, & C – Throughout watershed	Pathogens	Extensive population in undeveloped portions of watershed. Relative contribution of wild animals unknown.	Low
Herbicide use	Zone B – Recreational areas	Glyphosate Surflan	Minor usage is not problematic.	Low
Mines	Zone C – Remote areas of watershed	Metals	Water quality data do not indicate any problems.	Low
Roadside drainage from public roads	Zones B & C – Lake shoreline and remote areas	Hazardous materials	No history of spills from vehicle accidents.	Low
Fires	Zones A, B, & C – Watershed	Sediment	Fire in the summer of 2001. No significant sediment increase was observed entering Arroyo Valle or Lake Del Valle. Many areas of watershed are inaccessible.	Low

**Table 3. Water Quality Challenges at Del Valle Water Treatment Plant**

<b>Water Quality Challenge</b>	<b>Problem Statement</b>	<b>Major Sources</b>	<b>Other Sources, from Bethany Reservoir and SBA</b>	<b>Other Sources, from Lake Del Valle Watershed</b>
Formation of TTHMs and HAA5s	The relatively high concentrations of TOC in the Delta and Lake Del Valle water, combined with the high concentrations of bromide in Delta water make it difficult to meet TTHM and HAA5 MCLs at Del Valle WTP. Recent usage of ferric chloride as the primary coagulant coupled with more monitoring has reduced formation of TTHM and HAA5 significantly.	Delta Lake Del Valle	Storm runoff from Bethany Reservoir watershed Storm runoff from cattle grazing land and vineyards along SBA	Storm runoff from grazing land Storm runoff from undeveloped portions of watershed
Excessive algal growth	The high concentrations of nutrients, combined with abundant sunshine and warm water temperatures during the spring, summer, and fall months leads to excessive algal growth in the Delta, SBA, and Lake Del Valle. This results in taste and odor problems due to the formation of MIB, geosmin, and other byproducts of algal growth. It also results in daily fluctuations in pH, which can reduce the effectiveness of coagulants and other chemicals. Algae result in shortened filter run times, which can substantially reduce plant production and create difficulties meeting customer demands.	Delta is source of nutrients and algae. Additional algal growth likely occurs in Bethany and SBA. Copper sulfate is used to control algal growth in the SBA.	Algal growth is problematic during spring, summer, and fall months when there is minimal runoff from watersheds of Bethany Reservoir and the open canal sections of the SBA so the watersheds are not a source of algal stimulating nutrients.	Lake Del Valle may be additional source of algae and nutrients when water is released to SBA, primarily during fall months.
Variable and high turbidity	Turbidity is variable and at times increases quickly from about 20 NTU to about 80 NTU, and up to 200 NTU. This creates treatment challenges because operators have to quickly adjust chemical dosages without adequate time to conduct jar tests to accurately determine the appropriate dosage. It also results in lower plant production and creates difficulties meeting customer demands.	Possibly wind induced turbidity from Clifton Court during dry season Storm runoff from the Delta and Bethany watersheds during wet season	Cattle in water at Bethany Reservoir Storm runoff from cattle grazing land and vineyards along SBA Storm runoff from canal roadside drainage	Recreational activities Storm runoff from recreational areas Storm runoff from grazing land Storm runoff from undeveloped land Cattle in the lake
Temperature fluctuations	Daily variability in temperature creates difficulties maintaining the sludge blanket in the superpulsators at Del Valle WTP.	Delta water heats up as it flows through Clifton Court and the shallow open canal sections of SBA	None	None

**Table 3. Water Quality Challenges at Del Valle Water Treatment Plant, cont.**

<b>Water Quality Challenge</b>	<b>Problem Statement</b>	<b>Major Sources</b>	<b>Other Sources, from Bethany Reservoir and SBA</b>	<b>Other Sources, from Lake Del Valle Watershed</b>
Pathogens	The coliform and pathogen data indicate that pathogens are not problematic based on the relatively low levels found in SBA water during routine monitoring with current analytical methods. Levels may be higher during storm events. Improved analytical methods may result in higher levels being detected in the future.	Delta	Storm runoff from Bethany Reservoir watershed Storm runoff from cattle grazing land along SBA Cattle in water at Bethany Reservoir Wild animals	Body contact recreation Storm runoff from cattle grazing land Cattle in water at Lake Del Valle Wild animals
MTBE	Low levels found are not problematic.	Motorized boating in Lake Del Valle (BMPs in place to reduce levels)	Motorized boating in the Delta	None
High TDS concentrations	High TDS concentrations lead to aesthetic problems in finished water. The 1998 Bay-Delta Accord restricted pumping of Delta water during the spring months when TDS concentrations are lowest and shifted pumping to the fall months when TDS concentrations are highest. During drought conditions TDS concentrations increase substantially.	Delta and Lake Del Valle (Lake Del Valle concentrations are similar to Delta concentrations.)	Storm runoff from Bethany Reservoir watershed Storm runoff from areas that drain to open canal sections	Storm runoff from Lake Del Valle watershed
Personal care products and pharmaceuticals	This is an emerging area of concern but there are no data on the concentrations of these chemicals in SBA water.	Wastewater treatment plant discharges in the Delta.		

## **VULNERABILITY SUMMARY**

A sample of the vulnerability summary to be included in the annual consumer confidence report, as required by DHS, is as follows:

An Assessment of the SBA drinking water source was completed for Zone 7 Water Agency of the Alameda County Water Conservation and Flood Control District, (Zone 7 Water Agency). A copy of the complete assessment may be reviewed at the Zone 7 Water Agency office located at 5997 Parkside Drive in Pleasanton. You may request a summary of the assessment be sent to you by contacting Ms. Angela O'Brien at (925) 447-6704 ext. 118.

Many of the contaminants, such as pathogens, organic carbon, and nutrients detected in the SBA water supply originate in the Sacramento and San Joaquin watersheds and the Delta. There are numerous contaminant sources such as agricultural drainage, wastewater treatment plant discharges and urban runoff. Recreational usage of the water also contributes contaminants to the Delta. In addition seawater intrusion contributes salt and bromide to the water supply. The SBA source water is also vulnerable to cattle grazing in the watersheds of Bethany Reservoir, Lake Del Valle and along the open canal sections of the aqueduct. An increasing amount of land along the open canal sections of the SBA is being converted to vineyards and is a developing concern.

Although the SBA water source is considered vulnerable to various possibly contaminating activities, it is important to note that there are multiple barriers for physical removal of contaminants and disinfection of the source water at the WTPs. All drinking water standards are met in the treated water that is delivered to customers in the Zone 7 Water Agency service area.

## **ATTACHMENT A – ASSESSMENT SUMMARY**

The Del Valle Water Treatment Plant (WTP), operated by the Zone 7 Water Agency of the Alameda County Flood Control and Water Conservation District, is located in Alameda County and serves the cities of Pleasanton, Livermore, and Dublin. The drinking water source for the Del Valle WTP is the South Bay Aqueduct, a component of the State Water Project. Sacramento-San Joaquin Delta water is pumped into the South Bay Aqueduct at the South Bay Pumping Plant on Bethany Reservoir, near Byron. In addition, water from Lake Del Valle is released into the South Bay Aqueduct at times. The land uses in the watershed of Bethany Reservoir are cattle grazing and recreation. Cattle grazing and vineyards are the primary uses of land that drains to the open canal sections of the South Bay Aqueduct upstream of the WTP intakes. Much of the Lake Del Valle watershed is undeveloped, however near the lake cattle grazing and recreation are the primary activities.

An assessment of the South Bay Aqueduct drinking water source was conducted by Archibald and Wallberg Consultants. Information used in the assessment includes aerial photographs and sanitary surveys of the State Water Project. In addition, a field survey of the watersheds was conducted in March 2002 and Department of Water Resources staff responsible for maintaining the South Bay Aqueduct were interviewed. A copy of the complete assessment is available for review at Zone 7 Water Agency's office located at 5997 Parkside Drive in Pleasanton.

Many of the contaminants, such as pathogens, organic carbon, and nutrients, detected in the SBA water supply originate in the Sacramento and San Joaquin watersheds and the Delta. There are numerous contaminant sources such as agricultural drainage, wastewater treatment plant discharges and urban runoff. Recreational usage of the water also contributes contaminants to the Delta. In addition seawater intrusion contributes salt and bromide to the water supply.

The SBA water source is also vulnerable to cattle grazing in the watersheds of Bethany Reservoir, Lake Del Valle and along the open canal sections of the aqueduct. Cattle have direct access to the western shore of Bethany Reservoir and the northeastern shore of Lake Del Valle and may be a source of pathogens and other contaminants.

An increasing amount of land along the open canal sections of the South Bay Aqueduct downstream from Patterson Reservoir is being converted from grazing land to vineyards. The drainage from most vineyards is routed over or under the canal but there are some areas where vineyard drainage enters the canal. This may become an increasingly important source of contaminants as more land is converted to vineyards in the future.

Although the SBA water source is considered vulnerable to these activities, it is important to note that there are multiple barriers for physical removal of contaminants

and disinfection of the source water at the Del Valle WTP. All drinking water standards are met in the treated water that is delivered to customers in the Zone 7 Water Agency service area. Zone 7 Water Agency is working with the other South Bay Aqueduct Contractors to identify potential watershed management practices that could improve water quality and reduce the significance of the potential contaminant sources.

## ATTACHMENT B – GPS COORDINATES

### Drinking Water Source Location

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Public Water System Name: Alameda County Flood Control and Water Conservation District,  
Zone 7 Water Agency  
System No: 0110010  
Name of Source: DEL VALLE WTP-RAW-INLET  
Source No.: 0110010-009  
Date: 8/1/02  
Name of person completing form: Elaine Archibald, Archibald & Wallberg Consultants

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**LOCATION OF INTAKE:** (decimal degrees)

Latitude, degrees N: 37.6318173  
Longitude, degrees W: -121.7841742  
Horizontal Datum: NAD27

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**DESCRIPTION:**

Del Valle WTP intake on South Bay Aqueduct.

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**METHOD OF DETERMINING LOCATION:**

Global Positioning System  
Ashtech Reliance SCA-12 Receiver  
Accuracy  $\pm$  6 feet