CHAPTER 4: WATER QUALITY ASSESSMENT

Introduction

This chapter contains a summary of the quality of raw and treated water in the Cottonwood-Otay System Watershed during the period of January 1, 2001, through December 31, 2005. Following the summary there is an evaluation of the system's ability to comply with current standards and to meet anticipated future standards.

The Water Quality Laboratory of the City of San Diego provided monitoring data from Barrett, Morena, and Otay Reservoirs, and the Otay WTP.

Summary of Monitoring Program

Barrett and Morena Reservoirs were sampled near the outlet structure only. Otay Reservoir was sampled near the outlet structure at surface level, and at various outlet gauges. There also were several sampling points within the Cottonwood-Otay Watershed, and sampling points at the influent and effluent of the Otay WTP. See Table 3-4.1 for a summary of the sampling frequency.

The reservoirs and treatment plant influent/effluent were monitored for general physical characteristics, organic and inorganic constituents, and radiation. The watershed sample points are summarized in Table 3-4.2. The reservoirs, the outlet gauges, and the treatment plant influent/effluent are summarized in subsequent tables.

Several general physical characteristics of the source water were monitored, as well as microbiological parameters, and organic and inorganic constituents. Radiological monitoring was conducted only at the Otay Reservoir at surface level and Otay WTP influent, and consisted of tests for gross alpha and gross beta particles, as well as combined Radium-226 and Radium-228, Strontium-90, Tritium, and Uranium.

Description Of Water Quality At Watershed Sampling Points

Table 3-4.2 is a summary of the water quality data for the Cottonwood/Otay Watershed sampling points for the period of January 1, 2001 to December 31, 2005.

Of the twenty sample points in the watershed, eleven were chosen to present, based on the amount of data available. Those having fewer than five data points were deemed to be unrepresentative of a five year period. The Otay Fire of October 2003 and the extremely wet winter the following year prompted increased monitoring of the watershed. Samples have been analyzed for a broader spectrum of trace metals, nutrients, and organic constituents than in the previous five-year update. Microbiological parameters were not monitored.

The Drinking Water Standards used in Table 3-4.2 apply to treated, potable water, and are for reference only.

General Physical

Conductivity and Total Dissolved Solids were monitored. In both cases, the upper SMCL was exceeded by more than twice its value. This is to be expected due to the turbid nature of the samples.

Inorganic Constituents

Trace metals were filtered before analysis and reported as dissolved trace metals. In the months following the Otay Fire, there were high levels of many trace metals, especially aluminum, copper, zinc, and manganese. Nutrient loading was a concern during and after the rainy season of 2004-2005. Nutrient levels increased significantly in the initial post fire rain events. Nutrient levels have decreased from the highs of the initial post fire rain events, but remain higher then the pre-fire levels.

Organic Constituents

The full range of organic herbicides, pesticides, and other contaminants were monitored. None were detected at California Detection Level for Reporting (DLR).

Description Of Source Surface Water Quality At Barrett Reservoir

Table 3-4.3 contains a summary of water quality data for Barrett Reservoir at the surface.

General Physical

The monitored physical parameters of Barrett Reservoir at surface were within the standards for drinking water except for pH, color, and turbidity. Since the reservoir contains raw water, and the standards are for treated, the comparison is for reference only. The parameter pH was a maximum of 9.48, above the SMCL of 6.5 – 8.5. The turbidity reached a maximum 27 ntu, where the MCL is 0.5 ntu. The maximum color reading was 128cu, exceeding the SMCL of 15 cu. Threshold odor was not monitored at surface level.

Inorganic Constituents

There were twenty-eight inorganic constituents measured. The maximum values for Aluminum and Iron exceeded drinking water maximum contaminant levels. Aluminum and Iron average values were below MCL levels. These constituents were at levels easily treated by the water treatment plant.

Organic Constituents

The full range of organic herbicides, pesticides, and other contaminants were monitored. None were detected at California Detection Level for Reporting (DLR).

Description Of Source Surface Water Quality At Morena Reservoir

Table 3-4.4 contains a summary of water quality data for Morena Reservoir at the surface.

General Physical

The monitored physical parameters of Morena Reservoir at surface were within the standards for drinking water except for pH, color, and turbidity. Since the reservoir contains raw water, and the standards are for treated, the comparison is for reference only. The parameter pH was a maximum of 8.89, above the SMCL of 6.5 – 8.5. The turbidity reached a maximum 128 ntu, where the MCL is 0.5 ntu. The maximum color reading was 80cu, exceeding the SMCL of 15 cu. Threshold odor was not monitored at surface level.

Inorganic Constituents

There were twenty-eight inorganic constituents measured. The maximum values for Aluminum and Iron exceeded drinking water maximum contaminant levels. Aluminum and Iron average values were below MCL levels. These constituents were at levels easily treated by the water treatment plant.

Organic Constituents

The full range of organic herbicides, pesticides, and other contaminants were monitored. None were detected at California Detection Level for Reporting (DLR).

Description Of Source Surface Water Quality At Otay Reservoir

Table 3-4.5 contains a summary of water quality data for Otay Reservoir at the Surface.

General Physical

The monitored physical parameters of Otay Reservoir at surface were within the standards for drinking water except for color and turbidity. Since the reservoir contains raw water, and the standards are for treated, the comparison is for reference only. The maximum color reading was 35cu, where the SMCL is 15cu. The turbidity reached a maximum 15.9 ntu, where the MCL is 0.5ntu for 95% of samples. Threshold odor was not monitored at surface level.

Microbiological

Total coliform, E. Coli, and Enterococcus were monitored in order to obtain a background representation of microbiological conditions Total coliforms ranged from <10 /100ml to >24,000 /100ml. The E. Coli range was from <10 /100ml to 652 /100ml, and Enterococcus varied from <1 /100ml to 230 /100ml. Cryptosporidium and Giardia were not monitored.

Radiological

Otay Reservoir was monitored for gross alpha and beta particles, as well as combined Radium-226 and Radium-228, Strontium-90, Tritium, and Uranium. All measurements were well below the maximum contaminant levels.

Inorganic Constituents

There were twenty-eight inorganic constituents measured, The maximum value for Aluminum exceeded the MCL. The average value for aluminum was below the MCL. . Aluminum was easily treated by the water treatment plant.

Organic Constituents

The full range of organic herbicides, pesticides, and other contaminants were monitored. None were detected at California Detection Level for Reporting (DLR).

Description Of Source Water Quality Of Otay Reservoir At Outlet Gauges

Water quality data at four outlet gauges is summarized in Table 3-4.6. Outlet Gauges were sampled when they were 10 feet or greater under the surface. Outlet gauges measured were ga-84, ga-95, ga-106, and ga-117. The numbers refer to the distance (feet) above the streambed.

General Physical

All four outlet gauges measured exceeded the MCL/SMCL for color, turbidity, and threshold odor. There is no apparent correlation between outlet depth and the data.

Microbiological

The outlet gauges were measured for Total Coliform, E. Coli, and Enterococcus. All three gauges had positive readings for all parameters. Enterococcus ranged from <1 /100ml to 200 /100ml. E. Coli varied from <10 /100ml to 460 /100ml. Total Coliforms ranged from 10 /100ml to 28,000/100ml. This is a common occurrence in raw reservoir water.

Organic Constituents

Total Organic Carbon (TOC), Geosmin, and Methyl Isoborneol (MIB) were monitored at all four outlet gauges. TOC is a precursor to Trihalomethanes, and is monitored in source water. TOC ranged from a minimum of 4.58 mg/L at gauge 84, to a maximum of 9.69 mg/L at gauge 117. Geosmin and MIB were monitored for aesthetic reasons only. There are no maximum contaminant levels for these three parameters.

Description Of Source Water Quality At Influent To Otay Wtp

Table 3-4.7 contains a summary of water quality data for the influent to the Otay Water Treatment Plant.

General Physical

The monitored physical parameters of Otay WTP influent were within the standards for drinking water except for turbidity. Since the reservoir contains raw water, and the standards are for treated, the comparison is for reference only. The turbidity reached a maximum 28.9 NTU, where the MCL is 0.5ntu for 95% of samples. High turbidity was easily removed by the treatment plant.

Microbiological

Total coliform was monitored to determine the level of treatment at the Otay treatment plant. High total coliform values required additional treatment within the plant. Total coliforms ranged from <2 /100ml to >16,000 /100ml. Enterococcus was measured once and was non-detected. *Cryptosporidium* and *Giardia* were monitored, and ranged from non-detected for both to 0.1/L for *Cryptosporidium* and 0.2/L for *Giardia*.

Radiological

Otay WTP influent was monitored for gross alpha and beta particles, as well as combined Radium-226 and Radium-228, Strontium-90, Tritium, and Uranium. All measurements were well below the maximum contaminant levels.

<u>Inorganic Constituents</u>

There were twenty-eight inorganic constituents measured, of which only Aluminum exceeded the maximum contaminant level. Aluminum was easily removed in the treatment plant.

Organic Constituents

Otay WTP influent was monitored for both regulated and non-regulated organic substances, including herbicides, pesticides, and synthetic

contaminants. Low levels of Trihalomethanes (THM) were detected. THMs resulted from Otay plant filter wash water being recycled back to Otay reservoir. TOC is a precursor to Trihalomethanes, and is monitored in source water. TOC ranged from a minimum of 1.97 mg/L, to a maximum of 7.02 mg/L. TOC levels are of particular concern in Otay reservoir. High treated water THM levels have occurred when the plant is operating on 100% Otay reservoir water.

Description Of Source Water Quality At Otay Wtp Effluent

Table 3-4.8 contains a summary of water quality data for the Otay Water Treatment Plant effluent.

General Physical

The monitored physical parameters of Otay WTP effluent were within the standards for drinking water except for pH. The pH reached a maximum of 8.75 where the SMCL is 8.5. Plant operations monitor pH every two hours and adjust as necessary to keep the water quality at high levels. The Turbidity MCL was not exceeded at any time.

Microbiological

Total coliform was monitored in order to ascertain compliance with regulations. There were four positive Total coliforms out of 1207 readings. Since there were not more than 5% positive for any one month, the limit was not exceeded. *Cryptosporidium* and *Giardia* were monitored. Both ranged from non-detected to <0.1 /100L.

Inorganic Constituents

There were twenty-eight inorganic constituents measured, of which none exceeded the maximum contaminant levels.

Organic Constituents

Otay WTP effluent was monitored for both regulated and non-regulated organic constituents, including herbicides, pesticides, and synthetic contaminants. None exceeded the MCL. TOC is a precursor to Trihalomethanes(THM) and haloacetic acids(HAA5), and is monitored in effluent water to determine removal rate. TOC ranged from a minimum of 1.60 mg/L, to a maximum of 6.49 mg/L. Total THMs ranged from 27.4 µg/L to 99.9 µg/L. HAA5 ranged form 12.5 ug/L to 34.1ug/L. Geosmin and Methyl Isoborneol (MIB) were monitored to help control taste and odor. All other organics were not detected at California Detection Level for Reporting (DLR).

Evaluation Of Source Water Quality

The sources for the Otay WTP are Barrett, Morena, and Otay Reservoirs, and imported CWA raw water. The influent to Otay WTP varies according to the blends of the different sources. Sources include the Otay watershed system and imported water from San Diego County Water Authority.

High color and turbidity are also to be expected, since the reservoirs are part of a wildlife habitat. These constituents are treatable at the Otay water treatment plant. High TOC in Otay reservoir can result in difficultly in minimizing THM production. Blending of Otay reservoir and imported water resulted the a minimizing of THM production.

Evaluation Of System's Ability To Meet Current Drinking Water Standards

The source water is treated at the Otay WTP to comply with existing drinking water standards. Currently, the system complies with all primary standards. The system also complies with secondary standards, except for one color reading and nine pH readings.

Evaluation Of System's Ability To Meet Current And Anticipated IESWTR And D/Dbp Standards

The Otay WTP has the ability to meet all current IESWTR And D/DBP standards.

Anticipated Regulations

Stage 2 Disinfectants And Disinfection Byproducts Rule (D/DBP) -

Phase I of the Stage 2 D/DBP rule requires that all water supply systems meet "Locational" running annual averages (LRAA) of 120 µg/L for TTHM and 100 µg/L for HAA5 by May 2005. The LRAA for the Otay system all are within these limits, with a system-wide LRAA of 60.7 µg/L for TTHM, and a system-wide maximum of 46.7 for HAA5.

Phase II reduces the LRAA to 80 µg/L for TTHM and 60 µg/L for HAA5 by 2012. Phase II also requires water system suppliers to conduct Initial Distribution System Evaluations (IDSE) to select new monitoring sites that more accurately reflect high DBP locations. This evaluation requires water monitoring to be conducted for one year.

Currently the Otay WTP meets the Phase I standards of the Stage 2 D/DBP rule. For Phase II, the IDSE study will have to be completed to determine the locations of new monitoring sites having the highest TTHM and HAA5 before compliance can be begun. The Otay system currently would not meet LRAA for TTHM levels. Capital improvement to the Otay water treatment plant may be required to meet Stage 2 LRAA THM limits.

Increases in Otay reservoir TOC will hinder the ability to comply with THM regulations.

Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) -

The LT2ESWTR is being developed to provide increased protection against *Cryptosporidium.* This rule incorporates system specific treatment

requirements classified into categories, or 'bins', based on the results of the source water *Cryptosporidium* monitoring. Additional treatment requirements depend on the bin to which the system is assigned. Systems will choose technologies to comply with additional treatment requirements from a 'toolbox' of options.

Currently at the Otay WTP, the system will not require additional treatment, since the average *Cryptosporidium* at Otay influent is < 0.1 /100L.

Arsenic Regulation-

On January 22, 2001, a final rule revised the MCL for Arsenic from 50 µg/L to 10 µg/L. The final rule also clarifies how compliance is demonstrated for many inorganic and organic contaminants in drinking water. The compliance date is five years after the publication of the final rule.

The Otay WTP complies with the new Arsenic regulation because the maximum Arsenic reading for Otay WTP effluent was 2.72 µg/L.

Radionuclides Regulations -

The new Radionuclides Rule went into effect in December 2003. The new rule sets a MCL of 30 mg/L for Uranium and 5 pCi/L for Combined Radium 226/228. It also sets standards of 15 pCi/L for adjusted gross alpha particles and 4 mrem/year for beta particles and photon radioactivity. Compliance with this requirement is assumed if the average concentration of gross beta particle activity is less than 50 pCi/l and if the average concentration of tritium and strontium-90 are less than those listed in Table 3-4.3.

The Otay WTP currently complies with this rule.

Radon Regulation -

The EPA is formulating new regulations concerning Radon. The rule proposes a MCL of 300 pCi/L at the entry point to the distribution system. The EPA is proposing that initial one-year quarterly monitoring should begin three years after publication of the final rule. Radon has not been measured in the Otay system.

Sulfate Regulation -

The current SMCL range for sulfate is 250 – 500 mg/L. The Otay WTP currently complies with this regulation, since the maximum sulfate reading for Otay WTP effluent is 236 mg/L.

Table 3-4.1
RAW WATER QUALITY MONITORING PROGRAM
OTAY TREATMENT PLANT INFLUENT AND EFFLUENT,
AND BARRETT, MORENA, AND OTAY RESERVOIRS,
2001 THROUGH 2005

Parameters	Planned Sampling Frequency[1]		
	Barrett/ Morena	Otay	Otay WTP INF/EFF
General Physical			
Alkalinity	Q	Q	M
Color	Q	Q	D
Conductivity	Q	Q	M
Corrosivity	Q[4]	Q	M
Foaming Agents (MBAS)	NS	NS	A
Hardness as $CaCO_3$	Q	Q	M
Odor - Threshold	NS	NS[7]	D[7]
pH	Q	Q	M
Total Dissolved Solids	Q	Q	M
Turbidity	Q	Q	D
Microbiological			
Total Coliform	NS	W	D
E. Coli	NS	W	D
Enterococcus	NS	W	M
Cryptosporidium**	NS	NS	M
Giardia**	NS	NS	M
Radiological			
Gross Alpha particles	NS	(2)	(2)
Gross Beta particles	NS	(2)	(2)
Combined Radium-226 &	NS	(2)	(2)
Strontium-90	NS	(2)	(2)
Tritium	NS	(2)	(2)
Uranium	NS	(2)	(2)
Inorganic Constituents			
Aluminum	Q	Q	M
Antimony	Q	Q	Q
Arsenic	Q	Q	Q
Barium	Q	Q	Q
Beryllium	Q	Q	Q
Cadmium	Q	Q	Q
Calcium	Q[4]	Q	M
Chloride	Q	Q	M
Chromium	Q	Q	Q
Copper	Q	Q	M
Cyanide	A[3, 4]	Q	Q
Fluoride	Q	Q	M
Iron	Q	Q	M
Lead	Q	Q	M

Table 3-4.1
RAW WATER QUALITY MONITORING PROGRAM
OTAY TREATMENT PLANT INFLUENT AND EFFLUENT,
AND BARRETT, MORENA, AND OTAY RESERVOIRS,
2001 THROUGH 2005

Parameters	Planned Sampling Frequency[1]		
	Barrett/ Morena	Otay	Otay WTP INF/EFF
Magnesium	Q[4]	Q	Q
Manganese	Q	Q	M
Mercury	Q	Q	Q
Nickel	Q	Q	Q
Nitrate**	Q	M	W[3]
Nitrate + Nitrite**	A[3, 4]	Q	M
Nitrite as Nitrogen	Q	Q	W[3]
Phosphate (ortho)**	Q	Q	M
Phosphorus (total)**	Q	Q	M
Potassium	Q	Q	M
Selenium	Q	Q	Q
Silver	Q	Q	Q
Sulfate	Q	Q	M
Thallium	Q	Q	Q
Zinc	Q	Q	M
Perchlorate	Q	Q	Q
Organic Constituents, Regulated			
1,1,1-Trichloroethane	Q	Q	Q
1,1,2-Trichloro-	Q	Q	Q
1,1,2-Trichloroethane	Q	Q	Q
1,1-dichloroethane	Q	Q	Q
1,1-Dichloroethylene	Q	Q	Q
1,2,4-Trichlorobenzene	Q	Q	Q
1,2-dichloroethane	Q	Q	Q
1,2-Dichloropropane	Q	Q	Q
1,4-Dichlorobenzene	Q	Q	Q
2,4,5 TP	Q	Q	Q
2,4-D	Q	Q	Q
Alachlor	Q	Q	Q
Atrazine	Q	Q	Q
Bentazon	Q	Q	Q
Benzene	Q	Q	Q
Benzo(a)pyrene	Q	Q	Q
Bromodichloromethane	Q	Q	Q[6]
Bromoform	Q	Q	Q[6]
Carbofuran	Q	Q	Q
Chloramine	Q	Q	Q
Chlordane	Q	Q	Q
Chlorine	Q	Q	Q

Table 3-4.1 RAW WATER QUALITY MONITORING PROGRAM OTAY TREATMENT PLANT INFLUENT AND EFFLUENT, AND BARRETT, MORENA, AND OTAY RESERVOIRS, 2001 THROUGH 2005			
Parameters	Planned Sampling Frequency[1]		
	Barrett/ Morena	Otay	Otay WTP INF/EFF
cis-1,2-Dichloroethylene	Q	Q	Q
Dalapon	Q	Q	Q
Di(2-ethylhexyl) adipate	Q	Q	Q
Di(2-ethylhexyl) pthalate	Q	Q	Q
Dibromochloromethane	Q	Q	Q[6]
Dibromochloropropane	Q	Q	Q
Dichloroacetic acid	Q	Q	Q
Dichloromethane	Q	Q	Q
Dinoseb	Q	Q	Q
Diquat	Q	NS	Q
Endrin	Q	Q	Q
Ethylbenzene	Q	Q	Q
Glyphosate	Q	Q	Q
Haloacetic acids (HAA5) (five)	Q	Q	Q
Heptachlor	Q	Q	Q
Heptachlor epoxide	Q	Q	Q
Hexachlorobenzene	Q	Q	Q
Hexachlorocyclopentadiene	Q	Q	Q
Lindane	Q	Q	Q
Methoxychlor	Q	Q	Q
Methyl tert-Butyl Ether (MTBE)	Q	Q	Q
Molinate	Q	Q	Q
Monochlorobenzene	Q	Q	Q
o-Dichlorobenzene	Q	Q	Q
Oxamyl	Q	Q	Q
Pentachlorophenol	Q	Q	Q
Picloram	Q	Q	Q
Polychlorinated biphenyls	Q	Q	Q
Simazine	Q	Q	Q
Styrene	Q	Q	Q
Tetrachloroethylene	Q	Q	Q
Thiobencarb	Q	Q	Q
Toluene	Q	Q	Q
Total Organic Carbon (TOC)	M	M	W[6]
Total Trihalomethanes (TTHM)	Q	Q	W[6]
Toxaphene	Q	Q	Q
trans-1,2-Dichloroethylene	Q	Q	Q
Trichloroacetic acid	Q	Q	Q
Trichloroethylene	Q	Q	Q
Trichlorofluoromethane	Q	Q	Q
Vinyl chloride	Q	Q	Q
Xylenes	Q	Q	Q

Table 3-4.1
RAW WATER QUALITY MONITORING PROGRAM
OTAY TREATMENT PLANT INFLUENT AND EFFLUENT,
AND BARRETT, MORENA, AND OTAY RESERVOIRS,
2001 THROUGH 2005

Parameters	Planned Sampling Frequency[1]		
	Barrett/ Morena	Otay	Otay WTP INF/EFF
Organic Constituents, Unregulated			
Ethyl-tert-Butyl Ether (ETBE)	Q	Q	Q
t-Amyl-methyl ether (TAME)	Q	Q	Q
1,1,1,2-Tetrachloroethane	Q	Q	Q
1,1-Dichloropropene	Q	Q	Q
1,2,3-Trichlorobenzene	Q	Q	Q
1,2,3-Trichloropropane (TCP)	A[3]	A[3]	Q[6]
1,2,4-Trimethylbenzene	Q	Q	Q
1,3,5-Trimethylbenzene	Q	Q	Q
1,3-Dichlorobenzene	Q	Q	Q
1,3-Dichloropropane	Q	Q	Q
2,2-Dichloropropane	Q	Q	Q
3-Hydroxycarbofuran	Q	Q	Q
Aldicarb	Q	Q	Q
Aldicarb sulfone	Q	Q	Q
Aldicarb sulfoxide	Q	Q	Q
Aldrin	Q	Q	Q
Bromacil	A	A	A
Bromobenzene	Q	Q	Q
Bromochloromethane	Q	Q	Q
Bromomethane	Q	Q	Q
Butachlor	A	A	A
Carbaryl	Q	Q	Q
Chlorobenzene	Q	Q	Q
Chloroethane	Q	Q	Q
Chloromethane	Q	Q	Q
Dibromomethane	Q	Q	Q
Dicamba	Q	Q	Q
Dichlorodifluoromethane	Q	Q	Q
Dieldrin	Q	Q	Q
Geosmin	M[3]	M[3]	M[5]
Hexachlorobutadiene	Q	Q	Q
Isopropylbenzene	Q	Q	Q
Methomyl	Q	Q	Q
Methyl-isoborneol (MIB)	M[3]	M[3]	M[5]
Metolachlor	A	A	A
Metribuzin	A	A	A
Napthalene	Q	Q	Q
n-Butylbenzene	Q	Q	Q
n-Propylbenzene	Q	Q	Q
Prometryn	A	A	A
Propachlor	Q	Q	Q

Table 3-4.1
RAW WATER QUALITY MONITORING PROGRAM
OTAY TREATMENT PLANT INFLUENT AND EFFLUENT,
AND BARRETT, MORENA, AND OTAY RESERVOIRS,
2001 THROUGH 2005

Parameters	Planned Sampling Frequency[1]		
	Barrett/ Morena	Otay	Otay WTP INF/EFF
sec-Butylbenzene	Q	Q	Q
tert-Butylbenzene	Q	Q	Q

SAMPLING FREQUENCY DESIGNATION
D: Daily
W: Weekly
M: Monthly
Q: Quarterly
A: Annually
NS: Not Sampled

(1) Samples may be taken but not reportable due to instrumentation problems or quality control.
(2) Sample frequency is every four years. The data used in this report was obtained during 2002.
(3) Samples taken twice per month (M^3), twice per week (W^3), or twice annually (A^3).
(4) Sampled annually at Morena Reservoir
(5) Sampled weekly at plant influent and twice weekly at plant effluent.
(6) Plant effluent was sampled more frequently than plant influent for TOC and disinfection byproducts.
(7) Sampled at plant effluent and outlet gauges only.

NOTE:
** Denotes the start of a new parameter since the 2000 Sanitary Survey was completed.
Sampling frequency represents current monitoring schedule as of January 2001.

Table 3-4.2
SUMMARY OF RAW WATER QUALITY
COTTONWOOD-OTAY WATERSHED[1] 2001 - 2005

Parameters	Units	DLR/ MDL	Drinking Water Standards[2] MCL	SMCL	No. of Samples	Raw Water quality MIN	MAX	MEAN	MEDIAN
General Physical									
Conductivity	µS/cm			900-1600	179	148	4920	774	669
Total Dissolved Solids	mg/L	10		500-1000	293	183	2750	461	400
Inorganic Constituents[3]									
Aluminum	µg/L	50	100	200	25	nd	1250	253	150
Antimony	µg/L	6	6		29	nd	nd	nd	nd
Arsenic	µg/L	2	10		29	nd	9.18	nd	nd
Barium	µg/L	100	1000		14	nd	457	nd	nd
Beryllium	µg/L	1	4		13	nd	nd	nd	nd
Cadmium	µg/L	1	5		29	nd	nd	nd	nd
Chromium	µg/L	10	50		27	nd	nd	nd	nd
Copper	µg/L	50	1300	1000	29	nd	150	nd	nd
Lead	µg/L	5	1.5		29	nd	2.78	nd	nd
Manganese	µg/L	20		50	28	nd	1430	183.0	65.1
Selenium	µg/L	5	50		28	nd	9.65	nd	nd
Silver	µg/L	10		100	16	3.82	9.65	6.74	6.74
Sulfate	mg/L	6.25		250-500	72	20.9	319	55.7	43.3
Thallium	µg/L	1	2		18	nd	nd	nd	nd
Zinc	µg/L	50		5000	16	nd	nd	nd	nd
Total Nitrogen	mg/L	0.4	1		28	0.189	9.56	1.73	1.01
Phosphorus	mg/L	0.0781			140	0.042	0.746	0.144	0.125
Phosphate (ortho)	mg/L	0.2			141	0.101	3.16	0.473	0.300
Organic Constituents, Regulated[3]									
1,1,1-Trichloroethane	µg/L	0.5	200		65	nd	nd	nd	nd
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	10	1200		65	nd	nd	nd	nd
1,1,2-Trichloroethane	µg/L	0.5	5		65	nd	nd	nd	nd
1,1-Dichloroethane	µg/L	0.5	5		65	nd	nd	nd	nd
1,1-Dichloroethylene	µg/L	0.5	6		65	nd	nd	nd	nd
1,2,4-Trichlorobenzene	µg/L	0.5	70		65	nd	nd	nd	nd
1,2-dichloroethane	µg/L	0.5	.5		65	nd	nd	nd	nd
1,2-Dichloropropane	µg/L	0.5	5		65	nd	nd	nd	nd
1,4-Dichlorobenzene	µg/L	0.5	5		65	nd	nd	nd	nd
Alachlor	µg/L	1	2		50	nd	nd	nd	nd
Atrazine	µg/L	1	3		52	nd	nd	nd	nd
Benzene	µg/L	0.5	1		65	nd	nd	nd	nd
Benzo(a)pyrene	µg/L	0.1	0.2		43	nd	nd	nd	nd
Bromodichloromethane	µg/L	0.5			65	nd	nd	nd	nd
Bromoform	µg/L	0.5			65	nd	nd	nd	nd
Carbofuran	µg/L	5	18		58	nd	nd	nd	nd
Chlordane	µg/L	0.1	0.1		57	nd	nd	nd	nd
Chloroform	µg/L	0.5			65	nd	nd	nd	nd
cis-1,2-Dichloroethylene	µg/L	0.5	6		65	nd	nd	nd	nd
Di(2-ethylhexyl) adipate	µg/L	5	400		46	nd	nd	nd	nd
Di(2-ethylhexyl) pthalate	µg/L	3	4		42	nd	nd	nd	nd
Dibromochloromethane	µg/L	0.5			65	nd	nd	nd	nd
Dichloromethane (methylene chloride)	µg/L	0.1	5		65	nd	nd	nd	nd
Endrin	µg/L	0.1	2		62	nd	nd	nd	nd
Ethylbenzene	µg/L	0.5	700		65	nd	nd	nd	nd
Heptachlor	µg/L	0.01	.01		63	nd	nd	nd	nd
Heptachlor epoxide	µg/L	0.01	.01		63	nd	nd	nd	nd
Hexachlorobenzene	µg/L	0.05	1		63	nd	nd	nd	nd
Hexachlorocyclopentadiene	µg/L	1	50		61	nd	nd	nd	nd
Lindane	µg/L	0.2	0.2		57	nd	nd	nd	nd
Methoxychlor	µg/L	10	40		62	nd	nd	nd	nd
Methyl t-Butyl Ether (MTBE)	µg/L	3	13	5	65	nd	nd	nd	nd
Molinate	µg/L	2	20		8	nd	nd	nd	nd
Monochlorobenzene	µg/L	0.5	70		65	nd	nd	nd	nd

Table 3-4.2
SUMMARY OF RAW WATER QUALITY
COTTONWOOD-OTAY WATERSHED[1] 2001 - 2005

Parameters	Units	DLR/ MDL	Drinking Water Standards[2] MCL	SMCL	No. of Samples	Raw Water quality MIN	MAX	MEAN	MEDIAN
o-Dichlorobenzene	µg/L	0.5	600		65	nd	nd	nd	nd
Oxamyl	µg/L	20	200		58	nd	nd	nd	nd
Polychlorinated biphenyls (PCBs)	µg/L	0.5	0.5		36	nd	nd	nd	nd
Simazine	µg/L	1	4		38	nd	nd	nd	nd
Styrene	µg/L	0.5	100		65	nd	nd	nd	nd
Tetrachloroethylene	µg/L	0.5	5		65	nd	nd	nd	nd
Toluene	µg/L	0.5	150		65	nd	nd	nd	nd
Toxaphene	µg/L	1	3		57	nd	nd	nd	nd
Trichlorofluoromethane	µg/L	0.5	5		65	nd	nd	nd	nd
Vinyl chloride	µg/L	0.5	0.5		65	nd	nd	nd	nd
Xylenes	µg/L	0.5	1750		65	nd	nd	nd	nd
Organic Constituents, Unregulated									
Ethyl-t-Butyl Ether (ETBE)	µg/L	0.3			65	nd	nd	nd	nd
t-Amyl-methyl ether (TAME)	µg/L	0.2			65	nd	nd	nd	nd
1,1,1,2-Tetrachloroethane	µg/L	0.5			65	nd	nd	nd	nd
1,1-Dichloropropene	µg/L	0.5			65	nd	nd	nd	nd
1,2,3-Trichlorobenzene	µg/L	0.5			65	nd	nd	nd	nd
1,2,3-Trichloropropane (TCP)	µg/L	0.5			40	nd	nd	nd	nd
1,2,4-Trimethylbenzene	µg/L	0.2			65	nd	nd	nd	nd
1,3,5-Trimethylbenzene	µg/L	0.2			65	nd	nd	nd	nd
1,3-Dichlorobenzene	µg/L	0.5			65	nd	nd	nd	nd
1,3-Dichloropropane	µg/L	0.5			65	nd	nd	nd	nd
2,2-Dichloropropane	µg/L	0.5			65	nd	nd	nd	nd
3-Hydroxycarbofuran	µg/L	3			65	nd	nd	nd	nd
Aldicarb	µg/L	3			58	nd	nd	nd	nd
Aldicarb sulfone	µg/L	4			58	nd	nd	nd	nd
Aldicarb sulfoxide	µg/L	3			55	nd	nd	nd	nd
Aldrin	µg/L	0.075			63	nd	nd	nd	nd
Bromobenzene	µg/L	0.5			65	nd	nd	nd	nd
Bromochloromethane	µg/L	0.5			65	nd	nd	nd	nd
Bromomethane	µg/L	0.5			65	nd	nd	nd	nd
Carbaryl	µg/L	5			58	nd	nd	nd	nd
Chlorobenzene	µg/L	0.5			65	nd	nd	nd	nd
Chloroethane	µg/L	0.5			65	nd	nd	nd	nd
Chloromethane	µg/L	0.5			65	nd	nd	nd	nd
Dibromomethane	µg/L	0.5			65	nd	nd	nd	nd
Dichlorodifluoromethane	µg/L	1			65	nd	nd	nd	nd
Dieldrin	µg/L	0.02			60	nd	nd	nd	nd
Hexachlorobutadiene	µg/L	0.5			65	nd	nd	nd	nd
Isopropylbenzene	µg/L	0.5			65	nd	nd	nd	nd
Napthalene	µg/L	0.5			70	nd	nd	nd	nd
n-Butylbenzene	µg/L	0.5			65	nd	nd	nd	nd
tert-Butylbenzene	µg/L	0.5			65	nd	nd	nd	nd

NOTES:

* The State of California DLR values are used when available. Parameters without DLR values were reported as MDL levels.

** The acceptance criteria in this table apply to finished, potable water, and are for reference only.

(1) The sampling points summarized are: CWD9, KTC4, KTC7, LAP4, PVC1, PVC5, DUL0, DUL1A, JAM4, and UOR1.

(2) State MCL and MCLG values may be more stringent then federal standards for treated water.

(3) Trace metal samples were filtered before analysis. The results reflect dissolved trace metals.

nd: non-detected at State of California DLR

Table 3-4.3
SUMMARY OF RAW WATER QUALITY**
BARRETT RESERVOIR @ SURFACE 2001 - 2005

Parameters	Units	DLR*/ MDL	Drinking Water Standards[1]		No. of Samples	Raw Water quality			
			MCL	SMCL		MIN	MAX	MEAN	MEDIAN
General Physical									
Alkalinity	mg/L	2			20	122	240	208	222
Color	cu	1		15	19	13	128	37.4	28.0
Conductivity	µS/cm			900-1600	20	498	965	791	784
Corrosivity[3]	--			non-corrosive	16	0.5	1.85	1.2	1.28
Hardness as $CaCO_3$	mg/L	2			21	138	236	193	194
pH	pH			6.5-8.5	19	8.00	9.48	8.70	8.69
Total Dissolved Solids	mg/L	10		500-1000	18	308	491	429	426
Turbidity[2]	NTU	0.07	0.5	5	18	1.05	27.0	5.04	3.14
Inorganic Constituents[4]									
Aluminum	µg/L	50	100	200	20	nd	109	nd	nd
Antimony	µg/L	6	6		21	nd	nd	nd	nd
Arsenic	µg/L	2	10		21	nd	3.59	2.1	2.46
Barium	µg/L	100	1000		21	nd	nd	nd	nd
Beryllium	µg/L	1	4		21	nd	nd	nd	nd
Cadmium	µg/L	1	5		21	nd	nd	nd	nd
Calcium	mg/L	5			19	25.7	70	46.7	42.4
Chloride	mg/L	6.5		250-500	18	48.4	110	79	79.3
Chromium	µg/L	10	50		21	nd	nd	nd	nd
Copper	µg/L	50	1300	1000	21	nd	nd	nd	nd
Cyanide	µg/L	100	200		11	nd	nd	nd	nd
Fluoride	mg/L	0.1	2		20	0.239	0.597	0.486	0.535
Iron	µg/L	100		300	21	nd	562	nd	nd
Lead	µg/L	5	1.5		21	nd	nd	nd	nd
Magnesium	mg/L	3			19	9.10	27.8	18.0	17.7
Manganese	µg/L	20		50	21	nd	299	57.6	42.3
Mercury	µg/L	1	2		20	nd	nd	nd	nd
Nickel	µg/L	10	100		21	nd	nd	nd	nd
Nitrate	mg/L	2	45		39	nd	2.41	nd	nd
Nitrate + Nitrite	mg/L		10		12	nd	2.51	0.320	0.139
Nitrite as Nitrogen	mg/L	0.4	1		24	nd	nd	nd	nd
Potassium	mg/L	0.5			21	3.34	8.60	5.54	5.55
Selenium	µg/L	5	50		21	nd	nd	nd	nd
Silver	µg/L	10		100	21	nd	nd	nd	nd
Sulfate	mg/L	6.25		250-500	19	32.1	53.6	41.9	41.6
Thallium	µg/L	1	2		21	nd	nd	nd	nd
Zinc	µg/L	50		5000	20	nd	nd	nd	nd
Perchlorate	µg/L	4			24	nd	6.95	nd	nd
Organic Constituents, Regulated									
1,1,1-Trichloroethane	µg/L	0.5	200		19	nd	nd	nd	nd
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	10	1200		19	nd	nd	nd	nd
1,1,2-Trichloroethane	µg/L	0.5	5		19	nd	nd	nd	nd
1,1-Dichloroethane	µg/L	0.5	5		19	nd	nd	nd	nd
1,1-Dichloroethylene	µg/L	0.5	6		19	nd	nd	nd	nd
1,2,4-Trichlorobenzene	µg/L	0.5	70		19	nd	nd	nd	nd
1,2-dichloroethane	µg/L	0.5	.5		19	nd	nd	nd	nd
1,2-Dichloropropane	µg/L	0.5	5		19	nd	nd	nd	nd
1,4-Dichlorobenzene	µg/L	0.5	5		19	nd	nd	nd	nd
2,4,5 TP	µg/L	1	50		18	nd	nd	nd	nd
2,4-D	µg/L	10	70		18	nd	nd	nd	nd
Alachlor	µg/L	1	2		20	nd	nd	nd	nd
Atrazine	µg/L	1	3		20	nd	nd	nd	nd
Bentazon	µg/L	2	18		16	nd	nd	nd	nd
Benzene	µg/L	0.5	1		19	nd	nd	nd	nd
Benzo(a)pyrene	µg/L	0.1	.2		14	nd	nd	nd	nd
Bromodichloromethane	µg/L	0.5			19	nd	nd	nd	nd
Bromoform	µg/L	0.5			19	nd	nd	nd	nd

Table 3-4.3
SUMMARY OF RAW WATER QUALITY**
BARRETT RESERVOIR @ SURFACE 2001 - 2005

Parameters	Units	DLR*/ MDL	Drinking Water Standards[1]		No. of Samples	Raw Water quality			
			MCL	SMCL		MIN	MAX	MEAN	MEDIAN
Carbofuran	µg/L	5	18		17	nd	nd	nd	nd
Chlordane	µg/L	0.1	.1		20	nd	nd	nd	nd
Chloroform	µg/L	0.5			19	nd	nd	nd	nd
cis-1,2-Dichloroethylene	µg/L	0.5	6		19	nd	nd	nd	nd
Di(2-ethylhexyl) adipate	µg/L	5	400		13	nd	nd	nd	nd
Di(2-ethylhexyl) pthalate	µg/L	3	4		13	nd	nd	nd	nd
Dibromochloromethane	µg/L	0.5			21	nd	nd	nd	nd
Dichloromethane (methylene chloride)	µg/L	0.1	5		19	nd	nd	nd	nd
Dinoseb	µg/L	0.5	7		17	nd	nd	nd	nd
Diquat	µg/L	4	20		33	nd	nd	nd	nd
Endrin	µg/L	0.1	2		19	nd	nd	nd	nd
Ethylbenzene	µg/L	0.5	700		21	nd	nd	nd	nd
Glyphosate	µg/L	25	700		17	nd	nd	nd	nd
Heptachlor	µg/L	0.01	.01		20	nd	nd	nd	nd
Heptachlor epoxide	µg/L	0.01	.01		21	nd	nd	nd	nd
Hexachlorobenzene	µg/L	0.05	1		34	nd	nd	nd	nd
Hexachlorocyclopentadiene	µg/L	1	50		33	nd	nd	nd	nd
Lindane	µg/L	0.2	.2		20	nd	nd	nd	nd
Methoxychlor	µg/L	10	40		34	nd	nd	nd	nd
Methyl t-Butyl Ether (MTBE)	µg/L	3	13	5	19	nd	nd	nd	nd
Molinate	µg/L	2	20		10	nd	nd	nd	nd
Monochlorobenzene	µg/L	0.5	70		19	nd	nd	nd	nd
o-Dichlorobenzene	µg/L	0.5	600		19	nd	nd	nd	nd
Oxamyl	µg/L	20	200		17	nd	nd	nd	nd
Pentachlorophenol	µg/L	0.2	1		17	nd	nd	nd	nd
Picloram	µg/L	1	500		17	nd	nd	nd	nd
Polychlorinated biphenyls (PCBs)	µg/L	0.5	.5		16	nd	nd	nd	nd
Simazine	µg/L	1	4		16	nd	nd	nd	nd
Styrene	µg/L	0.5	100		19	nd	nd	nd	nd
Tetrachloroethylene	µg/L	0.5	5		19	nd	nd	nd	nd
Thiobencarb	µg/L		70	1	18	nd	nd	nd	nd
Toluene	µg/L	0.5	150		19	nd	nd	nd	nd
Total Organic Carbon (TOC)	mg/L	0.5			12	9.62	14.6	13.0	13.1
Toxaphene	µg/L	1	3		20	nd	nd	nd	nd
trans-1,2-Dichloroethylene	µg/L	0.5	10		19	nd	nd	nd	nd
Trichloroethylene	µg/L	0.5	5		19	nd	nd	nd	nd
Trichlorofluoromethane	µg/L	5	150		19	nd	nd	nd	nd
Vinyl chloride	µg/L	0.5	.5		19	nd	nd	nd	nd
Xylenes	µg/L	0.5	1750		19	nd	nd	nd	nd
Organic Constituents, Unregulated									
Ethyl-t-Butyl Ether(ETBE)	µg/L	0.3			19	nd	nd	nd	nd
t-Amyl-methyl ether(TAME)	µg/L	0.2			19	nd	nd	nd	nd
1,1,1,2-Tetrachloroethane	µg/L	0.5			19	nd	nd	nd	nd
1,1-Dichloropropene	µg/L	0.5			19	nd	nd	nd	nd
1,2,3-Trichlorobenzene	µg/L	0.5			19	nd	nd	nd	nd
1,2,3-Trichloropropane (TCP)	µg/L	0.5			10	nd	nd	nd	nd
1,2,4-Trimethylbenzene	µg/L	0.2			19	nd	nd	nd	nd
1,3,5-Trimethylbenzene	µg/L	0.2			19	nd	nd	nd	nd
1,3-Dichlorobenzene	µg/L	0.5			19	nd	nd	nd	nd
1,3-Dichloropropane	µg/L	0.5			19	nd	nd	nd	nd
2,2-Dichloropropane	µg/L	0.5			19	nd	nd	nd	nd
3-Hydroxycarbofuran	µg/L	3			17	nd	nd	nd	nd
Aldicarb	µg/L	3			16	nd	nd	nd	nd
Aldicarb sulfone	µg/L	4			17	nd	nd	nd	nd
Aldicarb sulfoxide	µg/L	3			17	nd	nd	nd	nd
Aldrin	µg/L	0.075			21	nd	nd	nd	nd
Bromacil	µg/L	10			5	nd	nd	nd	nd
Bromobenzene	µg/L	0.5			19	nd	nd	nd	nd

Table 3-4.3
SUMMARY OF RAW WATER QUALITY**
BARRETT RESERVOIR @ SURFACE 2001 - 2005

Parameters	Units	DLR*/ MDL	Drinking Water Standards[1]		No. of Samples	Raw Water quality			
			MCL	SMCL		MIN	MAX	MEAN	MEDIAN
Bromochloromethane	µg/L	0.5			19	nd	nd	nd	nd
Bromomethane	µg/L	0.5			19	nd	nd	nd	nd
Butachlor	µg/L	0.38			5	nd	nd	nd	nd
Carbaryl	µg/L	5			17	nd	nd	nd	nd
Chlorobenzene	µg/L	0.5			19	nd	nd	nd	nd
Chloroethane	µg/L	0.5			19	nd	nd	nd	nd
Chloromethane	µg/L	0.5			19	nd	nd	nd	nd
Dibromomethane	µg/L	0.5			19	nd	nd	nd	nd
Dicamba	µg/L	15			18	nd	nd	nd	nd
Dichlorodifluoromethane	µg/L	1			19	nd	nd	nd	nd
Dieldrin	µg/L	0.02			20	nd	nd	nd	nd
Hexachlorobutadiene	µg/L	0.5			19	nd	nd	nd	nd
Isopropylbenzene	µg/L	0.5			19	nd	nd	nd	nd
Methomyl	µg/L	2			17	nd	nd	nd	nd
Metolachlor	µg/L	10			5	nd	nd	nd	nd
Metribuzin	µg/L	0.5			5	nd	nd	nd	nd
Napthalene	µg/L	0.5			34	nd	nd	nd	nd
n-Butylbenzene	µg/L	0.5			19	nd	nd	nd	nd
n-Propylbenzene	µg/L	0.5			19	nd	nd	nd	nd
o-Chlorotoluene	mg/L	0.5			19	nd	nd	nd	nd
Prometryn	µg/L	2			5	nd	nd	nd	nd
Propachlor	µg/L	0.1			35	nd	nd	nd	nd
sec-Butylbenzene	µg/L	0.5			19	nd	nd	nd	nd
tert-Butylbenzene	µg/L	0.5			19	nd	nd	nd	nd

NOTES:

* The State of California DLR values are used when available. Parameters without DLR values were reported ad MDL levels.

** The acceptance criteria in this table apply to finished, potable water, and are for reference only.

(1) State MCL and MCLG values may be more stringent then federal standards for treated water.

(2) Turbidity of treated water is not to exceed 0.3 NTU 95% of the time.

(3) Based on the Langelier Index. A positive quantity indicates non-corrosive tendencies. A negative quantity indicates corrosive tendencies.

(4) Trace metal samples were filtered before analysis. Results reflect the dissolved trace metal fraction.

nd: non-detected at State DLR or MDL if DLR not Available

Table 3-4.4
SUMMARY OF RAW WATER QUALITY**
MORENA RESERVOIR @ SURFACE 2001 - 2005

Parameters	Units	DLR*/ MDL	Drinking Water Standards[1] MCL	Drinking Water Standards[1] SMCL	No. of Samples	Raw Water Quality MIN	Raw Water Quality MAX	Raw Water Quality MEAN	Raw Water Quality MEDIAN
General Physical									
Alkalinity	mg/L	2			17	180	326	250	245
Color	cu	1		15	16	14.5	80	34	31.0
Conductivity	µS/cm			900-1600	17	687	1390	958	898
Corrosivity[3]	--			non-corrosive	5	0.39	1.49	1.1	1.27
Hardness as $CaCO_3$	mg/L	2			18	166	298	237	243
pH	pH			6.5-8.5	15	7.94	8.89	8.42	8.41
Total Dissolved Solids	mg/L	10		500-1000	16	373	712	502	461
Turbidity[2]	NTU	0.07	0.5	5	17	1.48	128	14.6	5.28
Inorganic Constituents[4]									
Aluminum	µg/L	50	100	200	20	nd	221	87.1	75.9
Antimony	µg/L	6	6		20	nd	nd	nd	nd
Arsenic	µg/L	2	10		20	2.65	6.85	4.25	4.06
Barium	µg/L	100	1000		20	nd	nd	nd	nd
Beryllium	µg/L	1	4		19	nd	nd	nd	nd
Cadmium	µg/L	1	5		20	nd	nd	nd	nd
Calcium	mg/L	5			5	37.4	79.2	52.3	51.2
Chloride	mg/L	6.5		250-500	15	58.9	140	89.2	85.7
Chromium	µg/L	10	50		20	nd	nd	nd	nd
Copper	µg/L	50	1300	1000	20	nd	nd	nd	nd
Cyanide	µg/L	100	200		8	nd	nd	nd	nd
Fluoride	mg/L	0.1	2		17	0.221	0.77	0.563	0.597
Iron	µg/L	100		300	20	nd	347	107	112
Lead	µg/L	5	1.5		20	nd	2.63	nd	nd
Magnesium	mg/L	3			5	15.3	48.8	28.1	26.1
Manganese	µg/L	20		50	20	9.10	1.06	40.1	32.4
Mercury	µg/L	1	2		19	nd	nd	nd	nd
Nickel	µg/L	10	100		19	nd	nd	nd	nd
Nitrate	mg/L	2	45		22	nd	nd	nd	nd
Nitrate + Nitrite	mg/L		10		6	0.831	1.94	1.27	1.25
Nitrite as Nitrogen	mg/L	0.4	1		19	nd	nd	nd	nd
Potassium	mg/L	0.5			19	5.12	11.3	7.68	7.34
Selenium	µg/L	5	50		20	nd	nd	nd	nd
Silver	µg/L	10		100	20	nd	nd	nd	nd
Sulfate	mg/L	6.25		250-500	15	34.4	98.4	65.3	71.0
Thallium	µg/L	1	2		19	nd	nd	nd	nd
Zinc	µg/L	50		5000	20	nd	nd	nd	nd
Perchlorate	µg/L	5			23	nd	nd	nd	nd
Organic Constituents, Regulated									
1,1,1-Trichloroethane	µg/L	0.5	200		18	nd	nd	nd	nd
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	10	1200		18	nd	nd	nd	nd
1,1,2-Trichloroethane	µg/L	0.5	5		18	nd	nd	nd	nd
1,1-dichloroethane	µg/L	0.5	5		18	nd	nd	nd	nd
1,1-Dichloroethylene	µg/L	0.5	6		18	nd	nd	nd	nd
1,2,4-Trichlorobenzene	µg/L	0.5	70		18	nd	nd	nd	nd
1,2-dichloroethane	µg/L	0.5	.5		18	nd	nd	nd	nd
1,2-Dichloropropane	µg/L	0.5	5		18	nd	nd	nd	nd
1,4-Dichlorobenzene	µg/L	0.5	5		18	nd	nd	nd	nd
2,4,5 TP	µg/L	1	50		19	nd	nd	nd	nd

Table 3-4.4
SUMMARY OF RAW WATER QUALITY**
MORENA RESERVOIR @ SURFACE 2001 - 2005

Parameters	Units	DLR*/ MDL	Drinking Water Standards[1] MCL	SMCL	No. of Samples	Raw Water Quality MIN	MAX	MEAN	MEDIAN
2,4-D	µg/L	10	70		19	nd	nd	nd	nd
Alachlor	µg/L	1	2		21	nd	nd	nd	nd
Atrazine	µg/L	1	3		21	nd	nd	nd	nd
Bentazon	µg/L	2	18		17	nd	nd	nd	nd
Benzene	µg/L	0.5	1		18	nd	nd	nd	nd
Benzo(a)pyrene	µg/L	0.1	.2		12	nd	nd	nd	nd
Bromodichloromethane	µg/L	0.5			18	nd	nd	nd	nd
Bromoform	µg/L	0.5			18	nd	nd	nd	nd
Carbofuran	µg/L	5	18		17	nd	nd	nd	nd
Chlordane	µg/L	0.1	.1		19	nd	nd	nd	nd
Chloroform	µg/L	0.5			18	nd	nd	nd	nd
cis-1,2-Dichloroethylene	µg/L	0.5	6		18	nd	nd	nd	nd
Di(2-ethylhexyl) adipate	µg/L	5	400		14	nd	nd	nd	nd
Di(2-ethylhexyl) pthalate	µg/L	3	4		12	nd	nd	nd	nd
Dibromochloromethane	µg/L	0.5			18	nd	nd	nd	nd
Dichloromethane (methylene chloride)	µg/L	0.1	5		18	nd	nd	nd	nd
Dinoseb	µg/L	0.5	7		18	nd	nd	nd	nd
Endrin	µg/L	0.1	2		32	nd	nd	nd	nd
Ethylbenzene	µg/L	0.5	700		18	nd	nd	nd	nd
Glyphosate	µg/L	25	700		17	nd	nd	nd	nd
Heptachlor	µg/L	0.01	.01		20	nd	nd	nd	nd
Heptachlor epoxide	µg/L	0.01	.01		20	nd	nd	nd	nd
Hexachlorobenzene	µg/L	0.05	1		32	nd	nd	nd	nd
Hexachlorocyclopentadiene	µg/L	1	50		31	nd	nd	nd	nd
Lindane	µg/L	0.2	0.2		19	nd	nd	nd	nd
Methoxychlor	µg/L	10	40		30	nd	nd	nd	nd
Methyl t-Butyl Ether (MTBE)	µg/L	3	13	5	18	nd	nd	nd	nd
Molinate	µg/L	2	20		10	nd	nd	nd	nd
Monochlorobenzene	µg/L	0.5	70		18	nd	nd	nd	nd
o-Dichlorobenzene	µg/L	0.5	600		18	nd	nd	nd	nd
Pentachlorophenol	µg/L	0.2	1		18	nd	nd	nd	nd
Picloram	µg/L	1	500		18	nd	nd	nd	nd
Polychlorinated biphenyls (PCBs)	µg/L	0.5	0.5		15	nd	nd	nd	nd
Simazine	µg/L	1	4		16	nd	nd	nd	nd
Styrene	µg/L	0.5	100		18	nd	nd	nd	nd
Tetrachloroethylene	µg/L	0.5	5		18	nd	nd	nd	nd
Thiobencarb	µg/L		70	1	18	nd	nd	nd	nd
Toluene	µg/L	0.5	150		18	nd	nd	nd	nd
Total Organic Carbon (TOC)	mg/L	0.5			2	14.5	17.9	16.2	16.2
Toxaphene	µg/L	1	3		19	nd	nd	nd	nd
trans-1,2-Dichloroethylene	µg/L	0.5	10		18	nd	nd	nd	nd
Trichloroethylene	µg/L	0.5	5		18	nd	nd	nd	nd
Trichlorofluoromethane	µg/L	5	150		18	nd	nd	nd	nd
Vinyl chloride	µg/L	0.5	.5		18	nd	nd	nd	nd
Organic Constituents, Unregulated									
Ethyl-t-Butyl Ether(ETBE)	µg/L	0.3			18	nd	nd	nd	nd
t-Amyl-methyl ether(TAME)	µg/L	0.2			18	nd	nd	nd	nd
1,1,1,2-Tetrachloroethane	µg/L	0.5			18	nd	nd	nd	nd
1,1-Dichloropropene	µg/L	0.5			18	nd	nd	nd	nd
1,2,3-Trichlorobenzene	µg/L	0.5			18	nd	nd	nd	nd

Table 3-4.4
SUMMARY OF RAW WATER QUALITY**
MORENA RESERVOIR @ SURFACE 2001 - 2005

Parameters	Units	DLR*/ MDL	Drinking Water Standards[1] MCL	SMCL	No. of Samples	Raw Water Quality MIN	MAX	MEAN	MEDIAN
1,2,3-Trichloropropane (TCP)	µg/L	0.5			9	nd	nd	nd	nd
1,2,4-Trimethylbenzene	µg/L	0.2			18	nd	nd	nd	nd
1,3,5-Trimethylbenzene	µg/L	0.2			18	nd	nd	nd	nd
1,3-Dichlorobenzene	µg/L	0.5			18	nd	nd	nd	nd
1,3-Dichloropropane	µg/L	0.5			18	nd	nd	nd	nd
2,2-Dichloropropane	µg/L	0.5			18	nd	nd	nd	nd
3-Hydroxycarbofuran	µg/L	3			17	nd	nd	nd	nd
Aldicarb	µg/L	3			16	nd	nd	nd	nd
Aldicarb sulfone	µg/L	4			17	nd	nd	nd	nd
Aldicarb sulfoxide	µg/L	3			17	nd	nd	nd	nd
Aldrin	µg/L	0.075			20	nd	nd	nd	nd
Bromacil	µg/L	10			6	nd	nd	nd	nd
Bromobenzene	µg/L	0.5			18	nd	nd	nd	nd
Bromochloromethane	µg/L	0.5			18	nd	nd	nd	nd
Bromomethane	µg/L	0.5			18	nd	nd	nd	nd
Butachlor	µg/L	0.38			6	nd	nd	nd	nd
Carbaryl	µg/L	5			17	nd	nd	nd	nd
Chlorobenzene	µg/L	0.5			18	nd	nd	nd	nd
Chloroethane	µg/L	0.5			18	nd	nd	nd	nd
Chloromethane	µg/L	0.5			18	nd	nd	nd	nd
Dibromomethane	µg/L	0.5			18	nd	nd	nd	nd
Dicamba	µg/L	15			19	nd	nd	nd	nd
Dichlorodifluoromethane	µg/L	1			18	nd	nd	nd	nd
Dieldrin	µg/L	0.02			19	nd	nd	nd	nd
Hexachlorobutadiene	µg/L	0.5			18	nd	nd	nd	nd
Isopropylbenzene	µg/L	0.5			18	nd	nd	nd	nd
Methomyl	µg/L	2			17	nd	nd	nd	nd
Metolachlor	µg/L	10			6	nd	nd	nd	nd
Metribuzin	µg/L	0.5			6	nd	nd	nd	nd
Napthalene	µg/L	0.5			33	nd	nd	nd	nd
n-Butylbenzene	µg/L	0.5			18	nd	nd	nd	nd
n-Propylbenzene	µg/L	0.5			18	nd	nd	nd	nd
o-Chlorotoluene	mg/L	0.5			18	nd	nd	nd	nd
Prometryn	µg/L	2			6	nd	nd	nd	nd
Propachlor	µg/L	0.1			33	nd	nd	nd	nd
sec-Butylbenzene	µg/L	0.5			18	nd	nd	nd	nd
tert-Butylbenzene	µg/L	0.5			18	nd	nd	nd	nd

NOTES:

* The State of California DLR values are used when available. Parameters without DLR values were reported ad MDL levels.

** The acceptance criteria in this table apply to finished, potable water, and are for reference only.

(1) State MCL and MCLG values may be more stringent then federal standards for treated water.

(2) Turbidity of treated water is not to exceed 0.3 NTU 95% of the time.

(3) Based on the Langelier Index. A positive quantity indicates non-corrosive tendencies. A negative quantity indicates corrosive tendencies.

(4) Trace metal samples were filtered before analysis. Results reflect the dissolved trace metal fraction.

nd: non-detected at State DLR or MDL if DLR not Available

Table 3-4.5
SUMMARY OF RAW WATER QUALITY**
OTAY RESERVOIR @ SURFACE 2001 - 2005

Parameters	Units	DLR*/ MDL	Drinking Water Standards[1]		No. of Samples	Raw Water quality			
			MCL	SMCL		MIN	MAX	MEAN	MEDIAN
General Physical									
Alkalinity	mg/L	2			19	138	204	161	159
Color	cu	1		15	20	4	35	15	13.5
Conductivity	µS/cm			900-1600	20	677	1130	856	827
Corrosivity[3]	--			non-corrosive	16	0.18	1.30	0.89	0.96
Hardness as $CaCO_3$	mg/L	2			21	159	272	227	221
pH	pH			6.5-8.5	19	7.67	8.48	8.48	8.58
Total Dissolved Solids	mg/L	10		500-1000	19	150	523	441	451
Turbidity[2]	NTU	0.07	0.5	5	19	0.48	15.9	2.23	1.10
Microbiological									
Total Coliform	/100ml	10	(4)		256	nd	>24000	4487	1130
Enterococcus	/100ml	1			256	nd	230	7.1	2
E. Coli	/100ml	10			256	nd	652	35.4	15
Radiological									
Gross Alpha particles	pCi/L	3	15		4	nd	nd	nd	nd
Gross Beta particles	pCi/L	4	50		4	nd	7.14	nd	nd
Combined Radium-226 & Radium-228	pCi/L		5		4	nd	1.30	nd	nd
Strontium-90	pCi/L	2	8		4	nd	nd	nd	nd
Tritium	pCi/L	1000	20,000		4	nd	nd	nd	nd
Uranium	pCi/L	2	20		4	nd	2.81	nd	2.47
Inorganic Constituents[5]									
Aluminum	µg/L	50	100	200	20	nd	187	nd	nd
Antimony	µg/L	6	6		21	nd	nd	nd	nd
Arsenic	µg/L	2	10		21	nd	4.92	2.18	2.02
Barium	µg/L	100	1000		21	nd	nd	nd	nd
Beryllium	µg/L	1	4		21	nd	nd	nd	nd
Cadmium	µg/L	1	5		21	nd	1.34	nd	nd
Calcium	mg/L	5			19	33.8	70.8	51.9	49.6
Chloride	mg/L	6.5		250-500	19	67.4	99.6	84.8	84.4
Chromium	µg/L	10	50		21	nd	nd	nd	nd
Copper	µg/L	50	1300	1000	21	nd	56.8	nd	nd
Cyanide	µg/L	100	200		13	nd	nd	nd	nd
Fluoride	mg/L	0.1	2		20	0.231	0.505	0.370	0.380
Iron	µg/L	100		300	21	52.9	267	101	87.9
Lead	µg/L	5	1.5		21	nd	nd	nd	nd
Magnesium	mg/L	3			19	9.80	26.4	19.2	19.5
Manganese	µg/L	20		50	21	nd	488	30.3	nd
Mercury	µg/L	1	2		20	nd	nd	nd	nd
Nickel	µg/L	10	100		21	nd	nd	nd	nd
Nitrate	mg/L	2	45		49	0.024	3.35	0.88	0.40
Nitrate + Nitrite	mg/L		10		26	0.085	3.35	1.00	0.50
Nitrite as Nitrogen	mg/L	0.4	1		40	0.006	0.087	0.04	0.034
Potassium	mg/L	0.5			21	3.65	6.7	4.63	4.43
Selenium	µg/L	5	50		21	nd	7.38	nd	nd
Silver	µg/L	10		100	21	nd	nd	nd	nd
Sulfate	mg/L	6.25		250-500	19	42.1	148	110	111
Thallium	µg/L	1	2		21	nd	nd	nd	nd
Zinc	µg/L	50		5000	19	nd	nd	nd	nd
Perchlorate	µg/L	5			23	nd	nd	nd	nd

Table 3-4.5
SUMMARY OF RAW WATER QUALITY**
OTAY RESERVOIR @ SURFACE 2001 - 2005

Parameters	Units	DLR*/ MDL	Drinking Water Standards[1]		No. of Samples	Raw Water quality			
			MCL	SMCL		MIN	MAX	MEAN	MEDIAN
Organic Constituents, Regulated									
1,1,1-Trichloroethane	µg/L	0.5	200		19	nd	nd	nd	nd
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	10	1200		19	nd	nd	nd	nd
1,1,2-Trichloroethane	µg/L	0.5	5		19	nd	nd	nd	nd
1,1-dichloroethane	µg/L	0.5	5		19	nd	nd	nd	nd
1,1-Dichloroethylene	µg/L	0.5	6		19	nd	nd	nd	nd
1,2,4-Trichlorobenzene	µg/L	0.5	70		19	nd	nd	nd	nd
1,2-dichloroethane	µg/L	0.5	0.5		19	nd	nd	nd	nd
1,2-Dichloropropane	µg/L	0.5	5		19	nd	nd	nd	nd
1,4-Dichlorobenzene	µg/L	0.5	5		19	nd	nd	nd	nd
2,4,5 TP	µg/L	1	50		18	nd	nd	nd	nd
2,4-D	µg/L	10	70		18	nd	nd	nd	nd
Alachlor	µg/L	1	2		23	nd	nd	nd	nd
Atrazine	µg/L	1	3		19	nd	nd	nd	nd
Bentazon	µg/L	2	18		19	nd	nd	nd	nd
Benzene	µg/L	0.5	1		19	nd	nd	nd	nd
Benzo(a)pyrene	µg/L	0.1	0.2		19	nd	nd	nd	nd
Bromodichloromethane	µg/L	0.5			19	nd	nd	nd	nd
Bromoform	µg/L	0.5			19	nd	nd	nd	nd
Carbofuran	µg/L	5	18		17	nd	nd	nd	nd
Chlordane	µg/L	0.1	0.1		21	nd	nd	nd	nd
Chloroform	µg/L	0.5			19	nd	0.596	nd	nd
cis-1,2-Dichloroethylene	µg/L	0.5	6		19	nd	nd	nd	nd
Di(2-ethylhexyl) adipate	µg/L	5	400		17	nd	nd	nd	nd
Di(2-ethylhexyl) pthalate	µg/L	3	4		17	nd	nd	nd	nd
Dichloromethane (methylene chloride)	µg/L	0.1	5		19	nd	nd	nd	nd
Dinoseb	µg/L	0.5	7		17	nd	nd	nd	nd
Endrin	µg/L	0.1	2		37	nd	nd	nd	nd
Ethylbenzene	µg/L	0.5	700		19	nd	nd	nd	nd
Glyphosate	µg/L	25	700		17	nd	nd	nd	nd
Heptachlor	µg/L	0.01	.01		22	nd	nd	nd	nd
Heptachlor epoxide	µg/L	0.01	.01		23	nd	nd	nd	nd
Hexachlorobenzene	µg/L	0.05	1		37	nd	nd	nd	nd
Hexachlorocyclopentadiene	µg/L	1	50		33	nd	nd	nd	nd
Lindane	µg/L	0.2	0.2		21	nd	nd	nd	nd
Methoxychlor	µg/L	10	40		37	nd	nd	nd	nd
Methyl t-Butyl Ether (MTBE)	µg/L	3	13	5	19	nd	nd	nd	nd
Molinate	µg/L	2	20		11	nd	nd	nd	nd
Monochlorobenzene	µg/L	0.5	70		19	nd	nd	nd	nd
o-Dichlorobenzene	µg/L	0.5	600		19	nd	nd	nd	nd
Oxamyl (vydate)	µg/L	20	200		17	nd	nd	nd	nd
Pentachlorophenol	µg/L	0.2	1		17	nd	nd	nd	nd
Picloram	µg/L	1	500		17	nd	nd	nd	nd
(PCBs)	µg/L	0.5	0.5		17	nd	nd	nd	nd
Simazine	µg/L	1	4		18	nd	nd	nd	nd
Styrene	µg/L	0.5	100		19	nd	nd	nd	nd
Tetrachloroethylene	µg/L	0.5	5		19	nd	nd	nd	nd
Thiobencarb	µg/L		70	1	17	nd	nd	nd	nd
Toluene	µg/L	0.5	150		19	nd	nd	nd	nd
Total Organic Carbon (TOC)	mg/L	0.5			86	3.98	10.2	6.36	6.07
Toxaphene	µg/L	1	3		21	nd	nd	nd	nd
trans-1,2-Dichloroethylene	µg/L	0.5	10		19	nd	nd	nd	nd
Trichloroethylene	µg/L	0.5	5		19	nd	nd	nd	nd

Table 3-4.5
SUMMARY OF RAW WATER QUALITY**
OTAY RESERVOIR @ SURFACE 2001 - 2005

Parameters	Units	DLR*/ MDL	Drinking Water Standards[1]		No. of	Raw Water quality			
			MCL	SMCL	Samples	MIN	MAX	MEAN	MEDIAN
Trichlorofluoromethane	µg/L	5	150		19	nd	nd	nd	nd
Vinyl chloride	µg/L	0.5	0.5		19	nd	nd	nd	nd
Xylenes	µg/L	0.5	1750		19	nd	nd	nd	nd
Organic Constituents, Unregulated									
Ethyl-t-Butyl Ether(ETBE)	µg/L	0.3			19	nd	nd	nd	nd
t-Amyl-methyl ether (TAME)	µg/L	0.2			19	nd	nd	nd	nd
1,1,1,2-Tetrachloroethane	µg/L	0.5			19	nd	nd	nd	nd
1,1-Dichloropropene	µg/L	0.5			19	nd	nd	nd	nd
1,2,3-Trichlorobenzene	µg/L	0.5			19	nd	nd	nd	nd
1,2,3-Trichloropropane (TCP)	µg/L	0.5			10	nd	nd	nd	nd
1,2,4-Trimethylbenzene	µg/L	0.2			19	nd	nd	nd	nd
1,3,5-Trimethylbenzene	µg/L	0.2			19	nd	nd	nd	nd
1,3-Dichlorobenzene	µg/L	0.5			19	nd	nd	nd	nd
1,3-Dichloropropane	µg/L	0.5			19	nd	nd	nd	nd
2,2-Dichloropropane	µg/L	0.5			19	nd	nd	nd	nd
3-Hydroxycarbofuran	µg/L	3			17	nd	nd	nd	nd
Aldicarb	µg/L	3			16	nd	nd	nd	nd
Aldicarb sulfone	µg/L	4			17	nd	nd	nd	nd
Aldicarb sulfoxide	µg/L	3			17	nd	nd	nd	nd
Aldrin	µg/L	0.075			23	nd	nd	nd	nd
Bromacil	µg/L	10			6	nd	nd	nd	nd
Bromobenzene	µg/L	0.5			19	nd	nd	nd	nd
Bromochloromethane	µg/L	0.5			19	nd	nd	nd	nd
Bromomethane	µg/L	0.5			19	nd	nd	nd	nd
Butachlor	µg/L	0.38			6	nd	nd	nd	nd
Carbaryl	µg/L	5			17	nd	nd	nd	nd
Chlorobenzene	µg/L	0.5			19	nd	nd	nd	nd
Chloroethane	µg/L	0.5			19	nd	nd	nd	nd
Chloromethane	µg/L	0.5			19	nd	nd	nd	nd
Dibromomethane	µg/L	0.5			19	nd	nd	nd	nd
Dicamba	µg/L	15			18	nd	nd	nd	nd
Dichlorodifluoromethane	µg/L	1			19	nd	nd	nd	nd
Dieldrin	µg/L	0.02			22	nd	nd	nd	nd
Geosmin	ng/L	3			173	nd	11.1	nd	nd
Hexachlorobutadiene	µg/L	0.5			19	nd	nd	nd	nd
Isopropylbenzene	µg/L	0.5			19	nd	nd	nd	nd
Methomyl	µg/L	2			17	nd	nd	nd	nd
Methyl Isoborneol (MIB)	ng/L	4			169	nd	64.2	10.8	6.7
Metolachlor	µg/L	10			6	nd	nd	nd	nd
Metribuzin	µg/L	0.5			6	nd	nd	nd	nd
Napthalene	µg/L	0.5			33	nd	nd	nd	nd
n-Butylbenzene	µg/L	0.5			19	nd	nd	nd	nd
n-Propylbenzene	µg/L	0.5			19	nd	nd	nd	nd
Prometryn	µg/L	2			6	nd	nd	nd	nd
Propachlor	µg/L	0.1			38	nd	nd	nd	nd
sec-Butylbenzene	µg/L	0.5			19	nd	nd	nd	nd
tert-Butylbenzene	µg/L	0.5			19	nd	nd	nd	nd

Table 3-4.5
SUMMARY OF RAW WATER QUALITY**
OTAY RESERVOIR @ SURFACE 2001 - 2005

Parameters	Units	DLR*/ MDL	Drinking Water Standards[1]		No. of Samples	Raw Water quality			
			MCL	SMCL		MIN	MAX	MEAN	MEDIAN

NOTES:

* The State of California DLR values are used when available. Parameters without DLR values were reported ad MDL levels.

** The acceptance criteria in this table apply to finished, potable water, and are for reference only.

(1) State MCL and MCLG values may be more stringent then federal standards for treated water.

(2) Turbidity of treated water is not to exceed 0.3 NTU 95% of the time.

(3) Based on the Langelier Index. A positive quantity indicates non-corrosive tendencies. A negative quantity indicates corrosive tendencies.

(4) No more then 5% of distribution system samples can be total coliform positive

(5) Trace metal samples were filtered before analysis. Results reflect the dissolved trace metal fraction.

nd: non-detected at State DLR or MDL if DLR not Available

Table 3-4.6
SUMMARY OF RAW WATER QUALITY**
OTAY RESERVOIR AT OUTLET GAUGES 2001 - 2005

Outlet Gauge	Parameters	Units	DLR*/ MDL	Drinking Water Standards[1] MCL	SMCL	No. of Samples	Raw Water quality MIN	MAX	MEAN	MEDIAN
84	**General Physical**									
	Color	cu	1		15	244	nd	75	16.0	14.0
	Odor - Threshold	Odor	1		3	229	nd	17	3.97	3
	Turbidity[2]	NTU	0.07	0.5	5	243	0.1	20.4	2.00	1.22
	Microbiological									
	Total Coliform	/100ml	10	(3)		254	10	28000	1737	620
	Enterococcus	/100ml	1			254	nd	47	5.5	3.1
	E. Coli	/100ml	10			254	nd	270	29.3	20
	Organic Constituents									
	Total Organic Carbon (TOC)	mg/L	0.5			59	4.58	7.38	5.83	5.75
	Geosmin	ng/L	3			174	nd	11.6	nd	nd
	Methyl Isoborneol (MIB)	ng/L	4			171	nd	63.8	4.02	nd
95	**General Physical**									
	Color	cu	1		15	244	4	68	15.0	13.0
	Odor - Threshold	Odor	1		3	230	nd	17	4.09	3
	Turbidity	NTU	0.07	0.5	5	243	0.11	14.4	1.76	1.11
	Microbiological									
	Total Coliform	/100L	10	(3)		253	10	>24000	3296	910
	Enterococcus	/100L	1			253	nd	200	5.7	3
	E. Coli	/100L	10			253	nd	460	24.5	10
	Organic Constituents									
	Total Organic Carbon (TOC)	mg/L	0.5			61	5.06	8.22	5.95	5.83
	Geosmin	ng/L	3			175	nd	7.90	nd	nd
	Methyl Isoborneol (MIB)	ng/L	4			172	nd	57.1	7.7	4.34
106	**General Physical**									
	Color	cu	1		15	244	3	147	13.8	11
	Odor - Threshold	Odor	1		3	232	nd	24	4.25	3
	Turbidity	NTU	0.07	0.5	5	243	0.10	53.9	1.57	1.03
	Microbiological									
	Total Coliform	/100L	10	(3)		254	20	>24000	4245	1400
	Enterococcus	/100L	1			254	nd	140	6.6	3
	E. Coli	/100L	10			254	nd	280	26.6	10
	Organic Constituents									
	Total Organic Carbon (TOC)	mg/L	0.5			59	4.82	9.20	6.12	6
	Geosmin	ng/L	3			174	nd	13.4	nd	nd
	Methyl Isoborneol (MIB)	ng/L	4			172	nd	67.4	10.4	6.9
117	**General Physical**									
	Color	cu	1		15	120	2	110	16.3	13.0
	Odor - Threshold	Odor	1		118	118	nd	17	4.80	4.00
	Turbidity	NTU	0.07	0.5	5	121	0.44	9.28	1.41	1.11

Table 3-4.6
SUMMARY OF RAW WATER QUALITY**
OTAY RESERVOIR AT OUTLET GAUGES 2001 - 2005

Outlet Gauge	Parameters	Units	DLR*/ MDL	Drinking Water Standards[1] MCL	SMCL	No. of Samples	Raw Water quality MIN	MAX	MEAN	MEDIAN
	Microbiological									
	Total Coliform	/100L	10	(3)		127	10	>24000	3479	1200
	Enterococcus	/100L	1			127	nd	16	3.2	2
	E. Coli	/100L	10			127	nd	200	16.2	10
	Organic Constituents									
	Total Organic Carbon (TOC)	mg/L	0.5			27	5.38	9.69	6.81	6.41
	Geosmin	ng/L	3			107	nd	10.9	nd	nd
	Methyl Isoborneol (MIB)	ng/L	4			105	nd	68.3	11.6	7.7

NOTES:

* The State of California DLR values are used when available. Parameters without DLR values were reported ad MDL levels.

** The acceptance criteria in this table apply to finished, potable water, and are for reference only.

(1) State MCL and MCLG values may be more stringent then federal standards for treated water.
(2) Turbidity of treated water is not to exceed 0.3 NTU 95% of the time.
(3) No more then 5% of distribution system samples can be total coliform positive

nd: non-detected at State DLR or MDL if DLR not Available

Table 3-4.7
SUMMARY OF RAW WATER QUALITY**
OTAY WTP INFLUENT 2001 - 2005

Parameters	Units	DLR*/ MDL	Drinking Water Standards[1]		No. of Samples	Raw Water quality			
			MCL	SMCL		MIN	MAX	MEAN	MEDIAN
General Physical									
Alkalinity	mg/L	2			118	92.7	180	138	135
Color	cu	1		15	1202	nd	100	11.7	10.0
Conductivity	µS/cm			900-1600	58	607	1090	865	860
Corrosivity[3]	--			non-corrosive	53	-0.5	1.01	0.49	0.55
Foaming Agents (MBAS)	mg/L			0.5	5	nd	0.06	nd	0.05
Hardness as $CaCO_3$	mg/L	2			97	175	271	224	224
pH	pH			6.5-8.5	55	7.11	8.46	8.06	8.10
Total Dissolved Solids	mg/L	10		500-1000	58	358	660	484	494
Turbidity[2]	NTU	0.07	0.5	5	1728	0.08	28.9	1.10	0.77
Microbiological									
Total Coliform	/100ml	2	(4)		1763	nd	> 16000	239	28
Cryptosporidium	/L	0.1	2 log removal		59	nd	0.1	nd	nd
Giardia	/L	0.1	3 log removal		59	nd	0.2	nd	nd
Radiological									
Gross Alpha particles	pCi/L	3	15		4	nd	3.99	nd	3.39
Gross Beta particles	pCi/L	4	50		4	nd	4.45	nd	nd
Combined Radium-226 & Radium-228	pCi/L		5		4	nd	1.90	nd	nd
Strontium-90	pCi/L	2	8		4	nd	nd	nd	nd
Tritium	pCi/L	1000	20,000		4	nd	nd	nd	nd
Uranium	pCi/L	2	20		4	2.49	4.89	3.58	3.47
Inorganic Constituents									
Aluminum	µg/L	50	1000	200	43	nd	115	nd	nd
Antimony	µg/L	6	6		20	nd	nd	nd	nd
Arsenic	µg/L	2	10		20	nd	2.72	nd	2.13
Barium	µg/L	100	1000		20	nd	106	nd	nd
Beryllium	µg/L	1	4		18	nd	nd	nd	nd
Cadmium	µg/L	1	5		20	nd	nd	nd	nd
Calcium	mg/L	5			57	34.1	81.6	58.4	58.8
Chloride	mg/L	6.5		250-500	68	56.3	98.0	79.2	80.3
Chromium	µg/L	10	50		20	nd	nd	nd	nd
Copper	µg/L	50	1300	1000	44	nd	nd	nd	nd
Cyanide	µg/L	100	200		18	nd	nd	nd	nd
Fluoride	mg/L	0.1	2		56	0.225	0.513	0.306	0.295
Iron	µg/L	100		300	58	nd	674	nd	nd
Lead	µg/L	5	15		43	nd	nd	nd	nd
Magnesium	mg/L	3			57	3.30	27.6	18.6	20.1
Manganese	µg/L	20		50	42	nd	526	57.4	nd
Mercury	µg/L	1	2		19	nd	nd	nd	nd
Nickel	µg/L	10	100		20	nd	nd	nd	nd
Nitrate	mg/L	2	45		133	nd	3.55	nd	nd
Nitrate + Nitrite	mg/L		10		47	0.062	3.57	1.35	1.18
Nitrite as Nitrogen	mg/L	0.4	1		116	nd	nd	nd	nd
Potassium	mg/L	0.5			59	3.34	6.74	4.22	4.06
Selenium	µg/L	5	50		20	nd	nd	nd	nd
Silver	µg/L	10		100	20	nd	nd	nd	nd
Sulfate	mg/L	6.25		250-500	68	42.5	236	142	147
Thallium	µg/L	1	2		19	nd	nd	nd	nd
Zinc	µg/L	50		5000	56	nd	nd	nd	nd

Table 3-4.7 SUMMARY OF RAW WATER QUALITY** OTAY WTP INFLUENT 2001 - 2005									
Parameters	Units	DLR*/ MDL	Drinking Water Standards[1]		No. of Samples	Raw Water quality			
			MCL	SMCL		MIN	MAX	MEAN	MEDIAN
Organic Constituents, Regulated									
1,1,1-Trichloroethane	µg/L	0.5	200		20	nd	nd	nd	nd
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	10	1200		20	nd	nd	nd	nd
1,1,2-Trichloroethane	µg/L	0.5	5		20	nd	nd	nd	nd
1,1-dichloroethane	µg/L	0.5	5		20	nd	nd	nd	nd
1,1-Dichloroethylene	µg/L	0.5	6		20	nd	nd	nd	nd
1,2,4-Trichlorobenzene	µg/L	0.5	70		20	nd	nd	nd	nd
1,2-dichloroethane	µg/L	0.5	0.5		20	nd	nd	nd	nd
1,2-Dichloropropane	µg/L	0.5	5		20	nd	nd	nd	nd
1,4-Dichlorobenzene	µg/L	0.5	5		20	nd	nd	nd	nd
2,4,5 TP	µg/L	1	50		19	nd	nd	nd	nd
2,4-D	µg/L	10	70		19	nd	nd	nd	nd
Alachlor	µg/L	1	2		26	nd	nd	nd	nd
Atrazine	µg/L	1	3		26	nd	nd	nd	nd
Bentazon	µg/L	2	18		18	nd	nd	nd	nd
Benzene	µg/L	0.5	1		19	nd	nd	nd	nd
Benzo(a)pyrene	µg/L	0.1	0.2		18	nd	nd	nd	nd
Bromodichloromethane	µg/L	0.5			90	nd	1.04	nd	nd
Bromoform	µg/L	0.5			90	nd	1.25	nd	nd
Carbofuran	µg/L	5	18		20	nd	nd	nd	nd
Chlordane	µg/L	0.1	0.1		19	nd	nd	nd	nd
Chloroform	µg/L	0.5			90	nd	1.39	nd	nd
cis-1,2-Dichloroethylene	µg/L	0.5	6		19	nd	nd	nd	nd
Di(2-ethylhexyl) adipate	µg/L	5	400		19	nd	nd	nd	nd
Di(2-ethylhexyl) pthalate	µg/L	3	4		17	nd	nd	nd	nd
Dibromochloromethane	µg/L	0.5			65	nd	1.39	nd	nd
Dichloromethane (methylene chloride)	µg/L	0.1	5		19	nd	nd	nd	nd
Dalapon	µg/L	10	200		16	nd	nd	nd	nd
Dinoseb	µg/L	0.5	7		17	nd	nd	nd	nd
Diquat	µg/L	4	20		11	nd	nd	nd	nd
Endrin	µg/L	0.1	2		36	nd	nd	nd	nd
Ethylbenzene	µg/L	0.5	700		19	nd	nd	nd	nd
Glyphosate	µg/L	25	700		19	nd	nd	nd	nd
Haloacetic Acids (five) [5]	µg/L	0.5	60		16	nd	nd	nd	nd
Heptachlor	µg/L	0.01	0.01		18	nd	nd	nd	nd
Heptachlor epoxide	µg/L	0.01	0.01		19	nd	nd	nd	nd
Hexachlorobenzene	µg/L	0.05	1		37	nd	nd	nd	nd
Hexachlorocyclopentadiene	µg/L	1	50		32	nd	nd	nd	nd
Lindane	µg/L	0.2	0.2		19	nd	nd	nd	nd
Methoxychlor	µg/L	10	40		36	nd	nd	nd	nd
Methyl t-Butyl Ether (MTBE)	µg/L	3	13	5	19	0.219	1.15	0.710	0.730
Molinate	µg/L	2	20		14	nd	nd	nd	nd
Monochlorobenzene	µg/L	0.5	70		19	nd	nd	nd	nd
o-Dichlorobenzene	µg/L	0.5	600		19	nd	nd	nd	nd
Oxamyl	µg/L	20	200		20	nd	nd	nd	nd
Pentachlorophenol	µg/L	0.2	1		16	nd	nd	nd	nd
Picloram	µg/L	1	500		18	nd	nd	nd	nd
(PCBs)	µg/L	0.5	0.5		18	nd	nd	nd	nd
Simazine	µg/L	1	4		22	nd	nd	nd	nd
Styrene	µg/L	0.5	100		19	nd	nd	nd	nd
Thiobencarb	µg/L		70	1	18	nd	nd	nd	nd

Table 3-4.7
SUMMARY OF RAW WATER QUALITY**
OTAY WTP INFLUENT 2001 - 2005

Parameters	Units	DLR*/ MDL	Drinking Water Standards[1]		No. of	Raw Water quality			
			MCL	SMCL	Samples	MIN	MAX	MEAN	MEDIAN
Toluene	µg/L	0.5	150		19	nd	nd	nd	nd
Total Trihalomethanes(TTHM)[6]	mg/L	0.5	80		84	nd	1.37	nd	nd
Total Organic Carbon (TOC)	µg/L	0.5			272	1.97	7.02	4.36	4.68
Toxaphene	µg/L	1	3		19	nd	nd	nd	nd
trans-1,2-Dichloroethylene	µg/L	0.5	10		19	nd	nd	nd	nd
Trichloroethylene	µg/L	0.5	5		19	nd	nd	nd	nd
Trichlorofluoromethane	µg/L	5	150		19	nd	nd	nd	nd
Vinyl chloride	µg/L	0.5	0.5		19	nd	nd	nd	nd
Xylenes	µg/L	0.5	1750		19	nd	nd	nd	nd
						nd	nd	nd	nd
Organic Constituents, Unregulated									
Ethyl-t-Butyl Ether(ETBE)	µg/L	0.3			19	nd	nd	nd	nd
t-Amyl-methyl ether (TAME)	µg/L	0.2			19	nd	nd	nd	nd
1,1,1,2-Tetrachloroethane	µg/L	0.5			19	nd	nd	nd	nd
1,1-Dichloropropene	µg/L	0.5			19	nd	nd	nd	nd
1,2,3-Trichlorobenzene	µg/L	0.5			19	nd	nd	nd	nd
1,2,3-Trichloropropane (TCP)	µg/L	0.5			19	nd	nd	nd	nd
1,2,4-Trimethylbenzene	µg/L	0.2			19	nd	nd	nd	nd
1,3,5-Trimethylbenzene	µg/L	0.2			19	nd	nd	nd	nd
1,3-Dichlorobenzene	µg/L	0.5			19	nd	nd	nd	nd
1,3-Dichloropropane	µg/L	0.5			19	nd	nd	nd	nd
2,2-Dichloropropane	µg/L	0.5			19	nd	nd	nd	nd
3-Hydroxycarbofuran	µg/L	3			19	nd	nd	nd	nd
Aldicarb	µg/L	3			20	nd	nd	nd	nd
Aldicarb sulfone	µg/L	4			20	nd	nd	nd	nd
Aldicarb sulfoxide	µg/L	3			19	nd	nd	nd	nd
Aldrin	µg/L	0.075			19	nd	nd	nd	nd
Bromacil	µg/L	10			7	nd	nd	nd	nd
Bromobenzene	µg/L	0.5			19	nd	nd	nd	nd
Bromochloromethane	µg/L	0.5			19	nd	nd	nd	nd
Bromomethane	µg/L	0.5			19	nd	nd	nd	nd
Butachlor	µg/L	0.38			7	nd	nd	nd	nd
Carbaryl	µg/L	5			20	nd	nd	nd	nd
Chlorobenzene	µg/L	0.5			19	nd	nd	nd	nd
Chloroethane	µg/L	0.5			19	nd	nd	nd	nd
Chloromethane	µg/L	0.5			19	nd	nd	nd	nd
Dibromomethane	µg/L	0.5			19	nd	nd	nd	nd
Dicamba	µg/L	15			18	nd	nd	nd	nd
Dichlorodifluoromethane	µg/L	1			19	nd	nd	nd	nd
Dieldrin	µg/L	0.02			19	nd	nd	nd	nd
Geosmin	ng/L	0.3			255	1.34	22.2	5.15	4.38
Hexachlorobutadiene	µg/L	0.5			19	nd	nd	nd	nd
Isopropylbenzene	µg/L	0.5			19	nd	nd	nd	nd
Methomyl	µg/L	2			20	nd	nd	nd	nd
Methyl Isoborneol (MIB)	ng/L	0.4			250	1.52	48.3	8.14	6.50
Metolachlor	µg/L	10			7	nd	nd	nd	nd
Metribuzin	µg/L	0.5			7	nd	nd	nd	nd
Napthalene	µg/L	0.5			35	nd	nd	nd	nd
n-Butylbenzene	µg/L	0.5			19	nd	nd	nd	nd
n-Propylbenzene	µg/L	0.5			19	nd	nd	nd	nd
Prometryn	µg/L	2			7	nd	nd	nd	nd
Propachlor	µg/L	0.1			37	nd	nd	nd	nd
sec-Butylbenzene	µg/L	0.5			19	nd	nd	nd	nd
tert-Butylbenzene	µg/L	0.5			19	nd	nd	nd	nd

Table 3-4.7
SUMMARY OF RAW WATER QUALITY**
OTAY WTP INFLUENT 2001 - 2005

Parameters	Units	DLR*/ MDL	Drinking Water Standards[1]		No. of Samples	Raw Water quality			
			MCL	SMCL		MIN	MAX	MEAN	MEDIAN

NOTES:

* The State of California DLR values are used when available. Parameters without DLR values were reported ad MDL levels.

** The acceptance criteria in this table apply to finished, potable water, and are for reference only.

(1) State MCL and MCLG values may be more stringent then federal standards for treated water.

(2) Turbidity of treated water is not to exceed 0.3 NTU 95% of the time.

(3) Based on the Langelier Index. A positive quantity indicates non-corrosive tendencies. A negative quantity indicates corrosive tendencies.

(4) No more then 5% of distribution system samples can be total coliform positive

(5) Haloacetic acids (five) is the sum of the concentrations of mon-, di-, and trichloroacetic acids and mono- and dibromoacetic acids. MCL based on Annual Average

(6) Total trihalomethanes is the sum of the concentrations of chloroform, bromodichloromethane, dibromochloromethane, and bromoform. MCL based on Annual Average

nd: non-detected at State DLR or MDL if DLR not Available

Table 3-4.8
SUMMARY OF RAW WATER QUALITY
OTAY WTP EFFLUENT 2001 - 2005

Parameters	Units	DLR*/ MDL	Drinking Water Standards[1]		No. of Samples	Raw Water quality			
			MCL	SMCL		MIN	MAX	MEAN	MEDIAN
General Physical									
Alkalinity	mg/L	2			58	94.8	173	128	121
Color	cu	1		15	973	nd	14.0	2.99	3
Conductivity	µS/cm			900-1600	58	648	1160	888	882
Corrosivity[3]	--			non-corrosive	52	-0.2	1.1	0.60	0.67
Foaming Agents (MBAS)	mg/L			0.5	4	nd	0.090	nd	nd
Hardness as $CaCO_3$	mg/L	2			58	166	289	221	219
Odor--Threshold	odor	1		3	835	1	2	1.17	1.00
pH	pH			6.5-8.5	60	7.42	8.75	8.21	8.21
Total Dissolved Solids	mg/L	10		500-1000	57	372	666	496	505
Turbidity[2]	NTU	0.07	0.5	5	1517	nd	0.63	0.130	0.110
Microbiological									
Total Coliform	/100ml		(4)		1206	nd	4 pos	nd	nd
Cryptosporidium	/L		2 log removal		2	nd	nd	nd	nd
Giardia	/L		3 log removal		2	nd	nd	nd	nd
Inorganic Constituents									
Aluminum	µg/L	50	1000	200	58	nd	nd	nd	nd
Antimony	µg/L	6	6		20	nd	nd	nd	nd
Arsenic	µg/L	2	10		20	nd	nd	nd	nd
Barium	µg/L	100	1000		20	nd	nd	nd	nd
Beryllium	µg/L	1	4		18	nd	nd	nd	nd
Cadmium	µg/L	1	5		20	nd	nd	nd	nd
Calcium	mg/L	5			57	35	88.4	57.5	58.8
Chloride	mg/L	6.5		250-500	68	66.4	108	89.7	90.0
Chromium	µg/L	10	50		20	nd	nd	nd	nd
Copper	µg/L	50	1300	1000	58	nd	nd	nd	nd
Cyanide	µg/L	100	200		17	nd	nd	nd	nd
Fluoride	mg/L	0.1	2		56	0.209	0.520	0.305	0.293
Iron	µg/L	100		300	59	nd	170	nd	nd
Lead	µg/L	5	15		58	nd	nd	nd	nd
Magnesium	mg/L	3			57	4.0	32.8	18.6	20.1
Manganese	µg/L	20		50	58	nd	nd	nd	nd
Mercury	µg/L	1	2		19	nd	nd	nd	nd
Nickel	µg/L	10	100		20	nd	nd	nd	nd
Nitrate	mg/L	2	45		184	nd	3.71	nd	nd
Nitrate + Nitrite	mg/L		10		97	0.063	3.71	1.36	1.28
Nitrite as Nitrogen	mg/L	0.4	1		230	nd	nd	nd	nd
Potassium	mg/L	0.5			59	2.58	6.83	4.17	4.02
Selenium	µg/L	5	50		20	nd	nd	nd	nd
Silver	µg/L	10		100	20	nd	nd	nd	nd
Sulfate	mg/L	6.25		250-500	68	42.0	235	143	152
Thallium	µg/L	1	2		19	nd	nd	nd	nd
Zinc	µg/L	50		5000	56	nd	nd	nd	nd
Perchlorate	µg/L	5			33	nd	4.20	nd	nd
Organic Constituents, Regulated									
1,1,1-Trichloroethane	µg/L	0.5	200		20	nd	nd	nd	nd
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	10	1200		20	nd	nd	nd	nd
1,1,2-Trichloroethane	µg/L	0.5	5		20	nd	nd	nd	nd
1,1-dichloroethane	µg/L	0.5	5		20	nd	nd	nd	nd
1,1-Dichloroethylene	µg/L	0.5	6		20	nd	nd	nd	nd
1,2,4-Trichlorobenzene	µg/L	0.5	70		20	nd	nd	nd	nd
1,2-dichloroethane	µg/L	0.5	0.5		20	nd	nd	nd	nd
1,2-Dichloropropane	µg/L	0.5	5		20	nd	nd	nd	nd
1,4-Dichlorobenzene	µg/L	0.5	5		20	nd	nd	nd	nd
2,4,5 TP	µg/L	1	50		19	nd	nd	nd	nd

Table 3-4.8
SUMMARY OF RAW WATER QUALITY
OTAY WTP EFFLUENT 2001 - 2005

Parameters	Units	DLR*/ MDL	Drinking Water Standards[1]		No. of Samples	Raw Water quality			
			MCL	SMCL		MIN	MAX	MEAN	MEDIAN
2,4-D	µg/L	10	70		19	nd	nd	nd	nd
Alachlor	µg/L	1	2		25	nd	nd	nd	nd
Atrazine	µg/L	1	3		25	nd	nd	nd	nd
Bentazon	µg/L	2	18		19	nd	nd	nd	nd
Benzene	µg/L	0.5	1		20	nd	nd	nd	nd
Benzo(a)pyrene	µg/L	0.1	0.2		20	nd	nd	nd	nd
Bromodichloromethane	µg/L	0.5			116	9.40	35.5	21.6	22
Bromoform	µg/L	0.5			114	0.708	12.2	3.93	3.61
Carbofuran	µg/L	5	18		20	nd	nd	nd	nd
Chlordane	µg/L	0.1	0.1		20	nd	nd	nd	nd
Chloroform	µg/L	0.5			116	5.18	30.1	16.7	15.9
cis-1,2-Dichloroethylene	µg/L	0.5	6		19	nd	nd	nd	nd
Di(2-ethylhexyl) adipate	µg/L	5	400		19	nd	nd	nd	nd
Di(2-ethylhexyl) pthalate	µg/L	3	4		18	nd	nd	nd	nd
Dibromochloromethane	ug/L	0.5			116	10.1	33.6	19.8	19.7
Dichloromethane (methylene chloride)	µg/L	0.1	5		20	nd	nd	nd	nd
Dalapon	µg/L	10	200		29	nd	nd	nd	nd
Dinoseb	µg/L	0.5	7		17	nd	nd	nd	nd
Diquat	µg/L	4	20		11	nd	nd	nd	nd
Endrin	µg/L	0.1	2		37	nd	nd	nd	nd
Haloacetic Acids (five) [5]	µg/L	0.5	60		15	12.5	34.1	22.5	23.7
Ethylbenzene	µg/L	0.5	700		20	nd	nd	nd	nd
Glyphosate	µg/L	25	700		19	nd	nd	nd	nd
Heptachlor	µg/L	0.01	0.01		18	nd	nd	nd	nd
Heptachlor epoxide	µg/L	0.01	0.01		20	nd	nd	nd	nd
Hexachlorobenzene	µg/L	0.05	1		36	nd	nd	nd	nd
Hexachlorocyclopentadiene	µg/L	1	50		32	nd	nd	nd	nd
Lindane	µg/L	0.2	0.2		19	nd	nd	nd	nd
Methoxychlor	µg/L	10	40		38	nd	nd	nd	nd
Methyl t-Butyl Ether (MTBE)	µg/L	3	13	5	26	nd	nd	nd	nd
Molinate	µg/L	2	20		22	nd	nd	nd	nd
Monochlorobenzene	µg/L	0.5	70		20	nd	nd	nd	nd
o-Dichlorobenzene	µg/L	0.5	600		20	nd	nd	nd	nd
Oxamyl	µg/L	20	200		20	nd	nd	nd	nd
Pentachlorophenol	µg/L	0.2	1		16	nd	nd	nd	nd
Picloram	µg/L	1	500		19	nd	nd	nd	nd
(PCBs)	µg/L	0.5	0.5		19	nd	nd	nd	nd
Simazine	µg/L	1	4		23	nd	nd	nd	nd
Styrene	µg/L	0.5	100		20	nd	nd	nd	nd
Thiobencarb	µg/L		70	1	19	nd	nd	nd	nd
Toluene	µg/L	0.5	150		20	nd	nd	nd	nd
Total Trihalomethanes(TTHM)[6]	mg/L	0.5	80		111	27.4	99.9	58.2	59.6
Total Organic Carbon (TOC)	µg/L	0.5			224	1.60	6.49	3.53	3.59
Toxaphene	µg/L	1	3		20	nd	nd	nd	nd
trans-1,2-Dichloroethylene	µg/L	0.5	10		20	nd	nd	nd	nd
Trichloroethylene	µg/L	0.5	5		20	nd	nd	nd	nd
Trichlorofluoromethane	µg/L	5	150		20	nd	nd	nd	nd
Vinyl chloride	µg/L	0.5	0.5		20	nd	nd	nd	nd
Xylenes	µg/L	0.5	1750		20	nd	nd	nd	nd
Organic Constituents, Unregulated									
Ethyl-t-Butyl Ether(ETBE)	µg/L	0.3			20	nd	nd	nd	nd
t-Amyl-methyl ether (TAME)	µg/L	0.2			20	nd	nd	nd	nd
1,1,1,2-Tetrachloroethane	µg/L	0.5			20	nd	nd	nd	nd
1,1-Dichloropropene	µg/L	0.5			20	nd	nd	nd	nd
1,2,3-Trichlorobenzene	µg/L	0.5			20	nd	nd	nd	nd
1,2,4-Trimethylbenzene	µg/L	0.2			20	nd	nd	nd	nd
1,3,5-Trimethylbenzene	µg/L	0.2			20	nd	nd	nd	nd

Table 3-4.8
SUMMARY OF RAW WATER QUALITY
OTAY WTP EFFLUENT 2001 - 2005

Parameters	Units	DLR*/ MDL	Drinking Water Standards[1]		No. of Samples	Raw Water quality			
			MCL	SMCL		MIN	MAX	MEAN	MEDIAN
1,3-Dichlorobenzene	µg/L	0.5			20	nd	nd	nd	nd
1,3-Dichloropropane	µg/L	0.5			20	nd	nd	nd	nd
2,2-Dichloropropane	µg/L	0.5			20	nd	nd	nd	nd
3-Hydroxycarbofuran	µg/L	3			20	nd	nd	nd	nd
Aldicarb	µg/L	3			20	nd	nd	nd	nd
Aldicarb sulfone	µg/L	4			20	nd	nd	nd	nd
Aldicarb sulfoxide	µg/L	3			19	nd	nd	nd	nd
Aldrin	µg/L	0.075			20	nd	nd	nd	nd
Bromacil	µg/L	10			8	nd	nd	nd	nd
Bromobenzene	µg/L	0.5			20	nd	nd	nd	nd
Bromochloromethane	µg/L	0.5			20	nd	nd	nd	nd
Bromomethane	µg/L	0.5			20	nd	nd	nd	nd
Butachlor	µg/L	0.38			8	nd	nd	nd	nd
Carbaryl	µg/L	5			20	nd	nd	nd	nd
Chlorobenzene	µg/L	0.5			20	nd	nd	nd	nd
Chloroethane	µg/L	0.5			20	nd	nd	nd	nd
Chloromethane	µg/L	0.5			20	nd	nd	nd	nd
Dibromomethane	µg/L	0.5			20	nd	nd	nd	nd
Dicamba	µg/L	15			19	nd	nd	nd	nd
Dichlorodifluoromethane	µg/L	1			20	nd	nd	nd	nd
Dieldrin	µg/L	0.02			20	nd	nd	nd	nd
Geosmin	ng/L	3			156	nd	12.0	nd	nd
Hexachlorobutadiene	µg/L	0.5			20	nd	nd	nd	nd
Isopropylbenzene	µg/L	0.5			20	nd	nd	nd	nd
Methomyl	µg/L	2			20	nd	nd	nd	nd
Methyl Isoborneol (MIB)	ng/L	4			151	nd	33.3	nd	nd
Metolachlor	µg/L	10			8	nd	nd	nd	nd
Metribuzin	µg/L	0.5			8	nd	nd	nd	nd
Napthalene	µg/L	0.5			36	nd	nd	nd	nd
n-Butylbenzene	µg/L	0.5			20	nd	nd	nd	nd
n-Propylbenzene	µg/L	0.5			20	nd	nd	nd	nd
Prometryn	µg/L	2			8	nd	nd	nd	nd
Propachlor	µg/L	0.1			37	nd	nd	nd	nd
sec-Butylbenzene	µg/L	0.5			20	nd	nd	nd	nd
tert-Butylbenzene	µg/L	0.5			20	nd	nd	nd	nd

NOTES:

* The State of California DLR values are used when available. Parameters without DLR values were reported ad MDL levels.

(1) State MCL and MCLG values may be more stringent then federal standards for treated water.

(2) Turbidity of treated water is not to exceed 0.3 NTU 95% of the time.

(3) Based on the Langelier Index. A positive quantity indicates non-corrosive tendencies. A negative quantity indicates corrosive tendencies.

(4) No more then 5% of distribution system samples can be total coliform positive

(5) Haloacetic acids (five) is the sum of the concentrations of mon-, di-, and trichloroacetic acids and mono- and dibromoacetic acids. MCL based on Annual Average

(6) Total trihalomethanes is the sum of the concentrations of chloroform, bromodichloromethane, dibromochloromethane, and bromoform. MCL based on Annual Average

nd: non-detected at State DLR or MDL if DLR not Available

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

This chapter provides a summary of the key conclusions from this survey and recommendations to improve watershed protection and enhance drinking water quality.

Conclusions

Watershed and Water Supply System -

The City owns less then five% of the land within the watershed. Private and public ownership of the remaining lands is roughly equal. Several large Native American Indian reservations are contained within the watershed. This ownership pattern limits the control measures the City can implement and focuses watershed control efforts on coordination and communication with agencies.

Most of the watershed lands support rural, agricultural and open space land uses. However, there are several rural communities, such as Jamul, Dulzura, Morena Village and Pine Valley which exhibit urban characteristics. Potential contamination sources include many nonpoint sources which are more difficult to control than point sources.

The terrain is generally mountainous with slopes greater than 25%, creating the likelihood of transport of soils and contaminants to water bodies. The soils have generally high erosion potential. Rainfall ranges from approximately 13 inches annually in the lower watershed, to 20 to 30 inches annually in the mountain areas.

Morena, Barrett, Upper Otay, and Lower Otay reservoirs are interconnected and supply water to the Otay Water Treatment Plant. The reservoirs are connected in series starting at Morena Reservoir, flowing through Barrett Reservoir and ending in Otay reservoir. The plant also receives water from the San Diego County Water Authority (SDCWA).

The local water quality greatly influences the treatment requirements and the quality of water produced by the water treatment plant. The City has a policy of maximizing the use of local water. This policy minimizes the purchase of imported water.

Potential Contamination Sources in the Watershed -

The watersheds in San Diego County experienced huge fires in the fall of 2003. The fires burned 45% of the Otay Watershed. The fires were followed with very heavy rainfall in the winter of 2004. This combination of fires and rainfall resulted is large quantities of ash, soil, rocks, and debris being washed from the watershed into streams and reservoirs.

Other potential significant sources of contamination include livestock, sewage spills from Padre Dan Municipal Water District's pump station, San Vicente WRF, Barrett Honor Camp ponds, old and new septic systems, sewer spills, and recreational wastewater treatment facilities. In addition Otay WTP discharges filter backwash and sludge in Otay Reservoir.

Watershed Management and Control Practices -

The City exercises a number of management practices or controls within the watershed. On City lands, land use and potentially polluting activities are controlled directly. On lands not owned by the City, the primary controls include:

1) Monitoring land use, CEQA compliance activities, water quality permit activities, and other regulatory actions.
2) Coordinating with other agencies to implement appropriate controls. Additional City resources have been utilized in the past five years to improve City participation and control in both City owned and non-City owned land.

Water Quality Conditions -

Reservoir raw water quality monitoring indicates several constituents may be of concern. The constituents include turbidity, coliforms, nitrogen compounds, and TOC. A concentration of each contaminant varies from reservoir to reservoir and over time. Rain and fire events had significant impacts on turbidity, nitrogen compounds, and TOC.

Recommendations

General Recommendations -

Recommendations and corrective actions were developed for the purpose of improving overall watershed protection and drinking water quality. Generally, the recommendations strengthen this first barrier to water quality degradation – protection of source watershed. By strengthening this first barrier, impacts on the second barrier – water treatment – may be reduced.

The Otay Water Treatment Plant is effective at treating the raw water to meet current federal and state drinking water regulations except when operating on 100% Otay Reservoir water. Otay WTP produces high levels of TTHMs when treating 100% Otay Reservoir water. Blending of Otay Reservoir and imported water allows the Otay WTP to meet current TTHM limits. Requirements of the Stage 2 Disinfectants and Disinfection Byproducts Rule promulgated in January 2006, modify distribution system monitoring and

compliance criteria. Current treatment plant process and raw water quality make compliance with the Stage 2 rule difficult. Continued protection of the watershed is important in meeting drinking water quality regulations.

The recommendations provided are grouped by the following subjects:

- Water Quality Monitoring and Evaluation
- Interjurisdictional Coordination
- Watershed Management and Control Practices
- Public Education

Water Quality Monitoring and Evaluation -

During the 2001 – 2005 time period watersheds monitoring was significantly increased. The City should continue monitoring the watersheds. The baseline data for many parameters has been collected.

Additional evaluation of the data should be used to provide guidance on actions necessary to protect the watersheds. As with any monitoring program, the program should be evaluated to help ensure the necessary data is being obtained while conserving laboratory resources.

The monitoring program should place emphases on obtaining information necessary to assisting City and non-City forces efforts to protect the watershed. Continued interaction with all interested parties is necessary to continually improve the monitoring program.

Interjurisdictional Coordination -

Lines of communication both within the City and with neighboring agencies have been improved during the 2001 – 2005 time period. However, continued efforts are needed to further the communication and cooperation among agencies. Specific actions pertaining to Interjurisdictional coordination include the following:

- Expand Workgroups

  Workgroups have been established between many of the agencies such as County Planning, U.S. Forest service, Bureau of Land Management. The formation of the workgroups was a positive step. Participation in the workgroups is not consistent among the agencies and the City. Ensuring City forces continue to participation in workgroups is important to coordination between agencies. The City should also determine if additional workgroups will be beneficial.

- Review of New Watershed Land Uses

  Land use with the watersheds impacts potential contamination of the water. The City should emphases minimizing potential water quality issues when working with other agencies on watershed land usages.

Watershed Management and Control Practices -

Continue to reduce the impacts from cattle grazing. Impacts can be reduced by elimination of cattle grazing from riparian corridors, prevent cattle access to streams and water bodies, control transport of cattle waste to streams and water bodies, and reduce cattle density.

Public Education -

Public education material has been developed for trail and reservoir usage. Maintaining the educational material in readily available locations will help educate the public to the importance of protecting the watershed. The material should be periodically reviewed to ensure that it is accurate and appropriate.

Residents within the watershed have a significant impact on protecting the watershed. Educational programs should emphasize what residents can do to help protect the watershed and how protecting the watershed provides them great benefits.

Public awareness signage has been installed in several transportation corridors. The signage provides information on actions they can take to help improve water quality. The City should maintain the signage and review it for accuracy and appropriateness.