CITY OF RIDGECREST

Wastewater Treatment Plant No. 2

FINAL PROJECT REPORT

September 2008

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Engineers... Working Wonders With Water™

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WASTEWATER TREATMENT PLANT NO. 2 PROJECT REPORT

FINAL

SEPTEMBER 2008

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City of Ridgecrest

WASTEWATER TREATMENT PLANT NO. 2

PROJECT REPORT

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Chapter 1

INTRODUCTION

1.1 BACKGROUND

The City of Ridgecrest (City), and the China Lake Naval Air Weapons Station (NAWS), are located in California's Indian Wells Valley in the High Mojave Desert. The City in located in northeastern Kern County on Business Route 395 approximately 110 miles east-northeast of the City of Bakersfield. A location map is shown in Figure 1.1.

There were less than 100 people living in the Indian Wells Valley when Naval weapons testing began in 1943. By the mid 1950s, the Ridgecrest Sanitation District (RSD) was established to serve the small civilian service community that had developed outside the base. At that time, wastewater from the NAWS was treated at a facility on the base, while the RSD operated a smaller plant in the City. Around the mid-1970s a shift in population from the NAWS to the City created capacity problems for RSD at its treatment plant. The Environmental Protection Agency required the City and the NAWS to consolidate and treat the combined flows at a common wastewater plant on the NAWS. The plant located in the City was abandoned. The City has been operating the NAWS facility since 1974 and an expansion of the plant was complete in 1976 that provided capacity to treat both the City and NAWS flows.

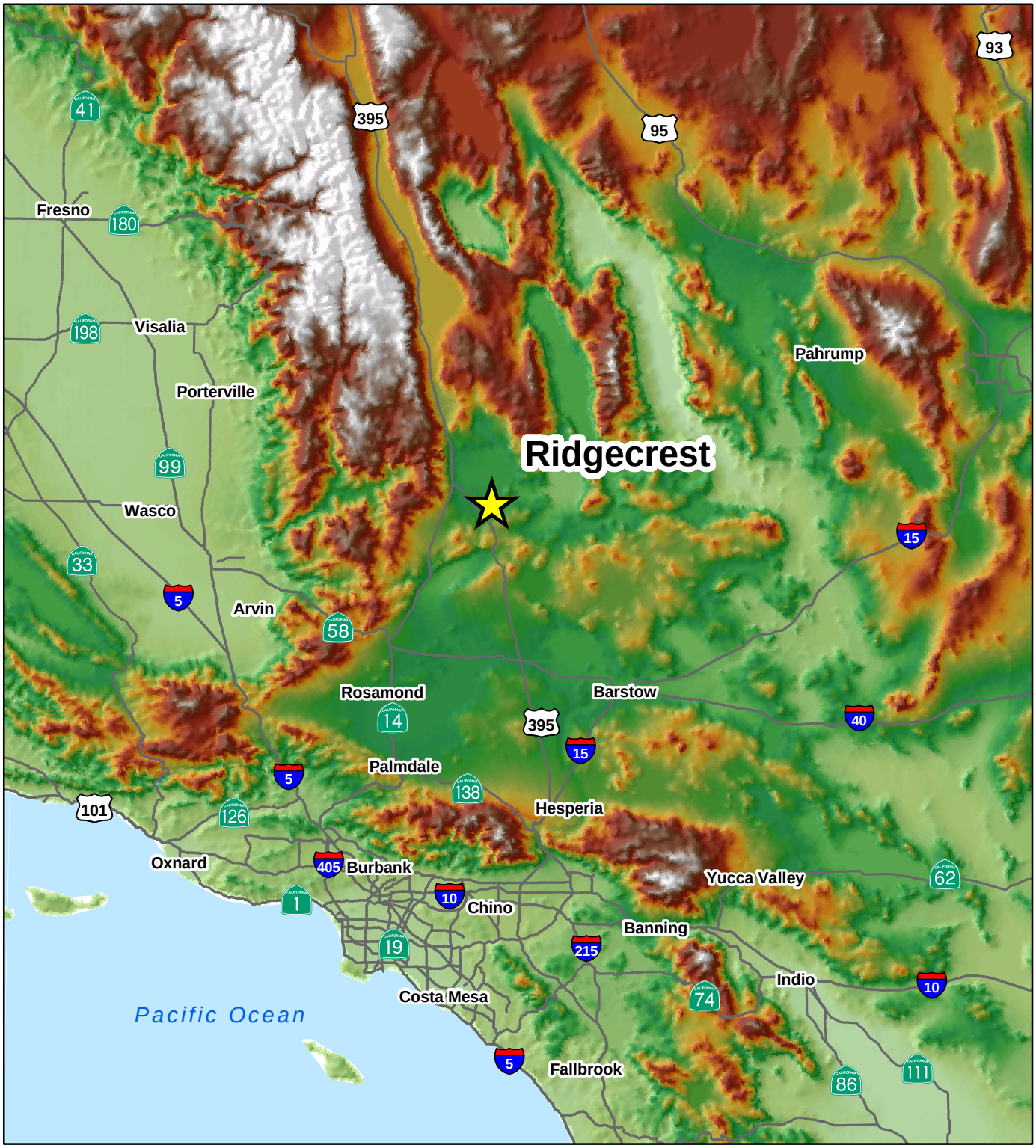
Wastewater from the City is collected in three trunks, a 24-inch diameter trunk from the NAWS and 15 and 24-inch trunks coming from the City. These trunks collect approximately 38 miles of sewer pipelines.

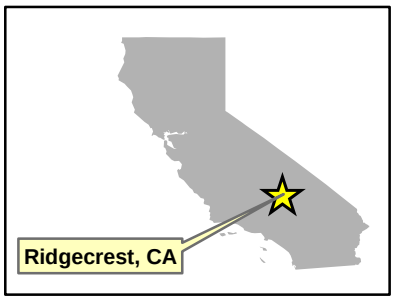
In 1993, the City was treating 3.3 million gallons per day (mgd) and the California Regional Water Quality Control Board (RWQCB) ordered the design of a plant expansion. During the mid 1990s, the population was in decline and flows stabilized around 2.9 mgd in 1996/97. Based on recent growth projections, the City is ready to expand the capacity of its wastewater treatment facilities to accommodate the new growth.

Currently the City discharges to four storage/percolation ponds located at the existing plant site and to a City owned 10-acre reclamation pond facility located at the site of the old RSD treatment plant on the eastern side of the City. The NAWS reclaims a portion of the treated effluent for irrigation of 214 acres at the NAWS golf course.

1.2 PURPOSE AND SCOPE OF STUDY

The purpose of this study is to develop a facilities plan for the wastewater treatment plant (WWTP) based on projected flows and loadings through the year 2030. The City is considering the construction of a second wastewater treatment facility to be located near the abandoned plant site east of Upjohn Road.





Elevation

High :14,000 Feet

Low : Sea Level

Major Roads

0 15 30 60 Miles

FIGURE 1.1
LOCATION MAP

WWTP FACILITIES PLAN

CITY OF RIDGECREST

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This report details the treatment, effluent disposal, and biosolids disposal alternatives that were proposed for the new treatment plant (Plant 2). A recommended project including an implementation schedule was developed for the project. The study must meet the current and anticipated waste discharge requirements of the RWQCB - Lahontan Region.

1.3 PREVIOUS STUDIES AND REPORTS

Table 1.1 lists the studies and reports that have been reviewed and incorporated into the preparation of this study.

Table 1.1 Previous Studies and Report
Wastewater Treatment Plant No. 2
City of Ridgecrest

Name	Date
Master Sewer Plan for the City of Ridgecrest	1981
Revised Master Sewer Plan for the City of Ridgecrest	1987
City of Ridgecrest Wastewater Treatment Plant Expansion	1998
Master Plan for Wastewater Treatment Facilities	1994
City of Ridgecrest - Sewer Study Letter	2002
Groundwater Management in the Indian Wells Valley Basin - Ridgecrest California	2003
Indian Wells Valley Water District - 2005 Urban Water Management Plan	2005

1.4 GENERAL

1.4.1 Climate

In broad climatological terms, the winters in Ridgecrest can be characterized as mild and dry. Summers are hot, dry, and nearly cloudless, this climate is the result of both the local topography and the mean position of the seasonal mid-latitude storm track.

The summer temperatures range from daytime highs of over 100 degrees Fahrenheit to nighttime lows of about 50 degrees Fahrenheit. The winter temperatures drop below 32 degrees Fahrenheit, with the frost period extending from late November to early March.

Precipitation in this area of California is not plentiful. It averages between 1 to 5 inches per year. Most of the rain falls between November and April. The prevailing wind is from the northwest. The wind generally increases in the evenings because of thermal effects.

1.4.2 Topography

Terrain in the City is mildly sloping with hills and mountain ranges surrounding the City. The slope of the incorporated portion of the City is approximately 0.5 percent (one foot per 200 feet). The average ground level elevation is approximately 2,300 feet above mean sea level (msl).

1.4.3 Geology

The City is situated on deep alluvial deposits. These deposits consist of heterogeneous, lenticular beds of unconsolidated clay, silt, sand, gravel, and boulders that were deposited from the large drainages of the surrounding mountain ranges, especially the Sierra Nevada and the Argus Range. Because of the relatively flat topographic conditions, soil erosion is minimal within the City.

It is general knowledge that the Kern County Region is seismically active. The Indian Wells Valley is bounded by the Sierra Nevada Fault on the west and the Argus Fault on the east. Three sets of strike slip fault zones cut across the center of the valley itself. Infrastructure improvements, residential developments and non-residential developments, like all other construction in the community and the Kern County area, could be subject to potentially severe seismic shaking in the event of an earthquake

1.4.4 Water Supply

All residential and commercial water service is provided to the City by Indian Wells Valley Water District (IWVWD), a privately held utility company which pumps water from 12 wells into above ground storage tanks within the City. IWVWD has long been reliant on groundwater as their sole source of potable water.

The normal depth to water in 2003 was approximately 160 feet. According to the City of Ridgecrest Consumer Confidence Report, located in Appendix A, water is of good quality with average values of specific conductance at 277 µmhos/cm, sodium at 92 parts per million (ppm), chlorides at 91 ppm, total hardness at 76 ppm and nitrate at 1.7 ppm.

The NAWS owns and operates water wells and storage tanks for delivering potable water to the NAWS. The wells and storage tanks are within the NAWS.

1.4.5 Groundwater

The ground water below the proposed Plant 2 sites is contained in a shallow perched aquifer that contains brackish water with high chloride, total dissolved solids, and arsenic concentrations. The nearest IWVWD domestic well is 1.5 miles from the proposed Plant 2 site.

The City has installed four groundwater monitoring wells at the existing plant site and three monitoring wells at the Plant 2 site (Appendix B). Samples have been taken since August of 2000. Depth to water in these wells is approximately 100 feet below ground surface.

Levels for total dissolved solids, nitrate, chloride, and arsenic in the groundwater surrounding the Plant 2 site are provided in Table 1.2 along with a comparison of the plant effluent, and domestic source water.

Table 1.2 Comparison of Background Constituents with Effluent Concentrations Wastewater Treatment Plant No. 2 City of Ridgecrest

Constituent	Water Supply(1)	Effluent Concentration(2)	Monitoring Well Concentration Range(3)
Total Dissolved Solids (mg/L)	355	640	1,020 - 1,660
Nitrate as Nitrogen, N (mg/L)	1.7	2.4	1.8 - 2.7
Total Kjeldahl Nitrogen (mg/L)	--	8.6	--
Chloride (mg/L)	91	170	320 - 550
Arsenic (μg/L)	10.9	10	15 - 96

Notes:
1. 2005 consumer Confidence Report by IWVWD.
2. Effluent concentrations taken from a general minerals analysis conducted in August 2006. Nitrate concentration from RWQCB monitoring reports for 2005 and 2006.
3. Concentrations from Groundwater Monitoring Wells No. CRMW01-3 data from the plant site taken between August 2000 and January 2004.

From Table 1.2 it can be seen that the groundwater of the shallow aquifer appears to be of poor quality and therefore, percolated effluent will not degrade the water contained in the shallow aquifer. A more detailed analysis of the groundwater conditions below the Plant 2 site and the possible migration of water from the perched upper aquifer to the lower potable aquifer is beyond the scope of this report.

EXISTING AND PROJECTED SERVICE AREA

2.1 SERVICE AREA

The City of Ridgecrest (City) is a community located in the Indian Wells Valley approximately 110 miles east-northeast of the City of Bakersfield. The Ridgecrest Wastewater Treatment Plant (WWTP) is located approximately 3.5 miles northeast of the center of the City. The WWTP is located on the China Lake Naval Air Weapons Station (NAWS) and the land surrounding it is high desert type landscape with little vegetation and no residential development. The location of the existing WWTP and its associated service area are shown in Figure 2.1.

As stated previously the City would like to construct a new wastewater treatment plant (Plant 2) on the east side of the City. According to City Staff the projected buildout design flow for Plant 2 would be approximately 3.0 million gallons per day (mgd). The service area for Plant 2 is shown in Figure 2.2. The new plant would scalp flow from the existing collection system and have capacity to treat additional flow from developing areas south of Upjohn Street up to the design flow of 3.0 mgd.

2.2 HISTORICAL AND PROJECTED POPULATIONS

Carollo Engineers, P.C. (Carollo) obtained Kern Council of Governments (COGs) historic population data and population projections from the Department of Finance (DOF) for this study.

Population data and growth projection estimates are essential to determining the present per capita wastewater flows and to estimate future wastewater flow projections. To determine the projected population an average growth rate needs to be used. Analysis of historic population figures has shown a historic growth rate of 1.3 percent from 1985 to 2005. Based on the direction of City staff, population projections were obtained from a report developed by WZI. Inc entitled Development Cost and Fee Study for Fire Facilities, Traffic Impacts, Park Development, Law Enforcement, and Storm Drain Facilities (Appendix C). This report established an average growth rate of 4.45 percent to the year 2015. This growth rate is used for calculating projected flows. Based on direction from City staff a growth rate of 2 percent was used to project population from 2015 to the year 2030. Historical and projected populations using the 4.45 and 2 percent projection rates for the City are outlined in Table 2.1. The net average annual growth rate over the 20-year planning period is approximately 2.6 percent. Based on these growth rates, the design population for the year 2030 will be approximately 56,077 residents.

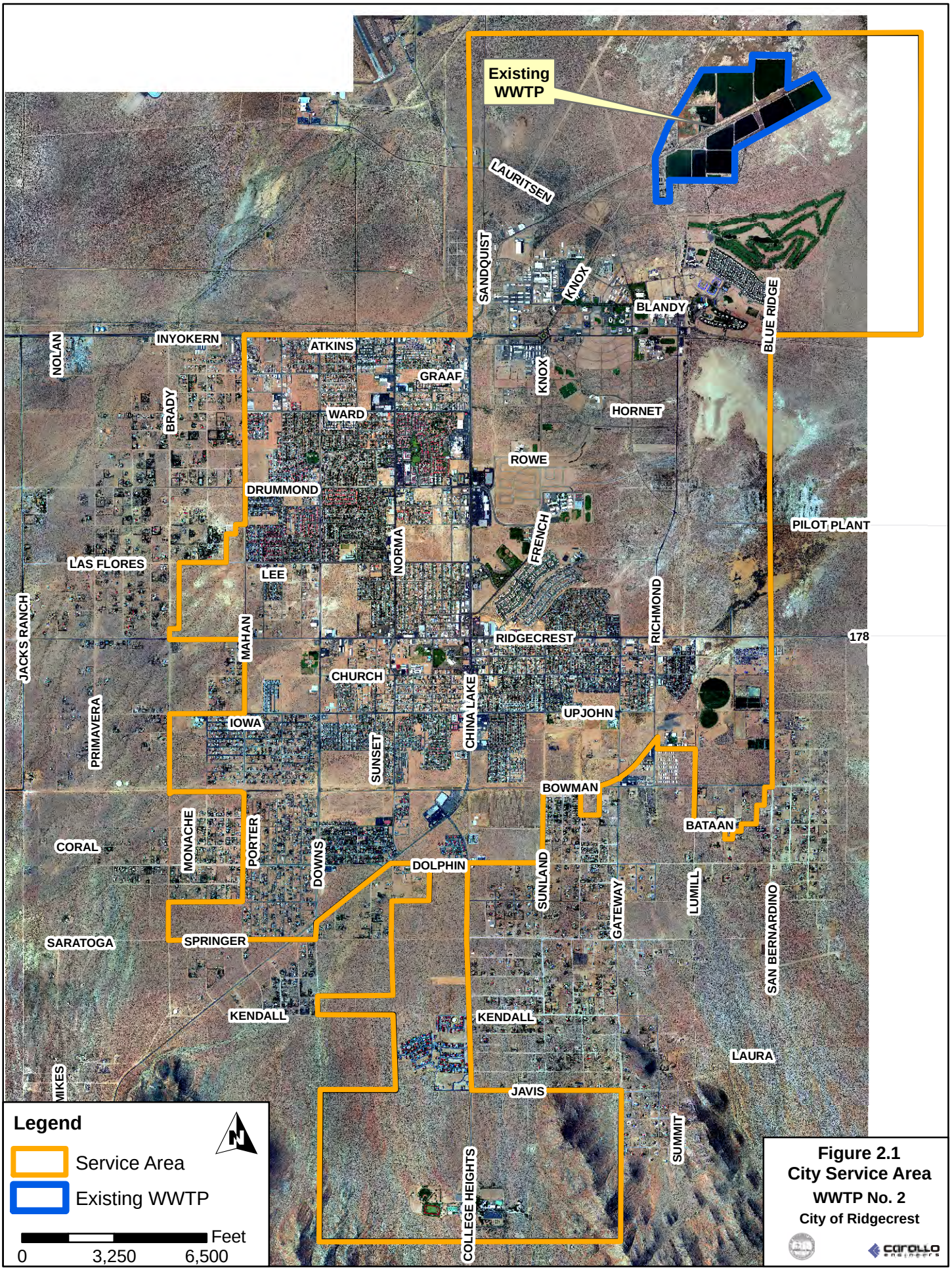

Figure 2.1
City Service Area
WWTP No. 2
City of Ridgecrest

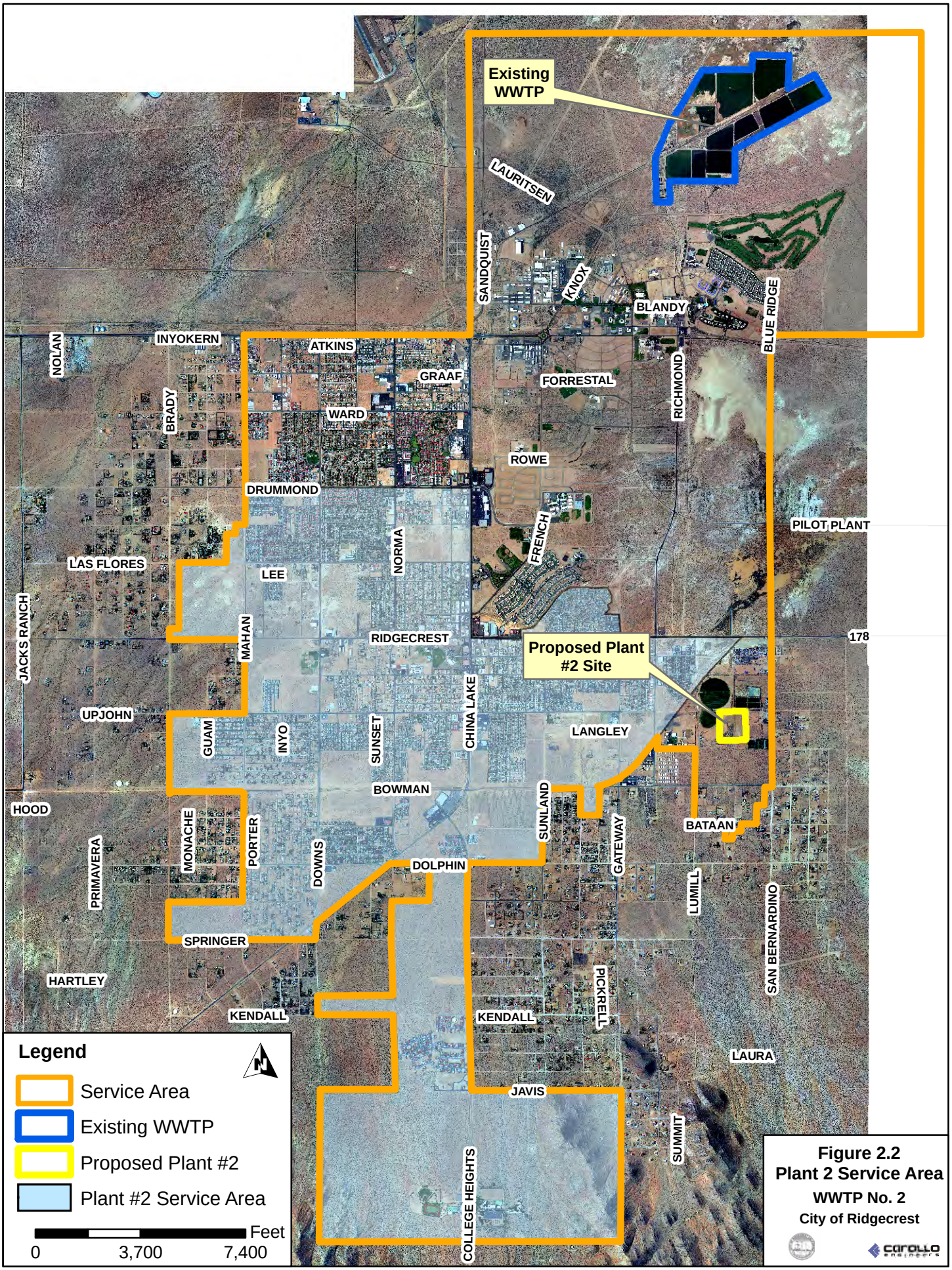

Figure 2.2
Plant 2 Service Area
WWTP No. 2
City of Ridgecrest

Table 2.1 Historical and Projected Population
Wastewater Treatment Plant No. 2
City of Ridgecrest

Year	Population[1]	Percent Growth
1985	21,700	2.07
1986	22,150	4.51
1987	23,150	6.91
1988	24,750	6.26
1989	26,300	4.94
1990	27,600	3.26
1991	28,500	0.70
1992	28,700	0.52
1993	28,850	-1.21
1994	28,500	-2.11
1995	27,900	-1.61
1996	27,450	-0.91
1997	27,200	-3.86
1998	26,150	-3.06
1999	25,350	-1.38
2000	25,000	0.93
2001	25,232	1.45
2002	25,598	1.02
2003	25,858	1.14
2004	26,154	1.96
2005	26,666	5.63
2006	28,166	5.33
2010	34,166	4.39
2015	41,666	4.45
2020	46,003	2.00
2025	50,791	2.00
2030	56,077	2.00

Note:
1. Population for 1985 though 2005 from Department of Finance population data. Projected population based on a projected 4.45 percent average growth rate up to 2015. From 2015 to 2030 a growth rate of 2% was used.

HISTORICAL AND PROJECTED FLOWS AND LOADINGS

3.1 HISTORICAL INFLUENT FLOWS

3.1.1 Annual Average Daily Flows

The relationship between past population and average annual daily (AAD) flows is used to determine the wastewater flows per capita in gallons per capita per day (gpcd). The historical gpcd is then used to estimate the projected gpcd for the planning period. The flows used to determine the gpcd include all of the flows into the Wastewater Treatment Plant (WWTP). The WWTP monitoring data is summarized in Appendix D. Historical AAD flows for the last five years are outlined in Table 3.1 below and shown in Figure 3.1.

Table 3.1 Historical AAD Flows
Wastewater Treatment Plant No. 2
City of Ridgecrest

Year	Population	Flow (mgd)	Per Capita Flow (gpcd)
2001	25,232	2.52	100
2002	25,598	2.50	98
2003	25,858	2.58	100
2004	26,154	2.52	96
2005	26,666	2.51	94
2006	28,166	2.57	91
6-Year Average		**2.53**	**97**

The calculated average value for the per capita wastewater flow for the past six years is 97 gpcpd. Therefore, for the purpose of this study, a per capita flow rate of 97 gpcd will be used for projecting future AAD flows.

3.1.2 Average Day Maximum Month Flow

The design of wastewater treatment plants is generally based on the average day maximum month (ADMM) flows. Using this approach the WWTP will have the capacity to treat the wastewater from the maximum month conditions as well as the average month. To project the ADMM flows the ratio of the historical ADMM to the AAD flows of the previous six years was determined. As shown in Table 3.2, the average ADMM to AAD ratio

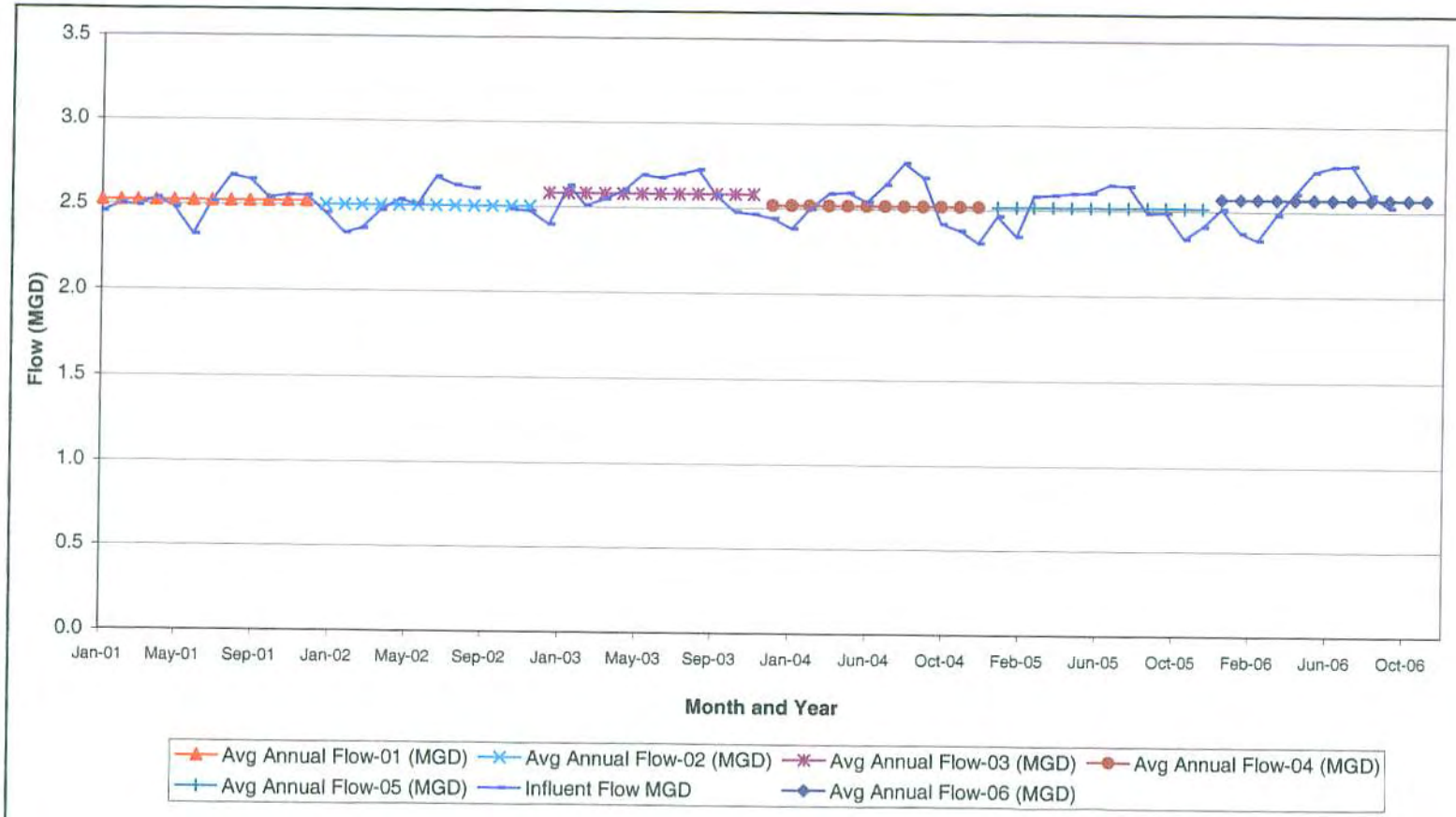

Figure 3.1
HISTORICAL MONTHLY AVERAGE FLOWS
City of Ridgecrest
Wastewater Treatment Plant No.2

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for the most recent 6-year period is 1.10. Therefore, a 1.10 ADMM to AAD flow factor will be used to determine the ADMM flows for the future planning period.

Table 3.2 Historical AAD and ADMM Flows Wastewater Treatment Plant No. 2 City of Ridgecrest

Year	Population	AAD Flow (mgd)	ADMM Flow (mgd)	ADMM:AAD Factor
2001	25,232	2.52	2.67	1.06
2002	25,598	2.50	2.67	1.07
2003	25,858	2.58	2.72	1.05
2004	26,154	2.52	2.77	1.10
2005	26,666	2.51	2.65	1.05
2006	28166	2.57	2.77	1.08
6-Year Average				**1.10**

3.1.3 Peak Hourly Flow

The peak hourly (PH) flow is required to make certain the pipelines, meters, and other critical hydraulic appurtenances are sized adequately, and to minimize any potential for flooding or overflow during high flow events. Usually, wastewater flows increase in wet weather because of infiltration and inflow. Previous reports list the PH factor as 1.75. However, a peaking factor of 2.0 will be utilized to determine peak hour flow rates. This factor is similar to flow projection factors used at similar sized communities in California. The flow projection factors and their corresponding flows to be used in this analysis are presented in Table 3.3 below.

Table 3.3 Flow Projection Factors Wastewater Treatment Plant No. 2 City of Ridgecrest

Flow Condition	Flow Projection Factor
Average Wastewater Flow per Person per Day (gpcd)	97
Average Annual Daily Flow (AAD)	1.0
Maximum Month to Average Day Flow (MMAD)	1.10
Peak Hour Flow (times AAD Flow)	2.0

3.2 PROJECTED INFLUENT FLOWS

Applying the above flow projection factors to the estimated future population at the growth rate specified in Chapter 2 results in the following projected yearly flows as shown in Table 3.4 below. This reveals the WWTP will only have the hydraulic capacity to treat the

ADMM flows through the year 2007.

Table 3.4	Projected AAD and ADMM Flows Wastewater Treatment Plant No. 2 City of Ridgecrest			
Year	**Population[1]**	**AAD Flow (mgd)**	**ADMM Flow (mgd)**	**PH Flow[3] (mgd)**
2005[2]	26,666	2.58	2.84	5.16
2006	28,166	2.72	3.00	5.45
2007	29,666	2.87	3.16	5.74
2008	31,166	3.01	3.32	6.03
2009	32,666	3.16	3.48	6.32
2010	34,166	3.30	3.63	6.61
2015	42,291	4.09	4.50	8.18
2020	46,003	4.45	4.89	8.90
2025	50,791	4.91	5.40	9.82
2030	56,077	5.42	5.97	10.85
2030 Planning Flows		**5.50**	**6.00**	**11.00**

Notes:
1. Based on projected growth rate of 4.45% from 2005 to 2015 and 2% from 2015 to 2030.
2. PH flow factor of 2.0 assumed.

The flow projections indicate a flow of 5.98 mgd in the year 2030. For the purposes of plant design criteria, an ADMM flow 6.0 million gallons per day (mgd) will be used and 5.5 mgd will be used for AAD.

3.3 DISTRIBUTION OF WASTEWATER FLOW

Plant 2 will scalp flow from the existing collection system by intercepting flow from a 21-inch diameter sewer trunk on East California Boulevard and a 21-inch diameter trunk in East Upjohn Road. These two trunk lines converge near the intersection of East California Boulevard and Lumell Street (Figure 3.2).

The existing wastewater treatment plant treats an average daily flow of approximately 2.5 mgd. Approximately 70 percent of the 2.5 mgd is attributed to the City of Ridgecrest, the other 30 percent is from the China Lake Naval Air Weapons Station (NAWS). The 70 percent equates to an existing City flow of approximately 1.77 mgd.

In order to determine the portion of the existing 1.77 mgd that will flow to Plant 2 and the existing plant an analysis was conducted using aerial photograph and geographic information system (GIS) software. The area serviced by the existing treatment plant was

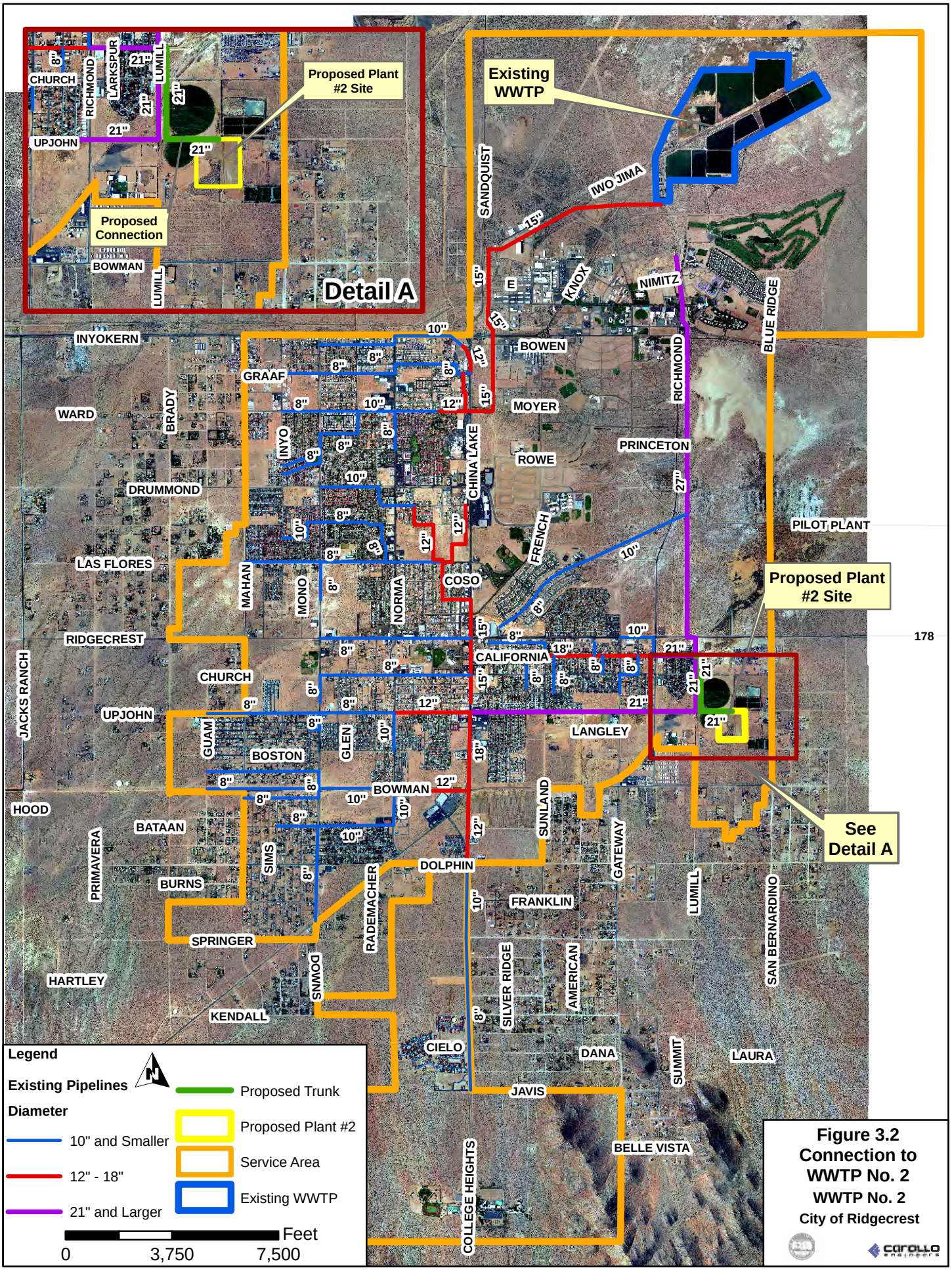

Figure 3.2
Connection to WWTP No. 2
WWTP No. 2
City of Ridgecrest

determined to be approximately 9,000 acres. Approximately 4,700 acres of the 9,000 existing acres is vacant land.

The average flow of 1.77 mgd was divided by the developed acreage to yield a wastewater generation factor of approximately 410 gallons per day per acre (gpdpa). This factor is relatively low compared to other cities in California. Typical values range between 800 and 2,000 gpdpa. The wastewater flow generation factor is used to determine flows contributions to the existing WWTP and Plant 2.

3.3.1 Plant 2 Service Area Wastewater Flows

A review of the wastewater collection system provided the area within the existing service area that will be tributary to Plant 2. This area includes lands south of West Drummond Avenue (Figure 3.3) and includes approximately 6,000 acres total with 3,100 acres of vacant land and 2,900 acres of developed lands.

In order to determine the wastewater flow rates for Plant 2 the 410 gpdpa wastewater generation factor was applied to the 2,900 acres of developed lands in the Plant 2 service area. This yielded an existing wastewater flow of 1.2 mgd. The service area diversion was determined to be at the intersection of California Avenue and Lumill Street.

At buildout of the City limits, a more conservative factor of 800 gpdpa was applied to the vacant lands. The 800 gpdpa factor was used assuming development density increases according to current residential building trends in California. This assumption increased the flow at build out for Plant 2 to a total of 3.6 mgd. Table 3.5 summarizes the flow development for existing and buildout conditions. The build out flow of 6.14 mgd is based on the total service area being developed. This number differs slightly from the 2030 population flow projections in Table 3.4. The 2030 population may not correspond to build out of the City limits. The flows at startup of Plant 2 are based on the projected City population in the year 2010.

Table 3.5 Wastewater Flow Distribution by Treatment Plant
Wastewater Treatment Plant No. 2
City of Ridgecrest

Flow Condition	Existing WWTP AAD/ADMM (mgd)	Plant 2 AAD/ADMM (mgd)	Total AAD/ADMM (mgd)
Existing	2.55/2.80	0	2.55/2.80
Start-up of Plant 2[2]	1.33/1.46	1.97/2.17	3.30/3.63
Buildout[1]	2.48/2.73	3.66/4.03	6.14/6.75

Note
1. Flow projections based on service area
2. Start up of Plant 2 assumed to be in the year 2010.

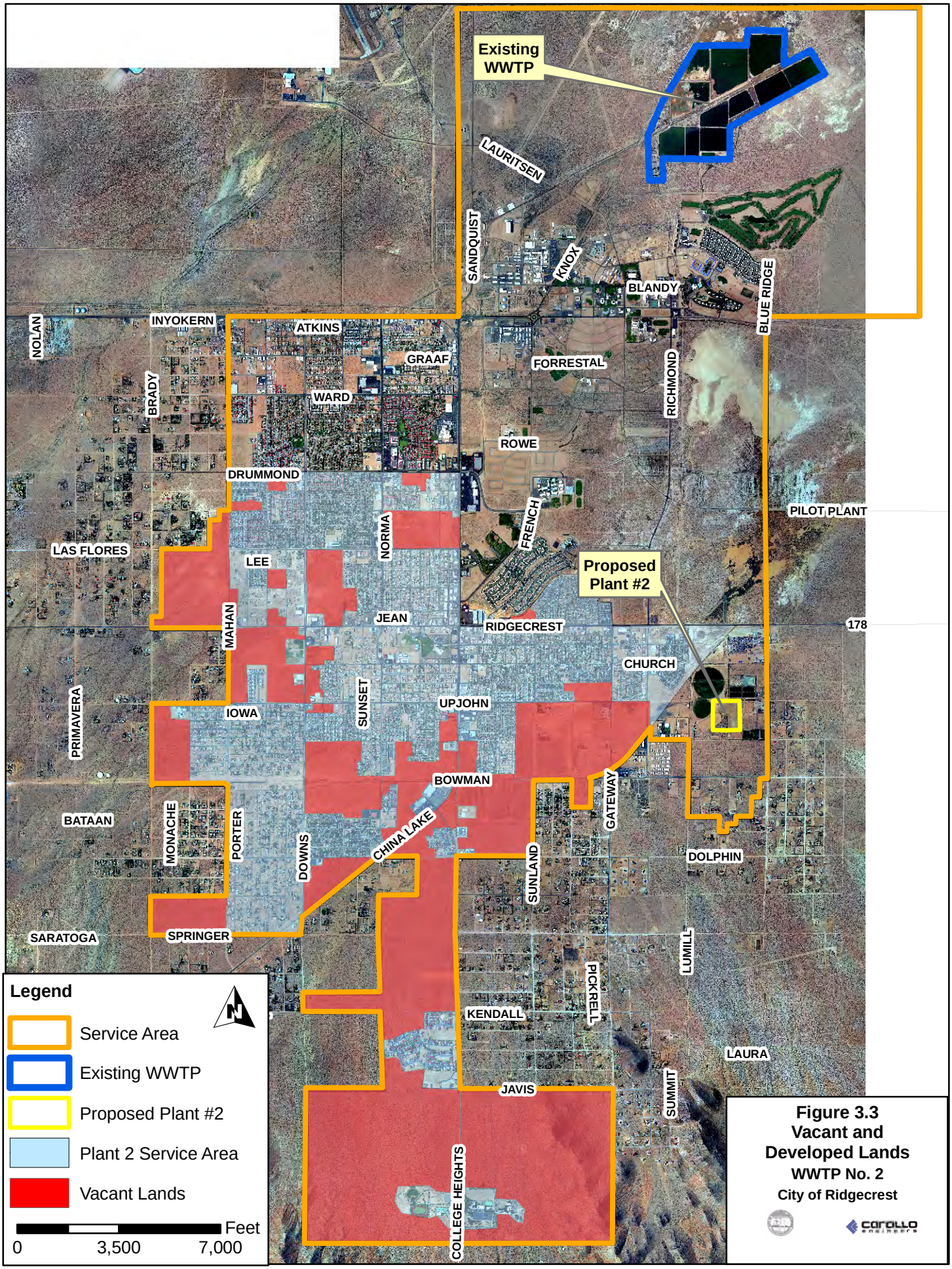

Figure 3.3
Vacant and Developed Lands
WWTP No. 2
City of Ridgecrest

As a result of the total population projection review, City staff recommended that the study be limited to 3.0 mgd at the Plant 2 site. Therefore, based on the Plant 2 service area analysis, approximately 0.66 mgd will need to be diverted to the existing WWTP. This can be easily accomplished by constructing a splitter structure at the diversion point.

3.4 HISTORICAL INFLUENT LOADINGS

3.4.1 General

Generally, wastewater strength is defined by its 5-day biochemical oxygen demand (BOD_5), total suspended solids (TSS), and its nitrogen content. The City's current Waste Discharge Requirements (WDR) does not require monitoring of TSS therefore there is no discussion of TSS influent concentrations. The TSS is assumed to be of normal strength for domestic sewage.

The BOD_5 is described as the amount of oxygen required over a five-day period at 20 degrees Celsius by bacteria while stabilizing the decomposable organic matter under aerobic conditions. Nitrogen can be found in many different forms such as ammonia (NH_3), organic nitrogen (N), nitrate (NO_3) and others. Typically, the nitrogen in untreated domestic wastewater is comprised of ammonia plus organic nitrogen and is defined as total Kjeldahl nitrogen (TKN).

3.4.2 Influent BOD_5

Based on the review of the historic influent loadings, it was determined that the past five years represents the best available data for determining the current influent characteristics. The WWTP monitoring data is summarized in Appendix D. Historical influent BOD_5 loadings for the past six years are shown in Table 3.6 and graphically in Figure 3.4. The six-year historical BOD_5 concentration for this time-period was 171 milligrams per liter (mg/L) for the annual average loads, and 308 mg/L for maximum monthly average loads. These are typical values for domestic sewage.

Table 3.6	Historical Influent BOD_5 Loading Wastewater Treatment Plant No. 2 City of Ridgecrest				
	Annual Average		Maximum Month		MMAD:AAD Factor[1]
Year	mg/L	ppd	Mg/L	ppd	
2001	208	3994	590	12297	3.08
2002	185	3538	260	5384	1.52
2003	170	3644	370	7603	2.09
2004	153	3204	230	4634	1.45
2005	158	3316	200	4145	1.25
2006	150	2685	200	4343	1.62
6-year Average	**171**		**308**		**1.83**

Based on a review of the above data, the ADMM BOD_5 concentration is 308 mg/L and this value reflects the average for the ADMM BOD_5 loadings over the six-year period versus the average annual loadings. The maximum month concentrations generally do not correspond to maximum month flows. Therefore, using the 6-year average maximum month concentration of 310 mg/L (with ADMM flows) would result in an overly conservative design. An ADMM design concentration of 280 can be calculated using the factor between the MMAD to AAD loadings.

However, as newer homes will dominate the wastewater flows to Plant 2, a conservative design concentration of 300 mg/L will be used for the plant design.

3.5 HISTORICAL PLANT PERFORMANCE

The records for the effluent quality from the WWTP for the last six years have also been reviewed and tabulated. Generally, the WWTP has produced an excellent quality effluent. Data for the effluent BOD_5 are summarized below.

3.5.1 Effluent BOD_5

The effluent BOD_5 shown in both concentration (mg/L) and loading (ppd) are shown in Table 3.7. Based on this data over the last six years the plant effluent has averaged 21 mg/L. The corresponding BOD_5 removal rates, determined from comparing the annual average influent and effluent concentration values, have also been shown with a 6-year average BOD_5 removal rate of 87 percent. Figure 3.5 also graphically displays the historic monthly BOD_5 removal rate.

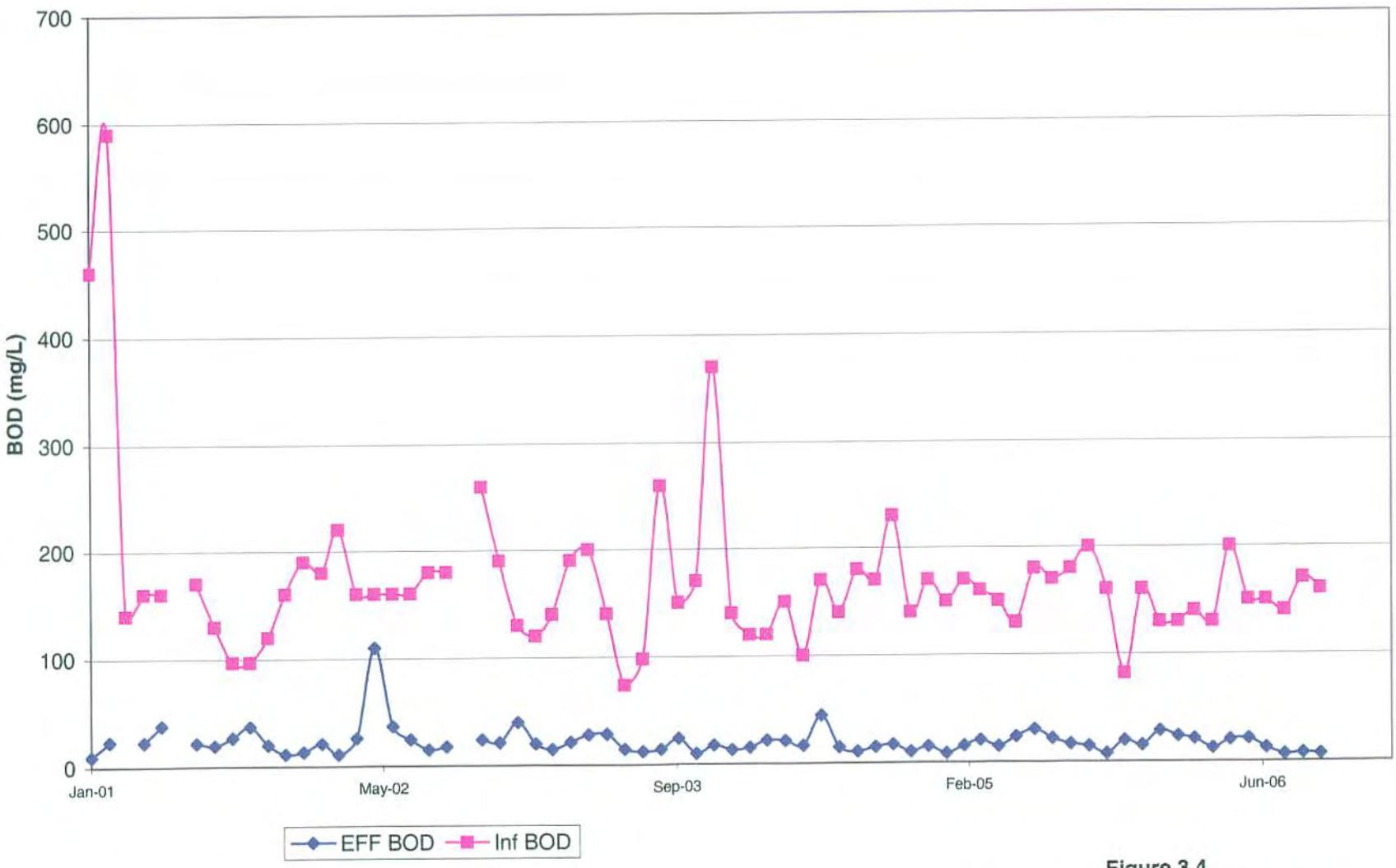

Figure 3.4
HISTORICAL MONTHLY AVERAGE BOD_5 CONCENTRATIONS
City of Ridgecrest
Wastewater Treatment Plant No.2

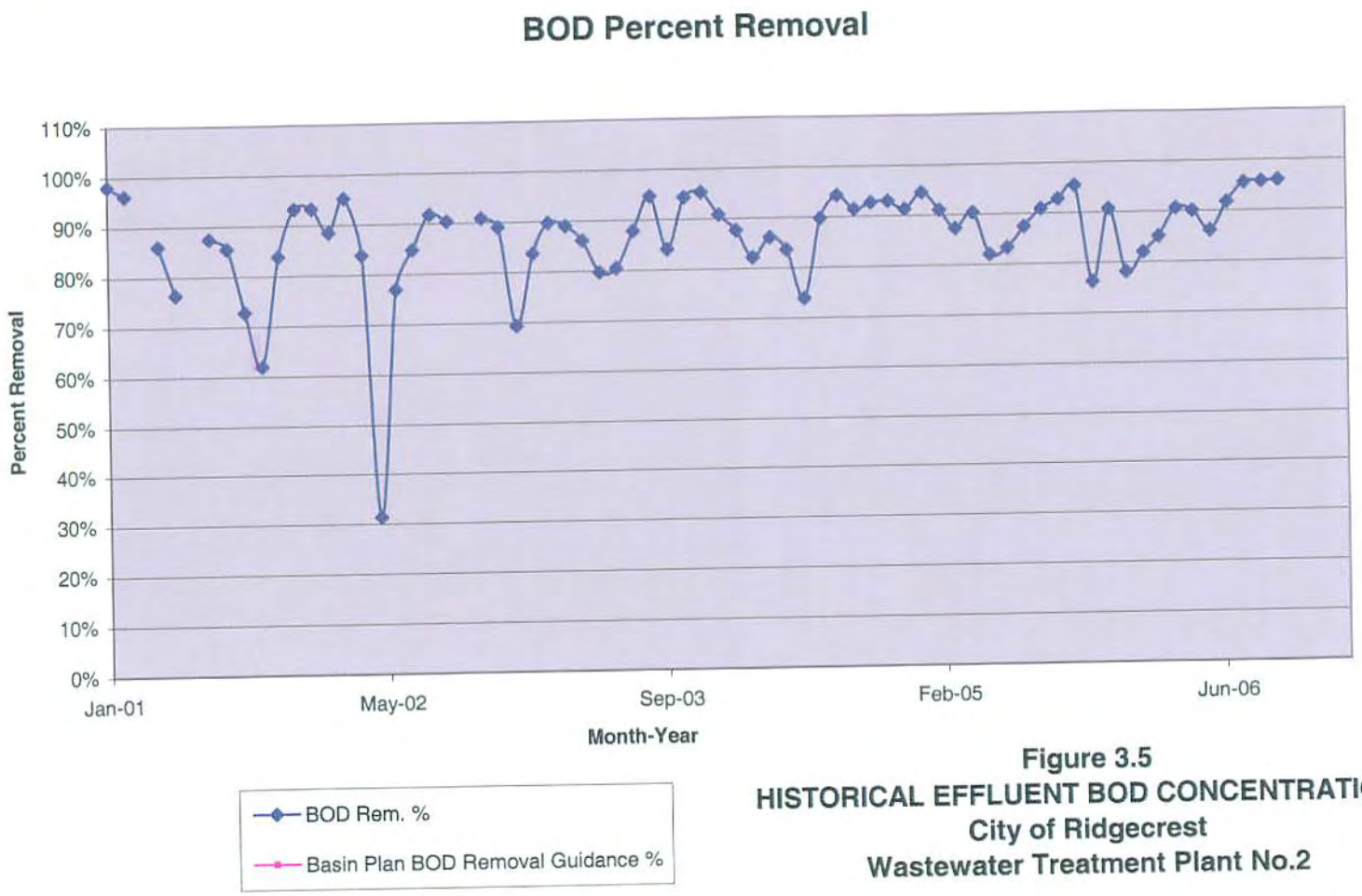

Figure 3.5
HISTORICAL EFFLUENT BOD CONCENTRATIONS
City of Ridgecrest
Wastewater Treatment Plant No.2

carollo engineers

3.6 PROJECTED INFLUENT LOADINGS

Generally, the design loading for a WWTP facility is determined by the ADMM flows and ADMM loadings previously identified. These projected values will be used to determine the organic loading for the planning period.

Table 3.7 Historical Effluent BOD_5 Wastewater Treatment Plant No. 2 City of Ridgecrest

Year	Annual Average mg/L	Annual Average ppd	Percent Removal
2001	23	402	76%
2002	29	558	83%
2003	20	434	86%
2004	18	374	88%
2005	17	364	88%
2006	16	281	89%
6-Year Average	**21**		**87%**

3.6.1 BOD_5

The projected BOD_5 loadings are determined using the previously identified ADMM BOD_5 concentration of 300 mg/L, as presented in Table 3.8. The BOD_5 loading at the end of the planning period (2030) is approximately 14,898 ppd.

Table 3.8 Projected Influent BOD_5 Loading Wastewater Treatment Plant No. 2 City of Ridgecrest

Year	Projected ADMM Flow (mgd)	Projected ADMM Loading (ppd)
2005	2.84	7,084
2006	3.00	7,483
2007	3.16	7,881
2008	3.32	8,280
2009	3.48	8,678
2010	3.63	9,077
2015	4.50	11,235
2020	4.89	12,221
2025	5.40	13,493
2030	5.97	14,940

3.6.2 Total Suspended Solids and Nitrogen

Limited data is available for total suspended solids and nitrogen. Because the BOD reflects normal domestic strength waste, a TSS of 250 and total kjeldahl nitrogen of 45 mg/l will be used for planning purposes.

3.6.3 Summary of Projected Influent Flows and Loadings

Table 3.9 outlines the recommended year 2030 influent design flows to be used in the alternative evaluations included as part of this Facilities Plan.

It is recommended that these planning period design flows and loadings will be confirmed and further refined during the design period.

Table 3.9 Summary of Design Influent Flows and Loadings Wastewater Treatment Plant No. 2 City of Ridgecrest

Parameter	AAD	ADMM
Population - Year 2030	56,077	56,077
Flow	5.5	6.0
BOD_5 - mg/l	180	300
BOD_5 Loading, ppd	8,126	14,900

3.7 HISTORICAL AND PROJECTED BIOSOLIDS PRODUCTION

The biosolids production for the years 2003 through 2005 is outlined in Table 3.10 below. As shown in the table the City has produced approximately 139 dry pounds of biosolids per million gallons (MG) of wastewater treated. The biosolids production rate has been relatively low. The projected biosolids production for this report will be based on the treatment process alternatives considered for the proposed plant. The estimated sludge production for advanced secondary (oxidation ditches) is approximately 200 tons per year for an annual average daily flow of one millions gallons per day.

Table 3.10	Historical Biosolids Production Wastewater Treatment Plant No. 2 City of Ridgecrest		
Year	**AAD Flow (mgd)**	**Biosolids (dry tons/yr)**	**Biosolids (lbs/MG)**
2001	2.52	66	144
2002	2.50	68	149
2003	2.58	68	144
2004	2.52	77	168
2005	2.51	47	103
2006			
Average		**64**	**139**

EXISTING AND FUTURE REGULATORY REQUIREMENTS

4.1 INTRODUCTION AND SUMMARY

The purpose of this chapter is to summarize the regulations that are applicable to the City of Ridgecrest's (City) Wastewater Treatment Plant No. 2 (WWTP). The following sections summarize the WWTP's effluent discharge requirements, biosolids requirements, and air quality regulations. A flow chart of the regulating agencies and regulations that would be included in the City's Waste Discharge Requirements (WDR's), air permit, and county biosolids regulations are provided on Figure 4.1. A brief summary of the regulations and requirements that apply to the City are provided below:

- WDR monitoring and limits for the effluent, ponds, and groundwater.
- Water Quality Control Plan for Lahonton Region (Basin Plan) establishing water quality objectives that include narrative and numeric limits.
- Title 22 recycled water regulations that state the allowable uses for the City's un-disinfected secondary recycled water.
- Future WDR effluent nitrogen limits to groundwater will be at Maximum Contaminant Levels (MCL) or at background levels.
- State, Federal, and County biosolids regulations that govern disposal of Class A and Class B biosolids.
- Future trend of many counties to ban Class A and Class B biosolids.
- Air regulations that limit the concentration of certain air contaminants from being discharged by the WWTP.

4.2 BACKGROUND

Wastewater discharges are governed by both federal and state requirements. The primary laws regulating water quality are the Clean Water Act (CWA) and the California Water Code (CWC). Under the CWA, the Environmental Protection Agency (EPA) or a delegated State agency regulates the discharge of pollutants into waterways through the issuance of National Pollutant Discharge Elimination System (NPDES) permits. NPDES permits set limits on the amount of pollutants that can be discharged into the surface waters of the United States.

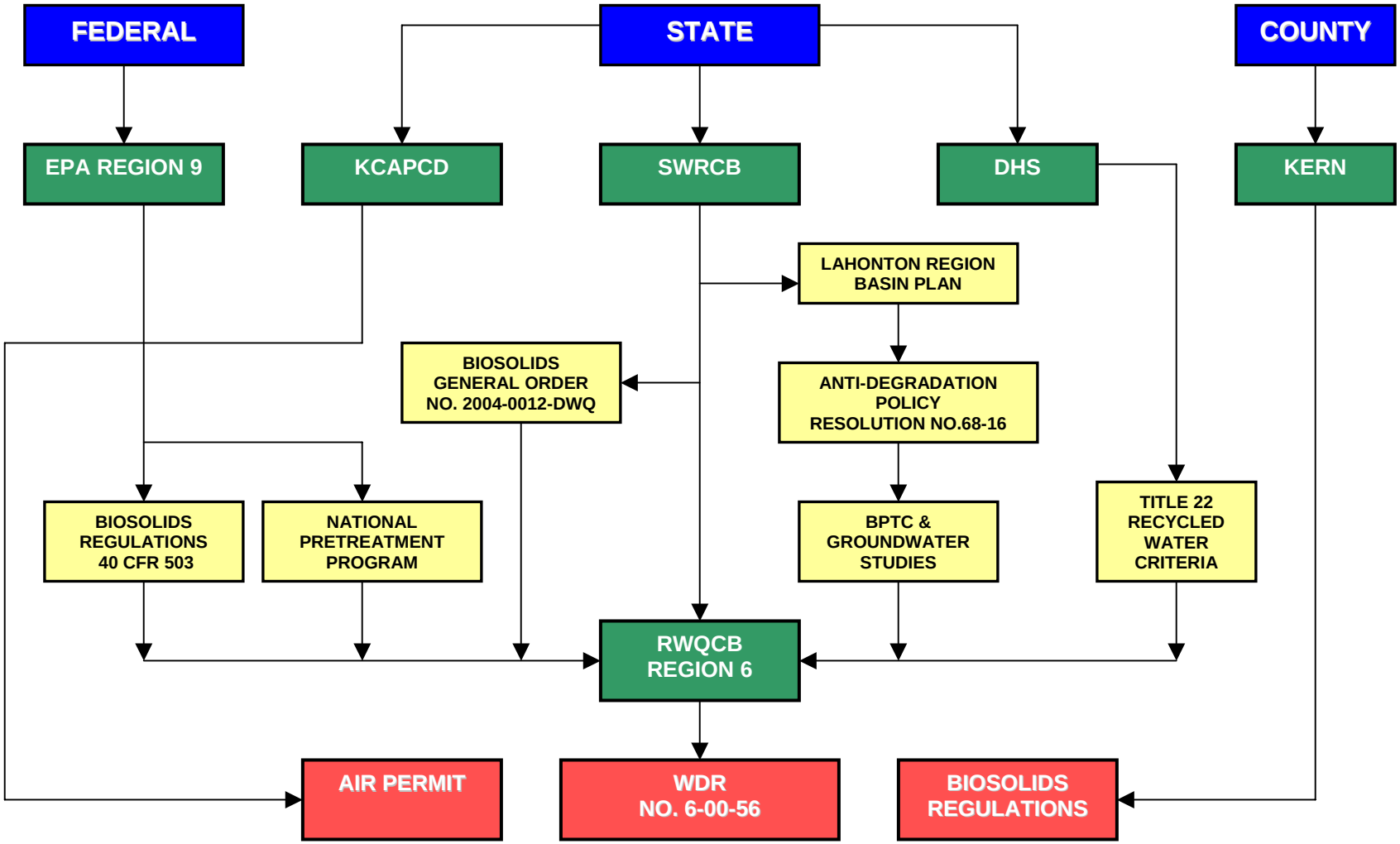

Figure 4.1
Regulating Agencies and Regulations Applicable to the City of Ridgecrest

Wastewater Treatment Plant No. 2

The CWC and the Porter-Cologne Act, a provision of the Code, require the State to adopt water quality policies, plans, and objectives for the protection of the State's waters. The State Water Resources Control Board (SWRCB) and the nine Regional Water Quality Control Boards (RWQCB) meet this requirement by establishing water quality criteria in regional Basin Plans, the Inland Surface Waters, Enclosed Bays and Estuaries Plan, the Thermal Plan, and the Ocean Plan.

The RWQCB is responsible for developing and issuing WDR to treatment facilities that discharge to land (for percolation and/or irrigation), and NPDES permits for treatment facilities that discharge to surface waters of the United States. The RWQCB is also responsible for issuing recycled water permits, as well as approving biosolids applications for dischargers within the State of California. Both the SWRCB and RWQCBs have regulatory authority along with the Department of Health Services (DHS) over projects using recycled water. The interagency involvement between the SWRCB, RWQCB and DHS is discussed within this chapter.

4.2.1 Agencies Responsible for Ridgecrest's Regulations

The RWQCB Lahonton Region is responsible for developing and issuing WDRs for the City. They are also responsible for requiring the City to develop and implement a pretreatment program for industrial discharges to the WWTP, according to the EPA National Pretreatment Program regulations. The City is responsible for obtaining all air quality permits from the Kern County Air Pollution Control District (KCAPCD), which limits air emissions on various types of equipment within WWTPs.

4.3 WASTE DISCHARGE REQUIREMENTS (WDRS)

The City WWTP is currently operating under WDR Board Order No. 6-00-56, issued by the RWQCB in June 2000. The City does not discharge to waterways and is therefore not required to obtain a NPDES permit. A copy of the WDR is provided in Appendix E. The purpose of the WDR is to set limits on pollutants that are discharged from the WWTF. The limits are designed to protect public health, protect present and future beneficial uses of the groundwater, and to preserve water quality objectives developed on a regional basis.

4.3.1 Effluent Discharge Requirements

The City's WDR includes effluent discharge limitations receiving water limitations and general requirements and prohibitions. The effluent discharge limitations are provided in Table 4.1.

In addition to the requirements in the table, the WDR lists other stipulations for the effluent discharge, which includes:

- pH shall be not less than the 6.0 pH units nor more than 9.0 pH units.

- All wastewaters discharged to the authorized disposal/recycling sites shall have a dissolved oxygen concentration not less than 1.0 milligrams per liter (mg/L).
- The receiving water limitations states that whenever the existing quality of water is better than the quality of water established in the Basin Plan, such existing quality shall be maintained unless appropriate findings are made under Resolution 68-16 (known as nondegradation objective).
- In ground waters, the median concentration of coliform organisms over any seven-day period shall be less than 1.1/100 milliliters.
- Groundwaters shall not contain concentrations of chemical constituents in excess of the MCL or secondary maximum contaminant level (SMCL) based on drinking water standards.
- Waters designated as AGR shall not contain concentrations of chemical constituents in amounts that adversely affect the waters for beneficial uses.
- Groundwaters shall not contain concentrations of chemical constituents that adversely affect the water for beneficial uses.
- Radionuclides shall not be present in concentrations that are deleterious to human, plants, animal, or aquatic life, or that result in the accumulation of radionuclides in the food chain to an extent that it creates a hazard to human, plant, animal, or aquatic life.
- Groundwaters shall not contain taste or odor-producing substances in concentrations that cause nuisances or that adversely affect beneficial uses.
- Free board of 1.0 foot for Ponds 1-7 is required and 2.0 feet freeboard on Ponds 8 and 11.

Table 4.1 Board Order No. 06-00-56 Effluent Discharge Requirements Wastewater Treatment Plant No. 2 City of Ridgecrest

Constituent	Units	Monthly Average	Daily Maximum
Monthly Average Flow	mgd	3.6	--
BOD_5	mg/L	30.0	45
Methylene Blue Active Substances	mg/L	1.0	2.0

4.3.2 Wastewater Reclamation Requirements

The treated wastewater from the WWTP is further discharged to the China Lake Naval Air Weapons Station (NAWS) golf course and to a separate City-owned land for alfalfa irrigation and to evaporation/percolation ponds. Wastewater recycling requirements are established under separate WDR's for the NAWS Golf Course (Board Order No. 6-84-36)

and the City of Ridgecrest irrigation site (Board Order No. 6-9-85). The water recycling board orders are located in Appendixes F and G.

The Naval Weapons Center pumps secondary effluent from the City's last oxidation pond, disinfects it in a chlorine contact chamber and then uses the disinfected effluent for golf course irrigation. The NAWS golf course board order includes effluent limits and reclamation requirements as shown on Table 4.2.

Table 4.2 CLNAWS Board Order 6-84-36 Reclamation Requirements Wastewater Treatment Plant No. 2 City of Ridgecrest

Constituent	Units	Monthly Average	Daily Max
Monthly Average Flow	mgd	1.4	
Coliform Organism[1]	ml/L	23/100	240/100

Notes:

1. 7-Day Average.

In addition to the requirements in the table, the Board Order stipulates other effluent discharge requirements that includes:

- All facilities use for transport and treatment of reclaimed wastewater shall be adequately protected against damage resulting from overflow washout or inundation from a storm or flood having a recurrence interval of once in 100 years.
- The use of reclaimed wastewater shall not cause a nuisance.
- The reclaimed wastewater shall be confined to the lands owned by the NAWS.

The effluent discharged to the separate city-owned land is pumped from Pond No. 3 through a three and half-mile pipe to the former WWTP site where there are four storage and evaporation ponds and 33.3 acres of alfalfa. The City's irrigation site Board Order No. 6-93-85 includes effluent limits and receiving water limitations as shown.

Table 4.3 City of Ridgecrest Board Order 6-84-36 Reclamation Requirements Wastewater Treatment Plant No. 2 City of Ridgecrest

Constituent	Units	Mean	Maximum
BOD	mg/L	30	45
MBAS	mg/L	1.0	2.0

In addition to the requirements in the table, several other stipulations apply:

- The discharge shall not have a pH of less than 6.0 or greater than 9.0.

- The wastewater made available to the authorized disposal/reclamation sites shall have a dissolved oxygen concentration not less than 1.0 mg/L.
- All effluent made available for reclamation shall comply with standard Department of Health Services reclamation requirements.
- The discharge of waste shall not cause the presence of the following substances or conditions in ground waters of the Indian Wells hydrologic unit:
  - Any perception, color, odor, taste or foaming.
  - Coliform organisms attributable to human wastes.
  - Toxic substances in concentrations that individually, collectively, or cumulatively cause detrimental physiological responses in human plant, animal or aquatic life.
  - Identifiable chlorinated hydrocarbons, organophosphates, carbonates, and other pesticides and herbicide groups, in summation in excess of the lowest detectable levels.
- The freeboard shall be 1.0 foot for Ponds 1-7, 1.5 feet in Pond No. 8 and 2.0 feet in Ponds 9-11.

4.3.2.1 Future WDR Requirements

4.3.3 Groundwater Limitations

The discharge of wastes from any storage, treatment, or disposal component associated with a WWTP shall not, in combination with other sources of waste constituents, cause the groundwater under and beyond a WWTP and discharge area(s) to exceed the MCL concentrations for drinking water standards. The nitrogen concentrations shall not exceed natural background concentration. The RWQCB would likely limit total dissolved solids (TDS) effluent concentrations slightly beyond the background levels. However, the TDS in the background groundwater quality at the site is about twice the level of the effluent concentrations.

Radionuclides shall not be present in concentrations that are deleterious to human, plant, animal, or aquatic life, or that result in the accumulation of radionuclides in the food chain.

Groundwaters shall not contain taste or odor-producing substances in concentrations that cause nuisance or that aversely affect beneficial uses.

4.4 WATER QUALITY OBJECTIVES

4.4.1 The Lahonton Regional (Basin Plan)

The effluent quality in Ridgecrest's proposed WWTP No. 2 discharge must meet the objectives developed in the Water Quality Control Plan for the Lahonton Region North and South Basins (1995) Second Edition, 1995. The Basin Plan addresses water quality

objectives for both surface and groundwater. The current WDR issued by the RWQCB has set discharge requirements consistent with the Basin Plan. The Basin Plan identifies the beneficial uses for the major rivers, creeks, and associated tributaries with the basin, and incorporates by reference plans and policies adopted by the SWRCB.

Groundwaters designated as municipal. The median concentration of coliform organisms over any seven-day period shall be less than 1.1/100 milliliters.

The Basin Plan cites numerical water quality objectives for waters designated as municipal supply. These are the MCLs specified in the following provisions of Title 22, California Code of Regulations: Tables 64431-A (Inorganic Chemicals) and 64431-B (Fluoride) of Section 64431, Table 64444-A (Organic Chemicals) of Section 64444, and Table 64449-A (Secondary Maximum Contaminant Levels Consumer Acceptance Limits), and 64449-B (Secondary Maximum Contaminant Levels Ranges) of Section 64449.

Groundwaters designated as municipal shall not contain radionuclides in excess of limits specified in Table 4 of Section 64443 (radionuclides).

Groundwaters designated as municipal at minimum, taste and odor concentrations shall not exceed adopted secondary MCLs specified in Table 64449-A of Section 64449 (Secondary MCLs - Consumer Acceptance Limits), and Table 64449-B of Section 64449 (Secondary MCLs - Ranges).

The Basin Plan contains narrative groundwater quality objectives that address constituents in the discharge that are potentially harmful to beneficial uses. Guidelines for identifying the quality of irrigation water necessary to sustain various crops were compiled by Ayers and Westcot in 1985 (Food and Agriculture Organization of the United Nations - Irrigation Drainage Paper No. 29).

The RWQCB has used the Ayers and Westcot guidelines in estimating the potential hazards to crop production associated with long-term use of the particular water being evaluated. The guidelines divide water quality characteristics as having relative degree of restriction on use. The guidelines, provided in Table 4.4, are used by the RWQCB to evaluate potential future uses of the groundwater underlying the WWTP.

Table 4.4 Numeric Guidelines for Irrigation Water
Wastewater Treatment Plant No. 2
City of Ridgecrest

Problem and Related Constituent	No Problem	Increasing Problem
Salinity of Irrigation Water (EC, µmhos/cm)	<700	700 - 3,000
Salinity of Irrigation Water (TDS, mg/L)[1]	<450	450 - 2,000
Specific Ion Toxicity from ROOT Absorption		

Table 4.4 Numeric Guidelines for Irrigation Water Wastewater Treatment Plant No. 2 City of Ridgecrest		
Problem and Related Constituent	**No Problem**	**Increasing Problem**
Sodium (mg/L)	<69	69 - 207
Chloride (mg/L)	<142	142 - 355
Boron (mg/L)	0.7	0.7 - 3.0
Specific Ion Toxicity from FOLIAR Absorption		
Sodium (mg/L)	<69	>69
Chloride (mg/L)	<106	>106
Miscellaneous		
NH_4-N (mg/L) (for susceptible crops)	<5	5 - 30
NO_3-N (mg/L) (for Susceptible crops)	<5	5 - 30
HCO_3 (mg/L) (only with overhead sprinklers)	<90	90 - 520
PH (for susceptible crops)	Normal range = 6.5 - 8.4	

Note:
1. Assumes an EC;TDS ratio of 0.6:1

4.5 BEST PRACTICABLE TREATMENT AND CONTROL (BPTC)

The City's current WDR 06-00-56 does not have any language addressing compliance with BPTC. However, one of the main emphases of the new WDRs issued by the RWQCBs is to ensure protection of the groundwater underlying the WWTP. To accomplish this goal, several provisions require monitoring and studies to determine that the groundwater will be protected. These provisions include a simple statement of the goal, the requirements to characterize the groundwater, and specific studies to determine BPTC.

In order for cities to characterize the groundwater, the cities are required in their WDRs to install a network of groundwater monitoring wells. The network of monitoring wells is to be approved by the RWQCB in order to determine background groundwater and possible degradation. Groundwater studies are also required to determine compliance with BPTC. At the end of the studies, the cities are to propose improvements to the WWTP that will bring it into compliance with BPTC, and specific groundwater limits that reflect full implementation of BPTC.

4.5.1 BPTC Policy

This BPTC policy is the outcome of the SWRCB Resolution No. 68-16, known as the "Anti-Degradation Policy", although it predates the federal policy, and, is similar to the federal anti-degradation policy (40 CFR Section 131.12).

Specifically, Resolution No. 68-16 states the following:

1. *Whenever the existing quality of water is better than the quality established in policies as of the date on which such policies become effective, such existing high qualities will be maintained until it has been demonstrated to the State that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies.*

2. *Any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters will be required to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained*.

Resolution No. 68-16 establishes in (1) above that where waters are of higher quality than required by State policies, such higher quality shall be maintained. The resolution also establishes the requirement in (2) that discharges to waters of the State shall be regulated to assure that the highest water quality is maintained. The discharges to waters of the State are required to use the BPTC necessary to maintain the highest water quality. The resolution is not a zero discharge standard, but a policy that existing quality be maintained when it is reasonable to do so.

In order to comply with the policy, it is important to understand the intent of BPTC as determined by the RWQCB. The RWQCB determined that BPTC applies to both treatment and control of wastewater. Treatment includes processes designed to remove constituents from wastewater discharges to levels that will not adversely impact the quality of receiving waters. Examples would include treatment facilities at the WWTP (i.e. sludge drying beds). Control includes containment of constituents so that degradation of receiving waters is minimized. Examples of control of discharge include lining sludge drying beds.

The term BPTC is not specifically defined by the Resolution. However, to determine BPTC compliance requires evaluating the treatment and control process at the WPCF for a given constituent that may have been demonstrated to be a constituent of concern (COC). The COCs for the WWTP will be identified during the BPTC evaluation but will be defined as a constituent that could impair the existing ground water quality.

4.6 RECYCLED WATER REGULATIONS

Several agencies have regulatory authority or jurisdiction over potential projects using recycled water. The major state agencies include the DHS, the SWRCB, and the RWQCB. In addition to State regulatory agencies, there may also be involvement by county and local authorities. There are currently no federal regulations pertaining to water recycling.

The DHS is the primary State agency responsible for public health, whereas the SWRCB and the RWQCB are the primary State agencies charged with protection, coordination, and control of water quality. These agencies work together to develop discharge permits for recycling projects. Generally, the DHS interprets the laws dictated by the California Code of Regulations applicable to recycling and makes recommendations on individual projects to the RWQCB, which is overseen by the SWRCB. The RWQCB issues the final permit for the recycling project.

The existing water recycling regulations, which dictate wastewater treatment processes and effluent quality criteria, are contained in the California Code of Regulations, Title 22, Division 4, Chapter 3, Sections 60301 through 60355. A compilation of the water recycling regulations can be found in “The Purple Book,” which can be found at http://www.dhs.cahwnet/gov/ps/ddwem/publications/waterrecycliing/purplebookupdate6-01.PDF. The regulations are intended "...to establish acceptable levels of constituents of recycled water and to prescribe means for assurance of reliability in the production of recycled water in order to ensure that the use of recycled water for the specified purposes does not impose undue risks to health..." The most recent revision to these regulations came into effect in 2001.

4.6.1 2001 Recycled Water Regulations - Recycled Water Quality

The DHS regulations define four types of recycled water determined by the treatment process and total coliform, bacteria, and turbidity levels. Although the DHS has not assigned type designations to the grades of recycled water defined by the current regulations, designations are provided here for clarity. The four treatment types of recycled water that are currently allowed are summarized in Table 4.4 and contained in Appendix H.

Article 3 of the Water Recycling Criteria details the acceptable uses of recycled water. Some of the uses specifically addressed include irrigation, impoundment, and cooling. The only exception noted for using recycled water is that the regulations shall not apply to on-site use at a water recycling plant, or wastewater treatment plant, provided public access is restricted to the area where reuse occurs.

In the case of the WWTP effluent, the facility meets the undisinfected secondary criteria based upon Title 22 regulations. Allowable uses for Ridgecrest’s effluent are listed in Table 4.4 and the section below.

4.6.1.1 <u>Irrigation</u>

Recycled water may be used for irrigation of various crops and landscapes. Recycled water specifically for the irrigation of the following must be disinfected tertiary recycled water:

- Food crops where the irrigation water comes into contact with the consumed portion of the crop;
- Parks and playgrounds;

- School yards;
- Residential landscaping; and
- Unrestricted access golf courses.

If the consumed portion of the food crop is produced above ground and recycled water does not contact the edible portion of the food crop, then disinfected secondary-2.2 recycled water must be used as a minimum standard. One recent clarification was made by the DHS in regards to orchard and vineyard irrigation using recycled water (see Appendix H). The position of the DHS Food and Drug Branch (FDB) is that un-disinfected secondary recycled water, which was previously allowed, is not suitable for orchard and vineyard crops. The DHS states that it is “quite likely the crops will come into contact with recycled water or soil irrigated with recycled water through typical harvesting practices.” As a result of this position, irrigation of orchard and vineyard crops must meet the requirements of disinfected secondary-2.2 recycled water.

A minimum standard of disinfected secondary-23 recycled water must be used for irrigation of the following:

- Cemeteries;
- Freeway landscaping;
- Restricted access golf courses;
- Unrestricted access ornamental nursery stock and sod farms;
- Pasture for animals producing milk for human consumption; and

Any non-edible vegetation where access is controlled so that the irrigated area cannot be used as if it were part of a park, playground, or schoolyard.

Recycled water used for the irrigation of the following must have a minimum standard of un-disinfected secondary recycled water.

- Non food-bearing trees;
- Fodder and fiber crops and pasture for animals not producing milk for human consumption;
- Seed crops eaten by humans;
- Food crops that must undergo commercial pathogen-destroying processing before being consumed by humans; and
- Restricted access ornamental nursery stock and sod farms.

Table 4.5 Recycled Water Treatment Regulations
Wastewater Treatment Plant No. 2
City of Ridgecrest

Recycled Water Type	Treatment Process	Approved Uses	Median Coliforms (MPN/100 ml)
Disinfected Tertiary	Filtered[1] and Disinfected[2]	Spray Irrigation of Food Crops Landscape Irrigation[3] Nonrestricted Recreational Impoundment	2.2[4]
Disinfected Secondary-2.2	Oxidized and Disinfected[2]	Surface Irrigation of Food Crops Restricted Recreational Impoundment Surface Irrigation of Orchards and Vineyards[5]	2.2[3]
Disinfected Secondary-23	Oxidized and Disinfected[2]	Pasture for Milking Animals Landscape Irrigaiton[6] Landscape Impoundment	23[3]
Undisinfected[7] Secondary	Oxidized	Fodder, Fiber and Seed Crops	

Notes:

1. "Filtered" means an oxidized wastewater that satisfied (a) or (b) below:
   a. Has been coagulated and passed through natural undisturbed soils or filter media with specified maximum flux rate depending on the type of filtration system <u>and</u> does not exceed:
      1. An average of 2 NTU within a 24-hour period,
      2. 5 NTU more than 5 percent of the time within a 24-hour period, and
      3. 10 NTU at any time.
   b. Has been passed through a microfiltration, ultrafiltration, nanofiltration, or reverse osmosis membrane so that the turbidity does not exceed:
      1. 0.2 NTU more than 5 percent of the time within a 24-hour period, and
      2. 0.5 NTU at any time.
2. Disinfected by either:
   a. A chlorine process with a continuous concentration contact time (CT) 450 mg-mins/l with a modal contact time ≥ 90 minutes (based on peak dry weather design flow).
   b. A process combined with filtration that inactivates and/or removes 99.999% of F-specific bacteriophage MS-2, or polio virus.
3. Includes unrestricted access golf courses, parks, playgrounds, schoolyards, and other landscaped areas with similar areas.
4. For the last seven days that analyses have been completed.
5. **No longer allowed**. The DHS has required that undisinfected secondary standards are not suitable, and that recycled water must meet disinfected secondary -2.2 requirements (see Appendix I).
6. Includes restricted access golf courses, cemeteries, freeway landscapes, and landscapes with similar public access.
7. Current and proposed designation of City of Ridgecrest effluent (excluding the GC discharge).

4.6.1.2 Industrial Use

Industrial use of recycled water is not specifically addressed by existing regulations. These projects are considered on a case-by-case basis. Frequently the required effluent water quality is determined by the particular industrial process needs.

4.6.1.3 Impoundments

Recycled water that is used as a source of supply for non-restricted recreational impoundments shall be disinfected tertiary recycled water that has been subjected to conventional treatment. Disinfected tertiary recycled water that has not been subjected to conventional treatment may be used for non-restricted recreational impoundments provided it is monitored for pathogenic organisms. The total coliform bacteria concentration shall comply with the criteria specified for disinfected tertiary recycled water.

Restricted recreational impoundments and publicly accessible impoundments at fish hatcheries shall have a minimum standard of disinfected secondary-2.2 recycled water. Landscape impoundments without decorative fountains have a minimum standard of disinfected secondary-23 recycled water.

4.6.1.4 Cooling

Recycled water used for industrial or commercial cooling or air conditioning that involves the use of a cooling tower, evaporative condenser, spraying, or any mechanism that creates a mist shall be disinfected tertiary recycled water. If a mist is not created then the water shall be at least disinfected secondary-23.

Whenever a cooling system, using recycled water in conjunction with an air conditioning facility, utilizes a cooling tower or otherwise creates a mist that could come into contact with employees or members of the public, the cooling system must use a drift eliminator while in operation. In addition, chlorine, or other biocide, must be used to treat the cooling system recirculating water to minimize the growth of microorganisms.

4.6.1.5 Other Purposes

Disinfected tertiary recycled water may also be used for the following:

- Flushing toilets and urinals;
- Priming drain pipes;
- Industrial process water that may come into contact with workers;
- Structural fire fighting;
- Decorative fountains;

- Commercial laundries;
- Consolidation of backfill around potable water pipelines;
- Artificial snowmaking; and
- Commercial mechanical car washes.
- Recycled water used for flushing sanitary sewers shall be at least undisinfected secondary recycled water.

4.6.1.6 Other Methods of Treatment

If a treatment process is demonstrated to the DHS to meet Title 22 regulations, upon their approval, it may be implemented for water recycling.

4.7 PROBABLE FUTURE DISCHARGE REGULATIONS

In addition to the future requirements that the City may see in their future permits, it is expected that even more stringent effluent quality requirements will be in enforced in the future, both in near-term and long-term horizons. As is typical for most cities, each revision of the WDR brings more stringent regulations and monitoring requirements for public operated treatment works (POTWs). Ridgecrest is no exception.

4.7.1 Groundwater Limitations

Based on the review of other WDRs issued in the south basins, the RWQCB would set groundwater limits of nitrate as nitrogen to drinking water MCLs or to background levels and TDS levels would be allowed slightly above background levels with a threshold concentration.

4.8 BIOSOLIDS DISPOSAL REGULATIONS

Currently, the WWTP disposes of biosolids by having a permitted land applier, San Joaquin Composting, pickup, haul, compost, and spread the biosolids on agricultural land in Kern County. Based on recently elected initiatives in Kern County on application of Biosolids to unincorporated areas, the City will need to consider application on City-owned lands.

This section provides a summary of the biosolids regulations that the WWTP must comply with for off-site reuse of biosolids now and into the future. Tables listing the various land application criteria are provided in Appendix J.

4.8.1 Overview

The major regulations that govern the application of biosolids at the reclamation area are the City's WDR, the U.S. EPA Sewage Sludge Regulations (40 CFR 503), the SWRCB

Water Quality Order No. 2004-0012 - DWQ (General Order), and any county Biosolids Ordinance from the county where the biosolids are land applied.

Since Ridgecrest sends their biosolids to an off-site facility, the City must comply with the 40 CFR 503 regulations and the General Order (as they pertain to biosolids generators), the WDR specifications for proper treatment and disposal, and the Kern County regulations. Any off-site facility that would take the biosolids must be permitted by the RWQCB.

4.8.2 Federal Regulations (40 CFR 503)

The Federal Regulations, 40 CFR 503, became effective in 1994. The regulation is self-implementing and imposes requirements on the facilities that produce the biosolids and on the land appliers. The regulation establishes standards for pollutant limits, operational standards, management practices, and monitoring, record keeping, and reporting requirements. In order for the biosolids to qualify for land application, the biosolids must meet the maximum pollutant limitations for ten metals, and satisfy requirements for pathogen reduction and vector attraction reduction. This section provides a brief summary of the federal standards the biosolids must meet in order to comply with the 40 CFR 503 regulations.

4.8.2.1 Metals Limitations

The 40 CFR 503 regulations contain pollutant ceiling concentrations for metals that are the maximum allowable concentrations for any biosolids to be land applied (40 CFR 503.13 Table 1). In addition, there is a set of lower pollutant limits for biosolids to be defined as “exceptional quality” (EQ) biosolids (see 40 CFR 503.13 Table 3). Biosolids with pollutants above the 40 CFR 503 Table 1 ceiling limits cannot be applied to land. Biosolids with pollutants below the 40 CFR 503 Table 1 ceiling limits, but above the Table 3 limits, can be applied to land but are subject to annual and cumulative pollutant loading limits. Biosolids below the 40 CFR 503.13 Table 3 limits can be applied to land without regard to the annual or cumulative loading limits.

The Table 1 and Table 3 metals limits are listed in Appendix J.

4.8.2.2 Pathogen Reduction

In addition to pollutant concentrations, biosolids must not pose a public health risk. Performance-based pathogen reduction standards, contained in 40 CFR 503.32, classify biosolids as either Class A or Class B. The goal of Class A biosolids is to reduce pathogens to below detectable limits. The goal of Class B biosolids is to meet adequate pathogen reduction requirements and to rely on environmental factors at the reuse site to further reduce pathogens. Therefore, sites that use Class B biosolids must follow additional site restrictions concerning public access, animal grazing, and crop harvesting.

The Class A and Class B alternatives are provided in Appendix J.

4.8.2.3 Vector Attraction Reduction

Vector attraction is any characteristic that attracts disease vectors, such as insects or animals that may transport or transmit infectious agents. The 40 CFR 503 regulation specifies ten alternatives for meeting the vector attraction reduction requirements. One alternative must be met in order for biosolids to be land applied. The alternatives are provided in Appendix J (Table J.3).

4.8.2.4 Exceptional Quality Biosolids

EQ biosolids may be used and distributed in bulk or bag form and are not subject to general requirements and management practices other than monitoring, record keeping, and reporting to substantiate that the quality criteria have been met. EQ biosolids are exempt from cumulative loading rate restrictions on the soils. In order to be classified as EQ biosolids, the biosolids must meet the lower EQ pollutant limits, be classified as Class A, and meet one of the vector attraction reduction requirements.

4.8.3 General Order

In 2004, the SWRCB adopted general WDRs for the discharge of biosolids as a soil amendment. The WDRs are contained in Water Quality Order No. 2004 – 0012 - DWQ (General Order). The General Order is intended to streamline the regulatory process for land application sites statewide. Key provisions that go beyond the requirements of 40 CFR 503 are:

- It is applicable for all land applied Class A and Class B biosolids, and essentially all EQ biosolids that contain more than 50 percent biosolids (i.e. compost blended with green waste, where the biosolids exceed 50 percent of the blend).
- The discharger and the applier must file a Notice of Intent (NOI), which is a form and associated data, and submit a filing fee. A separate NOI and filing fee must be submitted for each landowner involved in a reuse project. After approval of the NOI, the RWQCB will issue a Site ID Number. Once the City receives the number, the City submits the Application information. If all requirements are met, then the RWQCB will issue a Notice of Applicability (NOA). For comparison, the self-implementing 40 CCFR 503 regulations do not require application forms or pre approvals.
- The 40 CFR 503 pollutant ceiling concentrations must be met. In addition, the General Order contains a molybdenum limit of 75 mg/kg and a cumulative loading limit of 16 lbs/acre. Cumulative loading limits are required for all sites, even those that receive EQ biosolids. Background soils concentrations must be measured and used to calculate cumulative loading limits on the soils. This reduces the overall effective cumulative loading limit for any given site. The metal limits are listed in Appendix H.
- In addition to metals and nutrients, biosolids must be monitored annually for pesticides and PCBs (EPA Method 8080) and semi-volatile organics (EPA Method 8270).

- Biosolids must be incorporated into the soil within 24 hours in arid areas.
- To protect from dust and blown particulates, biosolids with a moisture content less than 50 percent moisture cannot be land applied. Depending on the biosolids density, this may correspond to a maximum dryness of 50 to 60 percent solids.
- Class B biosolids within a half mile of sites with a high potential of public exposure (schools, parks, hospitals, etc) shall be injected.
- Annual plant tissue testing for molybdenum, copper, and selenium is required.
- Previously undisturbed lands or sites that lay fallow for a period of more than one year (excluding land that has been disked or tilled) must have a biological site assessment completed to identify special-status species.
- Individual owners of the property at which the land application occurs are ultimately responsible for ensuring compliance with the General Order.

4.8.4 Future Trends for Biosolids Land Application

A disturbing trend throughout California is the elimination of biosolids land application. Counties that have banned, or practically banned, all biosolids applications include Shasta, Lassen, Glenn, Yuba, Lake Sutter, Contra Costa, San Joaquin, Stanislaus, Madera, Santa Cruz, Monterey, San Benito, Tulare, San Bernardino, and Imperial. Other counties, such as Fresno, Kings, Kern, and Riverside have passed ordinances banning land application of Class B biosolids.

The Kern County voters passed a measure, in June 2006, to ban all sludge application on unincorporated lands. Therefore, historic practice of hauling sludge away by local applicator is in jeopardy. The most viable alternative is to pursue a general order for land application of the sludge onto the City-owned farmland.

There is a question if building an on-site facility for treating biosolids to Class A would be cost effective for WWTPs in eastern Kern County. There does not appear to be a “disposal cost incentive” for a WWTP to produce Class A biosolids on-site, prior to disposal off-site by a private contractor. Based on conversations with private contractors, they would not likely give a price cut to a WWTP who produced Class A sludge on-site. An exception might be made for a very large facility, with a proven on-site compliance record.

For very large facilities, such as Fresno, an on-site Class A treatment facility might be cost effective for long-term off-site disposal. But for smaller dischargers (i.e., Ridgecrest), the annualized costs for such a large capital project would most likely greatly exceed the annual costs for using privatized contractors to haul away the material.

4.9 AIR QUALITY REGULATIONS

The KCAPCD issues the emissions permit for the WWTP based on both the Federal Clean Air Act (FCAA), which has created a comprehensive national framework designed to protect ambient air quality by limiting air emission from both stationary and mobile sources, and California's comprehensive state air quality control program.

4.9.1 Kern County Air Pollution Control District (KCAPCD) Regulations

4.9.1.1 Overview

The FCAA requires the EPA to set National Ambient Air Quality Standards (NAAQS) for several problem air pollutants to protect human health and welfare. Standards were established for carbon monoxide, ozone, fine particulate matter (PM), nitrogen dioxide, sulfur dioxide, and lead. The FCAA requires that the California Air Resources Board prepare an air quality control plan – the State Implementation Plan (SIP) – that contains the strategies and control measures that California will use to attain the NAAQS.

The California Air Resources Board (CARB) is the agency responsible for coordination and oversight of state and local air pollution control programs in California and for implementing the California Clean Air Act of 1988 (CCAA). CARB has also developed state air quality standards which are generally more stringent than federal standards. Other CARB duties include monitoring air quality in conjunction with local air districts, setting emissions standards for new motor vehicles, and reviewing district input for the SIP. The SIP consists of the emissions standards for vehicles and consumer related sources set by CARB, and attainment plans and rules adopted by the local air districts.

The KCAPCD has the primary responsibility for control of air pollution from sources other than motor vehicles and consumer products in the eastern Kern County region.

The KCAPCD is responsible for preparing attainment plans for each nonattainment criteria pollutant (ozone and PM) for which it does not meet the standard. Separate SIPS for each of the criteria pollutants must be adopted by the KCAPCD and ARB and submitted to EPA.

4.9.1.2 Background

KCAPCD activities include rule development and enforcement, monitoring of air quality, a permit system for stationary and mobile air pollution sources, air quality planning, protection of the public from the adverse affects of toxic air contaminants, and responses to public requests for information regarding air quality issues.

The KCAPCD administers rules and regulations that apply to stationary and mobile sources that emit air contaminants in eastern Kern County. KCAPCD regulations are separated into nine categories, summarized in Table 4.5.

Regulations I, II, and III give administrative details and requirements for regulation in the form of permits, fees, and hearing board procedures. Generally, new and existing stationary sources are governed by requirements in Regulations II and IV. Regulation IV contains rules governing emission of conventional pollutants, visible emissions, nuisances (odors), and references the National Emission Standards for Hazardous Air Pollutants (NESHAPs). Regulation VIII contains rules governing fugitive dust emissions.

For this report, the regulations that specify prohibitions and/or compliance limits that are applicable to wastewater treatment facilities are separated into two categories that impact major and minor treatment plant operations.

Prohibitory Rules applicable to major treatment plant operations are listed in Table 4.6. The rules include emission limits for conventional pollutants (NO_x, SO_x, CO, VOCs).

Table 4.6 Kern County Air Pollution Control District Regulations Wastewater Treatment Plant No. 2 City of Ridgecrest

Regulation	Description
I	General Provisions
II	Permits
III	Fees
IV	Prohibitions
V	Procedures Before the Hearing Board
VI	Air Pollution Emergency Contingency Plan
VII	Toxic Air Pollutants
VIII	Fugitive PM_{10} Emissions
IX	Mobile and Indirect Sources

At the proposed WWTP, sources of conventional air contaminants are predominantly derived from the operation of equipment fueled by diesel fuel (standby generator). Other sources of air contaminants are derived from fugitive emissions from wastewater processes.

4.9.2 KCAPCD Permitting Process

Rule 2010 specifies a “two-tiered” permitting process for the KCAPCD. The permitting process governs the construction, replacement, operation, or alternation of any source operation that emits or may emit contaminants. The two-tiered process includes an “Authority to Construct” (ATC) followed by a “Permit to Operate” (PTO). ATC and PTO permits are generally required for the construction, modification, replacement, or operation of combustion sources (i.e. flares, incinerators, engines). The KCAPCD has indicated that,

in the future, permits may be required for noncombustion facilities or operations that emit or have the potential to emit air contaminants.

The KCAPCD's New and Modified Stationary Source Review (NSR) program is designed to meet both the state and federal NSR requirements for nonattainment areas, and applies to new and modified stationary sources that emit NO_x, VOC, PM-10, SO_x, CO, and other pollutants subject to District permit. In conjunction with amendments to Rule 2201, the District also amended Rule 2530 (Federally Enforceable Potential to Emit), which provides facilities with consistently low emissions mechanisms to escape Title V permitting requirements. The District was obligated to submit revised NSR and Title V rules reflecting "extreme" classification to the EPA as required in the reclassification to extreme nonattainment for the one-hour ozone standard. However, the State of California is challenging EPA's arguments relative to federal NSR reforms on the basis that California has more stringent NSR requirements. The District is currently faced with the federal requirement to incorporate the federal NSR reforms, while state law specifically forbids the District from relaxing key components of the NSR review. Currently, the revised Rule 2201 satisfies the state requirements that no NSR rules can be made less stringent that the rules that existed on December 30, 2002. The lawsuit is ongoing at this time and the District is deferring additional amendments to Rule 2201 pending the outcome of litigation.

Table 4.7 Kern County Air Pollution Control District Prohibitory Rules Governing Major Treatment Plant Operations Wastewater Treatment Plant No. 2 City of Ridgecrest

Rule No.	Title	Requirements	Facilities and Operations Affected
419	Nuisance	▪ No Emissions Causing Nuisance and Annoyance	Odor Generating Facilities
404.1	Particulate Matter Concentration	▪ <0.2 grain/cf	Engine vents and scrubber stacks
427	Stationary Piston Engines (Oxides of Nitrogen)	▪ NO_x, CO, VOC Emission Limits ▪ Emission Control Plan ▪ Compliance Testing	Internal Combustion Engines >50 hp, Special Categories for Water/Wastewater Treatment Facilities, limited exemption for standby engines
407	Sulfur Compounds	▪ Sulfur <0.2 Percent, (as SO_2)	Combustion of Diesel Engines
402	Fugitive Dust	▪ Control Particulate Matter (PM_{10})	Unpaved Roads and Unpaved Vehicle/Equipment Traffic Areas
410.1	Architectural Coatings	▪ VOC Content Limits ▪ Labeling Requirements	All Paining of Structures, Pavement, Curbs or Trailers
410.4	Surface Coating of Metal Parts/Products	▪ VOC Content Limits ▪ Labeling Requirements	Coating or Painting of any Metal part or Equipment
412	Gasoline Transfer to Storage	▪ Vapor Recovery Systems	Gasoline Storage
412.1	Transfer of Gas to Vehicle Fuel Tanks	▪ Vapor Recovery System	Gasoline Pumps
410.3	Organic Solvent Degreasing Operations	▪ Various Requirements by Category	Maintenance Degreasers

EXISTING WASTEWATER TREATMENT FACILITIES

5.1 GENERAL

The City of Ridgecrest's (City) existing Wastewater Treatment Plant (WWTP) is located approximately three miles northeast of the City's downtown area. The major portions of the plant were constructed in 1946 with the addition of Clarifier No. 3 in 1976 and most recently a headworks upgrade in 2006. The plant facilities include a headworks (that includes mechanical bar screens, a grit chamber and a comminutor), primary setting tanks, facultative oxidation ponds, and evaporation/percolation ponds. There are also two aerobic digesters, and solar sludge drying. The design criteria for the existing treatment plant and effluent disposal system are provided in Table 5.1. Figure 5.1 is a plant site layout. Figure 5.2 is a process diagram of the existing wastewater facilities.

5.2 WASTEWATER TREATMENT PLANT

5.2.1 Headworks

The headworks have recently been upgraded and the existing mechanical bar screens and grit removal system are being demolished and replaced. A second influent channel was added with a new auger grinder, and the existing auger grinder was relocated to a new channel parallel to the new auger grinder. New facilities for grit removal and handling include an induced vortex grit removal system as well as a grit classifier. The new headworks is designed to handle peak flows of 7.2 million gallons per day (mgd) through two channels and 3.0 mgd through each channel separately.

5.2.2 Influent and Effluent Flow Metering

The total plant influent is measured in two (18-inch) Parshall Flumes located between the primary sedimentation tanks and the facultative ponds. The capacity of both flumes is 5.0 mgd. Flume No.1 measures the flow to pond Unit A (Ponds 1-4) and Flume No. 2 measures flow to pond Unit B (Ponds 5-7). Flow from the City is measured before it enters the headworks in a third Parshall Flume (Flume No. 3). This 12-inch diameter flume collects flow from the City's existing 24-inch diameter sewer trunk. Flow from the China Lake Naval Air Weapons Station (NAWS) is calculated by subtracting the flow measurement from Flume No. 3 from the total measured flow from Flumes No. 1 and 2.

5.2.3 Primary Sedimentation Tanks

There are currently four primary sedimentation tanks at the WWTP. Three of these are rectangular clarifiers (Tanks 1,2 and 4). Two of the rectangular clarifiers have an overflow rate (OFR) of 707 gallons per ft per day (g/f/day) and the other has an OFR of 715 g/f/day. The fourth (Tank No.3) is a circular clarifier with a diameter of approximately 77 feet and an

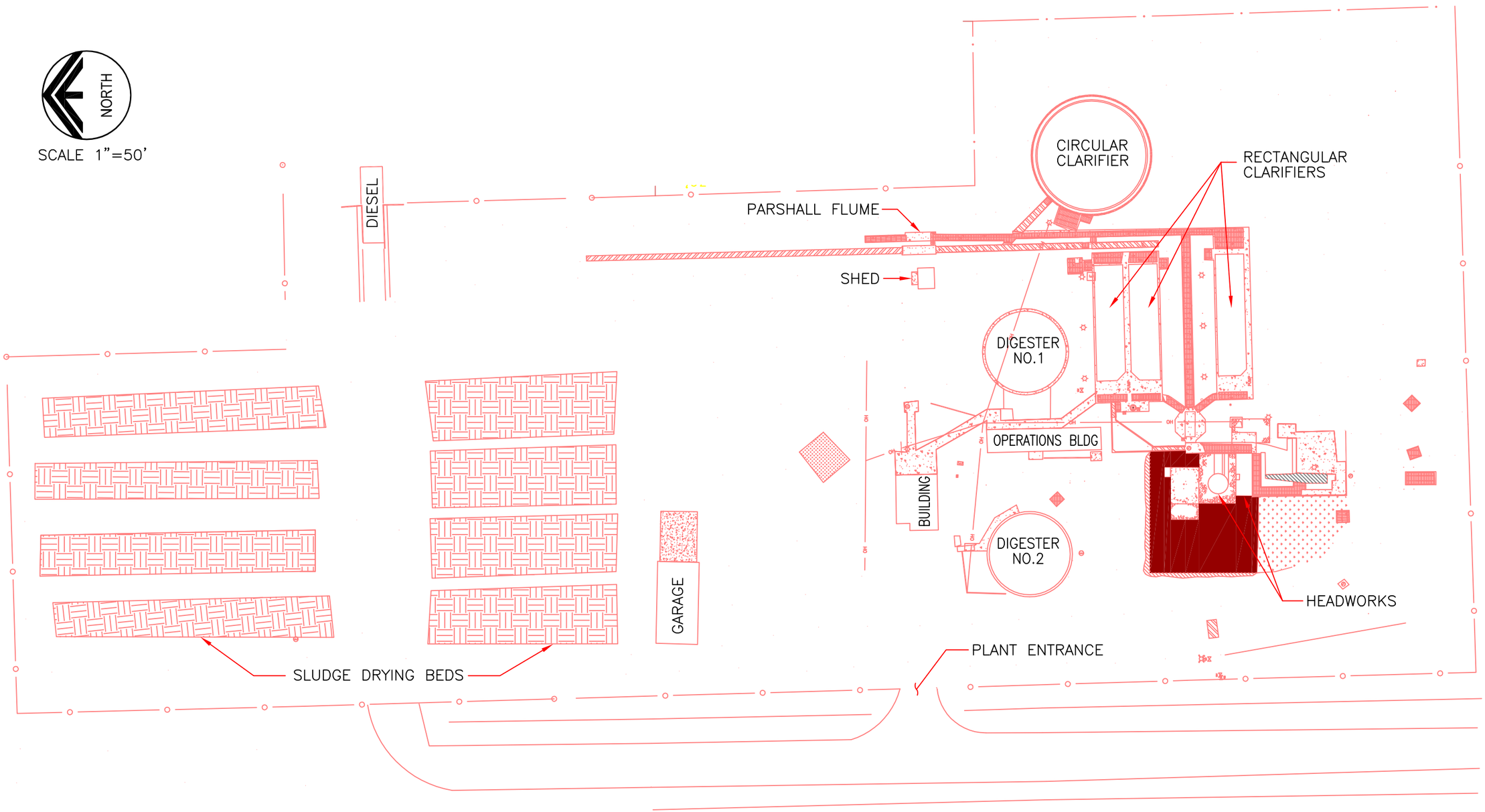

Figure 5.1
EXISTING WASTEWATER TREATMENT PLANT
WASTEWATER TREATMENT PLANT No.2
CITY OF RIDGECREST

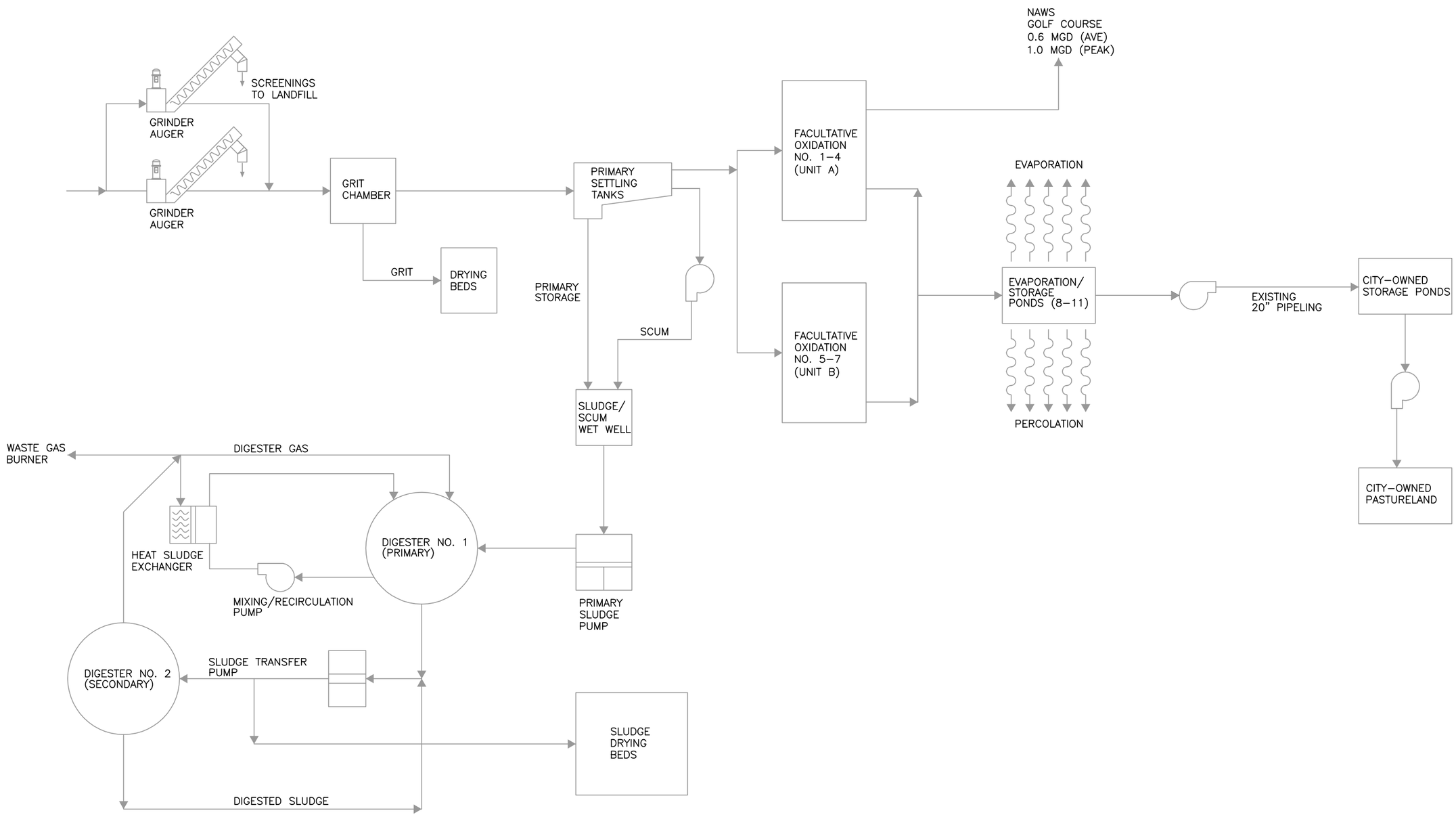

Figure 5.2
EXISTING PLANT PROCESS
WASTEWATER TREATMENT PLANT No.2
CITY OF RIDGECREST

OFR of 696 g/f/day. Tanks No. 3 can be used for either primary settling or as a second stage for additional settling of effluent from Tanks 1 and 2.

Table 5.1	**Design Criteria - Existing Wastewater Treatment Plant Wastewater Treatment Plant No. 2 City of Ridgecrest**
General	
Per Capita Wastewater Flow Rate	97
Average Day Maximum Month (ADMM)	3.6
Peak Hour Flow (mgd)	5.70
BOD_5 (mg/L) AA	180
Effluent Limits	
BOD_5 (mg/L), Monthly Average	40
BOD_5 (mg/L), Daily Maximum	80
Headworks	
Vortex Grit Chamber	
PHF (mgd)	7.2
Grit Classifier	
PHF (mgd)	7.2
Auger Grinder	
PHF (mgd)	2 @ 3.6
Parshall Flume	
Influent (No. 3 - Influent)	
Capacity Range (mgd)	10.4
Throat size (in)	12
Parshall Flumes No. 1 and 2 - (Pond Influent)	2
Capacity, each	15.9
Throat Size (in)	18
Primary Clarifier 1, 2	
Surface Overflow Rate (gpd/sq ft	600-1,200
Weir Overflow Rate (gpd/ft @ average flow)	10,000
Detention Time (hrs)	1-3
Length (ft)	66
Side Wall Depth (ft)	10

Table 5.1	Design Criteria - Existing Wastewater Treatment Plant Wastewater Treatment Plant No. 2 City of Ridgecrest
Primary Clarifier 3	
Surface Overflow Rate (gpd/sq ft	600-1,200
Weir Overflow Rate (gpd/ft @ average flow)	10,000
Detention Time (hrs)	1-3
Length (ft)	55
Side Wall Depth (ft)	10
Primary Clarifier 4	
Surface Overflow Rate (gpd/sq ft	600-1,200
Weir Overflow Rate (gpd/ft @ average flow)	10,000
Detention Time (hrs)	1-3
Length (ft)	77
Side Wall Depth (ft)	8.5
Primary Anaerobic Digester Tank	
Hydraulic retention time (days)	10-20
Volatile Solids Loading (lbs/day/cf)	0.1-0.4
Secondary Anaerobic Digester Tank	
Solids Retention Time (days)	30-60
Volatile Solids Reduction (%)	50-60
Aerated Facultative Lagoons	
Number	7
A-Series - Ponds 1-4 (area	61
B-Series - Ponds 5-7 (area	49
Sludge Beds	
Number	8
Total area for beds with under drain (sq ft)	14,100
Effluent Pump Station	
Number of Pumps	2
Size (hp)	25
Evaporation/Percolation Ponds	
Numbers	4
Ponds in Service (No. 8 & 10) - (acres)	59

Table 5.1	Design Criteria - Existing Wastewater Treatment Plant Wastewater Treatment Plant No. 2 City of Ridgecrest
Ponds out of Service (No. 8 & 11) - (acres)	66
Number at proposed Plant 2	4
Total Area (acres)	7.2

According to a previous report, Tank No. 3 is currently used as an emergency back up. Tank No. 3 was initially an oxidation unit, but has been modified to be used as a circular clarifier, but has a bottom that is not sloped. Sludge must be swept to two hoppers before it can be pumped to the sludge collection wet well. This limits Tank No. 3's solids removal efficiency. Tanks No. 1, 2, and 4 were built in 1946 and circulation Tank No. 3 was built in 1976. These clarifiers are beyond their useful life. However, they have been well maintained over the years.

5.2.4 Anaerobic Digestion

The WWTP currently has one 40 foot primary digester and one 40 foot secondary diameter circular anaerobic digester. Digesters are used in wastewater treatment plants to reduce the volatile organic solids content by 40 to 60 percent. Both digesters were recently emptied and cleaned of deposited grit. The capacity of the two digesters is approximately 3.1 mgd.

The digesters have floating roofs and are heated and mixed. The digester gas is collected and is combusted in a combined boiler-hot water heat exchanger. The hot water is used to heat the digester contents in a built-in heat exchanger.

The digesters are beyond their useful life. However, they have been well maintained over the years.

5.2.5 RAS/WAS Pump Station

The RAS/WAS pump station collects sludge from the four rectangular clarifiers. A piston pump pumps the primary sludge to the digesters. The pump is well suited to primary sludge and there is no reason why it should not continue to be used. Parts for the piston pump are no longer available commercially, however, staff has adequate parts in stock. Maintenance of this pump is therefore entirely dependant on plant staff and can only continue as long as they are confident that it can be maintained in a working condition. Overall this structure is beyond its useful life. However, this pump station has been well maintained over the years.

5.2.6 Facultative Ponds

The primary effluent is split and flows to pond Units A and B. These pond units consist of seven facultative stabilization ponds totaling approximately 110 acres. The sequence of flow in the two pond units is shown in Figure 5.3. Effluent sent to Unit A flows through

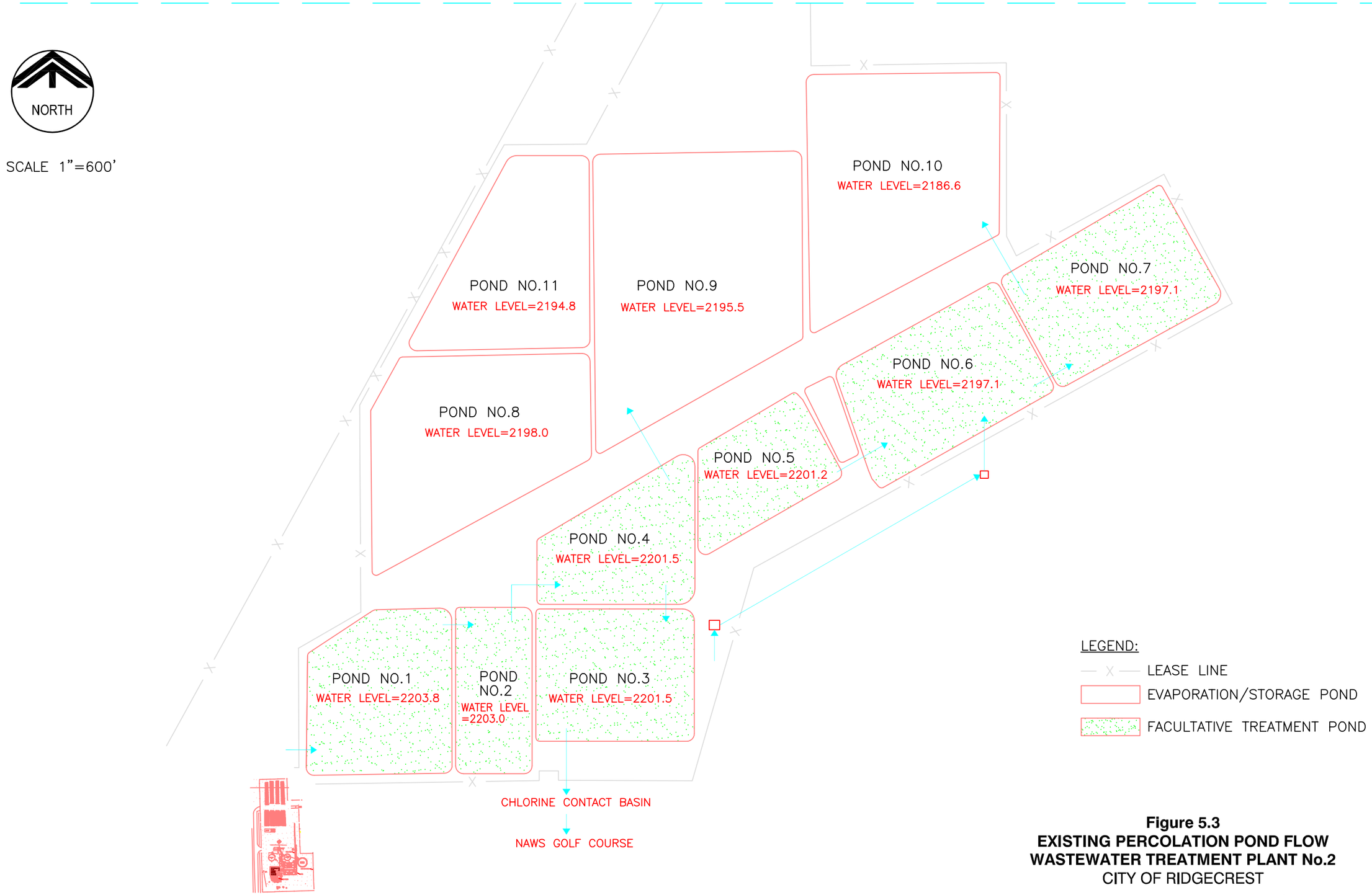

Figure 5.3
EXISTING PERCOLATION POND FLOW
WASTEWATER TREATMENT PLANT No.2
CITY OF RIDGECREST

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carollo engineers

Ponds 1, 2, 4, and 3, in that order, before being pumped to the Navy's chlorine contact basin (CCB) and then the golf course. Effluent may also flow from Pond 4 to the evaporation/percolation ponds.

Flow through Unit B is directed to either Pond 5 or 6. Wastewater flows from Pond 5 to the evaporation ponds and from Pond 6 to Pond 7 then into the evaporation ponds.

5.2.7 Sludge Drying Beds

Sludge is applied to solar drying beds from the Anaerobic Digesters. There are currently eight solar sludge drying beds without under drains totaling 14,100 square feet. Sludge is stored in the beds during the winter until favorable conditions in the summer allow for rapid drying of both the sludge, accumulated sludge from the winter months, and freshly digested sludge. The dry sludge is land applied at the City's agricultural fields. Four of the existing sludge beds have concrete tracts for dumping fresh sludge and hauling dried sludge.

5.2.8 Overall Plant

With the exception of the newly upgraded headworks, the WWTP is beyond its useful life. However, the plant has been well maintained over the years and thus the City has benefited by the extension of the plant facilities useful operations.

5.3 EFFLUENT STORAGE AND REUSE

Discharge of recycled effluent to City-owned land is governed by Waste Discharge Requirements (WDR) Order No. 6-93-85 (Appendix E).

The total land owned by the City is approximately 242 acres as shown in Figure 5.4, which includes the reclamation area, WWTP area and the City's old treatment plant site. The City discharges effluent from the aerated facultative ponds (Ponds 1-7) to Ponds 8 through 11 located at the existing WWTP and to the City owned farmland and storage/evaporation and percolation reclamation area at the old plant site. There are approximately 125 acres of evaporation ponds at the existing plant site, along with the 7.2 acres at the old plant site The NAWS reclaims a portion of the treated effluent for irrigation on approximately 214 acres at the NAWS golf course.

The City pumps effluent from Facultative Pond No. 3 three in a 20-inch transmission pipeline to the City owned ponds at the old plant site. This water is used to irrigate approximately 33 acres of alfalfa. Ponds at the existing site and the old site have soil cement side slope with unlined bottoms. The ponds are required to maintain two feet of free board by the WDR.

The NAWS has a separate Board Order (No. 6-84-36) for reuse on the golf course. They take effluent from Pond 3 and treat it to tertiary standards using a pressure filter system and a CCB. The pressure filter system consists of 12 sand filter pressure chambers and a

covered chlorine contact basin. The NAWS has abandoned the use for the pressure filters due to high algae biomass content in the water from Pond 3. The algae clogged the filters and the NAWS tried several other types of media to maintain system performance, but poor results have caused them to stop using the system. Currently the effluent bypasses the filters and goes directly into the CCB.

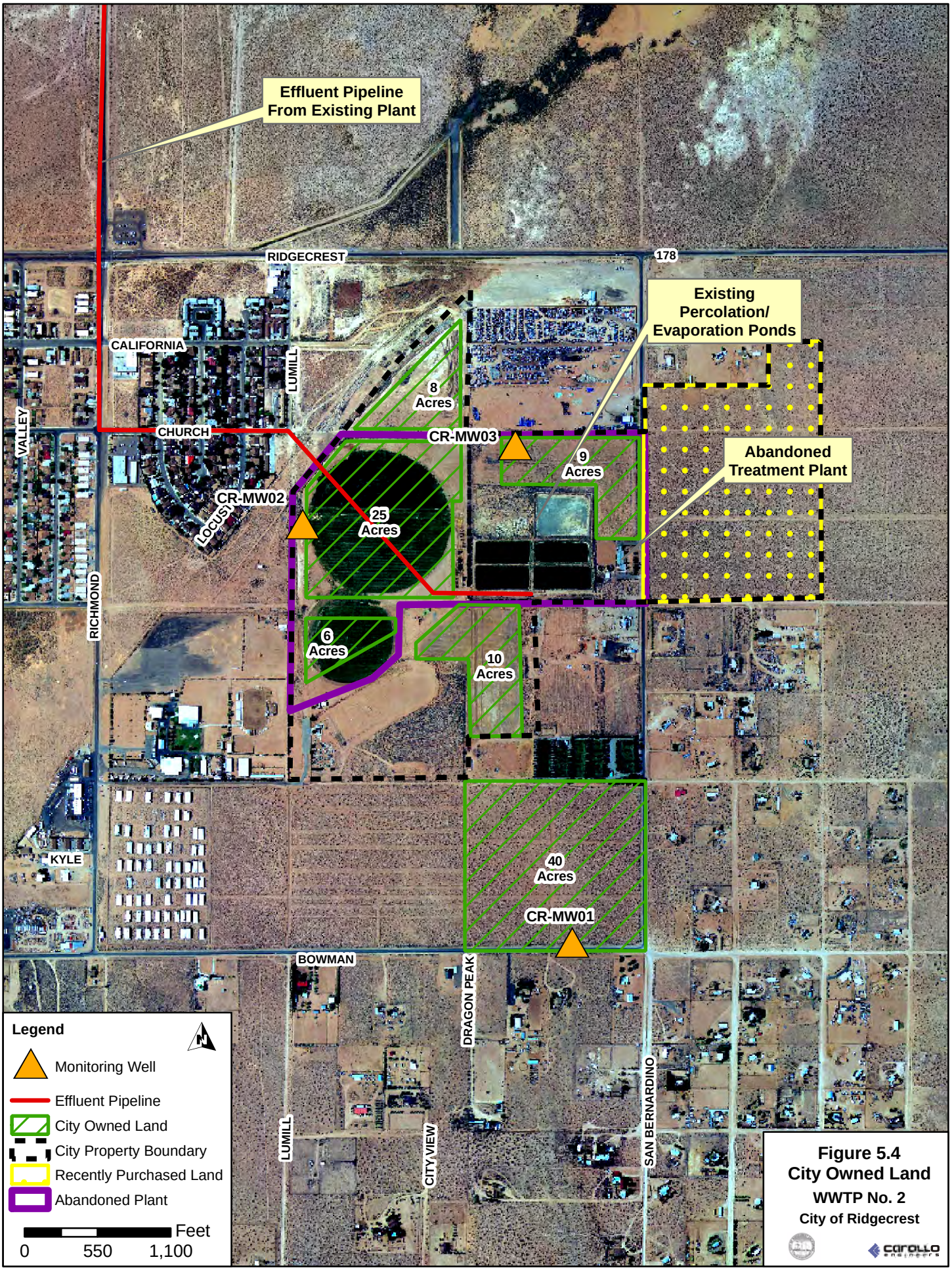

Figure 5.4
City Owned Land
WWTP No. 2
City of Ridgecrest

Chapter 6

ALTERNATIVE ANALYSIS

6.1 GENERAL

Based on the projected growth of the City of Ridgecrest (City)additional treatment facilities are needed to serve the future population. The City would like to utilize their existing lands to construct a new wastewater treatment plant to serve the future populations. This chapter develops two treatment alternatives for the City's new Wastewater Treatment Plant (Plant 2) to meet projected growth. Based on the 20-year population projections and design criteria developed in Chapter 3 the new treatment facilities should be constructed to a treatment capacity of 3.0 million gallons per day (mgd) with an effluent disposal capacity of 3.0 mgd. This new facility would serve the southern portion of the City. Based on the analysis in Section 3.3.1 the projected plant flow at the Plant No. 2 will be about 1.46 mgd when diverting all the collection capture area flow.

6.2 VIABLE WASTEWATER TREATMENT PROCESSES

Three treatment processes configurations have been considered for Plant 2. These processes include the Extended Aeration Activated Sludge (ExAAS) process, the Sequential Batch Reactor (SBR), and the Membrane Bioreactor (MBR). All three processes have the ability to completely nitrify and de-nitrify the wastewater prior to discharge. For tertiary treatment, the ExAAS and the SBR would need to add filtration and disinfection, while the MBR would only need to add disinfection.

With the projected wastewater flows of 1.46 mgd for the Plant No. 2 site at plant startup, the plant flow for alternative analysis was 3.0 mgd.

6.2.1 Extended Aeration Activated Sludge

The ExAAS process, in an oxidation ditch configuration, is a very common process being utilized in California today and it is very operator friendly. The process is considered an advanced secondary treatment process. Due to the high quality effluent produced, tertiary filters and disinfection can be easily added to the process.

The ExAAS process is a suspended growth system where the microorganisms that break down and consume the waste suspended in the liquid or mixed liquor. There are many variations in the activated sludge process including standard rate activated sludge, extended aeration, step feed, solids contact, and others.

Regardless of the variation of the activated sludge process, each system incorporates a return flow known as Return Activated Sludge (RAS). This return is the source of the microbiology or "bugs" needed to consume the waste in the influent wastewater. These

bugs in the presence of food (wastewater) and oxygen are the mechanism to biologically degrade (oxidize) the waste. The RAS consists of the settled material on the bottom of the secondary clarifier. Generally, centrifugal pumps are used to continuously pump the RAS from the bottom of the secondary clarifiers to the aeration basins. Periodically as the bugs reproduce and grow, they need to be wasted to keep a healthy population. This Waste Activated Sludge (WAS) is sent to the solids handling facilities for further treatment.

With the exception of very lightly loaded variations such as solids contact, the activated sludge processes can be modified to biologically nitrify and denitrify the ammonia in the wastewater. For the activated sludge process to do this several interrelated steps must occur in the aeration basin and secondary clarifier as generally described in the following. The aeration basin is divided in to two zones, anoxic and aerobic. The first zone where the wastewater is introduced is the anoxic zone. In the anoxic zone the wastewater is mixed with the RAS and recycled mixed liquor. The RAS is the source of the bugs, the wastewater is the food and ammonia source, and the mixed liquor contains the nitrate (oxidized ammonia). Since there is only mixing and no aeration in the anoxic zone the microorganisms utilize the oxygen from the nitrate (NO_3) molecule in their process of oxidizing the biochemical oxygen demand (BOD) in the wastewater. This process is known as denitrification and results in the nitrogen gas being released from the mixed liquor. Once the waste passes through the anoxic zone it enters the aeration zone. In the aeration zone the BOD is continued to be oxidized and the ammonia (NH_4) that was in the incoming wastewater is oxidized to NO_3. As the mixed liquor is recycled back through the anoxic zone the process begins over. Finally, the mixed liquor from the aeration basin is sent to the secondary clarifiers for settling.

The process of nitrifying and denitrifying has many benefits. Most importantly the nitrification/denitrification process produces an effluent with a total nitrogen concentration of less than 10 mg/L. This results in an effluent that will meet current and expected nitrogen limits. During the denitrification process BOD is being oxidized utilizing the oxygen from the NO_3 molecule. Utilizing the oxygen from the NO_3 molecule results in less aeration required. This is known as an oxygen credit, which is another side benefit of the process. During the oxidation of wastewater alkalinity is used. Alkalinity is the pH buffering capacity of the wastewater. During the denitrification process some of the alkalinity used in the oxidation process is restored. Also from an operational aspect the nitrification/denitrification process generally produces a better settling sludge.

With the ExAAS process the City could discharge the treated effluent onto feed and fodder crops. In order to expand the discharge into landscape or golf course irrigation filtration and disinfection would need to be added. The typical design parameters for the ExAAS process are provided in Table 6.1.

Table 6.1	Extended Aeration Activated Sludge Typical Design Parameters Wastewater Treatment Plant No. 2 City of Ridgecrest
Parameter	**Value**
Hydraulic Retention Time, hrs	18 - 36
BOD_5 Loading, lbs/10^3 ft^3/day	10 - 25
Sludge Age, days	20 - 30
MLSS, mg/L	1,500 - 5,000

Some advantages and disadvantages to extended aeration process are presented in Table 6.2.

Table 6.2	Advantages and Disadvantages of Extended Aeration Process Wastewater Treatment Plant No. 2 City of Ridgecrest
Advantages	**Disadvantages**
The racetrack type design promotes plug flow.	Energy costs are slightly higher than for the SBR processes.
BOD_5 removal is typically high 75-95 percent.	If Title 22 water is required in the future, filtration and disinfection are needed at an additional cost.
Extended aeration can be easily adapted to provide for nitrification and denitrification	
Effluent quality is generally very good.	
Very easy to operate and maintain	
Extended aeration is very forgiving and is able to handle shock loadings and wide variations in flows with little impact to the effluent quality.	

6.2.2 Sequential Batch Reactor

The SBR is a fill and draw system that involves a complete-mix reactor that incorporates a series of treatment cycles or steps into a single unit. The five treatment steps include the following:

- Step 1 - Fill. The purpose of the fill step is to add raw wastewater or primary effluent to the reactor.

- Step 2 - React. During this step aeration and mixing of reactor contents takes place. This is equivalent to the same process that takes place in a standard activated sludge reactor.
- Step 3 - Settle. During this step the aeration and mixing is turned off and the mixed liquor allowed to settle simulating the process in a standard secondary clarifier.
- Step 4 - Draw. During this process the withdrawal of the treated reactor takes place. The removal of the treated wastewater is generally accomplished with a floating decant system.
- Step 5 - Idle. During the idle step the waste sludge is removed from the reactor.

Sequencing batch reactors have biological operating characteristics very similar to extended aeration activated sludge wastewater treatment plants. Typical design parameters for the sequencing batch reactors are presented in Table 6.3 below.

Table 6.3 Sequencing Batch Reactors Typical Design Parameters Wastewater Treatment Plant No. 2 City of Ridgecrest

Parameter	Value
Hydraulic Retention Time, hrs	12 - 50
$_{BOD5}$ Loading, lbs/10^3 ft^3/day	5 - 15
MLSS, mg/L	1,500 - 5,000

Sludge wasting is an important step in the SBR operation that greatly affects performance. The amount and frequency of the sludge wasting is determined by performance requirements. It occurs during the idle cycles. A unique feature of the SBR process is that it does not require RAS to maintain the sludge content in the aeration chamber. Because both aeration and settling occur in the same chamber, no sludge is lost in the reaction step. However, either flow equalization basins or multiple reactors are required to accommodate a continuous flow of wastewater through the treatment process. Table 6.4 lists the advantages and disadvantages of the SBR treatment process.

Table 6.4 Advantages and Disadvantages of SBR Treatment Process Wastewater Treatment Plant No. 2 City of Ridgecrest	
Advantages	**Disadvantages**
Elimination of secondary clarifier and RAS pumping.	Relative lack of operational experience by City staff with the process.
High tolerance for peak flows and shock loadings	Operation is PLC based and requires a higher level of operator attention then the oxidation ditch.
Capable of nitrifying and denitrifying	If Title 22 water is required in the future effluent filtration and disinfection would be required at an additional cost.
	Need multiple units flow equalization basins to account for reliability and redundancy since the reactor and clarifier are in the same tank

The use of SBRs has generally been associated with smaller flows from resorts and small isolated residential or commercial developments. There are relatively few installations at larger municipal installations. Since the SBR process includes both aeration and clarification in the tankage, a complete standby unit must be provided for reliability and redundancy requirements. For instance, if an SBR tank were taken off line for any reason the City would lose both an aeration basin and secondary clarifier at the same time.

6.2.3 Membrane Bioreactor

The MBR process consists of fine screenings, an aeration basin with fine bubble diffusers, supported by blowers and a dedicated basin to house the membrane facility.

MBR can provide organic and suspended solids removal in one step. The use of MBR technology eliminates the need for conventional secondary clarification and effluent filtration as the solids separation and filtration steps are accomplished by the membranes. Because the clarifiers are eliminated, the effects attributed to filamentous organisms and the associated poorly settling sludge is eliminated.

To provide nitrified and denitrified effluent, an anoxic selector basin will be provided. Piping flexibility will be provided to allow the mixed liquor suspended solids (MLSS) recycle, RAS, and raw wastewater to be step fed into the different zones in the selector. This will allow the operators the needed flexibility to meet changing influent conditions and effluent limitations. Membrane manufacturers require that a fine screen be installed before the membranes to remove hair and other small material that may blind the membranes. These screens will be located upstream of the selection/aeration basin and are in addition to the bar screens located in the headworks.

Without operating under the limitations of the conventional clarification process, the activated sludge process in a MBR plant can now be operated at very high concentrations of MLSS of up to 10,000 - 12,000 mg/L. Construction of a separate aeration basin similar to the ExAAS system will be required. This structure would be constructed of concrete and will be compartmentalized to house individual trains of membrane cassettes. This will allow the cassettes to be isolated for in place cleaning. A crane can also be supplied to lift the cassettes out of the membrane bioreactor tank if needed. This structure will be covered to protect the cassettes and associated equipment from the elements.

Air is introduced into the bottom of the membrane tank. The air is discharged through diffusers in the bottom of the tank to scour the outside of the membranes. This process keeps the material from collecting on the outside of the membranes and limiting their capacity. The system includes air blowers, air columns, and air separation columns.

Centrifugal pumps are used to draw the mixed liquor through the membranes. As the mixed liquor passes through the membrane, the solids are rejected and the clear permeate (effluent) passes through the membrane. With a membrane pore size of 0.04 microns, the effluent is of high enough quality that effluent filtration is not needed even for Title 22 disinfected tertiary reclaimed water.

In addition to a series of permeate pumps, a backpulse pumping system is required. This system includes a series of pumps, piping and valving to allow the membranes to be periodically backpulsed. A cleaning system is required to keep the membranes at their peak performance. This system includes the piping and valving to clean the membranes in place.

As with any activated sludge process, return sludge and waste sludge pumping facilities are required. In addition, sludge recirculation pumps will also be required.

To control the system dissolved oxygen (DO) probes and turbidity analyzers are required for each train. A PLC/PC control system is provided by the manufacturer to control the functions of the membrane bioreactor system. It is recommended that the majority of the equipment, including the membranes, be housed in a building. This building should incorporate a separate control room. Table 6.5 lists the advantages and disadvantages of the MBR treatment process.

Table 6.5 Advantages and Disadvantages of the MBR Process Wastewater Treatment Plant No. 2 City of Ridgecrest	
Advantages	**Disadvantages**
Elimination of secondary clarifiers and conventional filtration (if needed)	Generally more expensive per gallon than other activated sludge processes
High tolerance for wide variations in organic loadings	Need Blowers and diffused aeration system.
Capable of nitrifying and denitrifying	Requires more operator attention
Cassettes can be added to match flows	Requires more mechanical equipment than other forms of activated sludge treatment.
Provides full Title 22 unrestricted use effluent for parks and crop irrigation	MBR's have specific loading rates or capacities. This requires that enough cassettes be installed to handle any peak flows and cassette down time.
	This technology does not have the long history of operating like more conventional biological systems.

6.3 DESCRIPTION OF ALTERNATIVES

Carollo Engineers (Carollo) looked at the three treatment processes describe above and two alternatives were developed for the City to consider for Plant 2.

Alternative No. 1: This alternative includes the installation of an extended aeration activated sludge treatment plant in the form of an Oxidation ditch. The activated sludge process is rated for 3 mgd. Two clarifiers and a separate sludge pumping facility are necessary as part of the extended aeration activated sludge treatment plant.

Alternative No. 2: This alternative includes the installation of a membrane bioreactor (MBR) plant. The MBR process is rated for 3 mgd. Since the MBR effluent can be disinfected and used for irrigation of golf course and landscape irrigation, this process becomes particularly attractive when comparing its costs to the purchase price of land, which may be needed for the disposal of treated effluent.

6.4 FACILITIES COMMON TO ALL ALTERNATIVES

There are certain elements of Plant 2 that are common to both alternatives. These components and facilities are discussed below.

Administrative and Laboratory Building: The Administrative and laboratory building will be approximately 2,000 square feet and include the following facilities:

- Testing Laboratory
- 2 Offices and a Operation Center
- Men's and Woman's Locker Room
- Training and Lunch Room
- Storage and Miscellaneous Area

MCC Building: This building will house the Master Control Center (MCC) for the entire treatment facility

Headworks: A new headworks facility will be constructed to receive influent from the collection system. It would include a parshall flume for influent flow metering, two mechanical bar screens, and a screenings compactor. The bar screens are sized for design flows with one out-of-service. The screenings would be compressed to remove water and the dewatered screenings dumped into a commercial trash bin.

Influent Pipeline: This pipeline will divert flow from the existing collection system to the headworks. The pipeline will consist of approximately 2,100 linear feet of 21-inch diameter section and approximately 1,100 linear feet of 36-inch diameter section.

Centrifuge Building: The centrifuge facility will be used for solids handling and dewatering of WAS. The facility will incorporate magnetic flow meters, polymer feed and injection systems and two centrifuges.

Sludge Holding Tanks: The sludge holding tanks will be used to store WAS before being processed in the centrifuge facility.

Sludge Drying Beds: Solar sludge drying beds will be used to dry biosolids before being hauled away for composting. The sludge bed will be soil-cement lined or asphalt lined to comply with future provisions that are expected in the WDR.

Emergency Generator: A preliminary estimate of the motor loads has been determined for the alternatives described below. In sizing a generator, the starting motor loads become more critical in determining the correct size of the generator than the actual connected load. Although a detailed design has not yet been completed, it is estimated that a minimum size for a generator will be 1,000 to 1,250 Kilowatt (kw).

6.4.1 Effluent Disposal

In addition to providing the treatment process necessary to treat the wastewater generated by the City's residential, commercial and industrial users, accommodations for discharging the treated wastewater are also necessary. Historically this includes a combination of percolation/evaporation ponds and farming with feed and fodder crops.

Several effluent disposal options were evaluated for the City of Ridgecrest. These options include additional farmland for feed and fodder crop irrigation, irrigation of the Bowman Channel Parkway and Evaporation/Percolation ponds.

Farmland Irrigation: Feed and fodder crops have an irrigation water demand of 2.5 to 4.0 acre-feet per acre depending on the crop. Assuming furrow irrigation (60-70 percent efficiency), the total water demand would be approximately 3.4 to 5.4 acre-feet per acre. Since most WWTP farming operations are not all planted exclusively with high water demand crops such as alfalfa, an average cropping demand of 4.4 is a realistic water demand. Using an average irrigation demand of 4.4 acre-feet per acre (feed and fodder crops), approximately 250 acres of farmland for every 1.0 mgd of annual average flow. Therefore, the ultimate acreage needed for 3.0 mgd would be on the order of 750 acres. In addition, approximately 90 days of effluent storage capacity is recommended to get through the winter months when there is little water demand by the crops.

Bowman Channel Parkway: This option is very attractive since the effluent water is reclaimed on a “parkway” visible to the general public. However, landscape water demands for parkways are approximately 3.0 acre-feet per acre (including irrigation inefficiencies). The water must also be treated to tertiary levels (beyond secondary treatment). One hundred acres of parkway landscaping could accommodate approximately 0.55 mgd of treated tertiary effluent based on landscape water demands. A dedicated irrigation system and “purple pipe” irrigation system would need to be developed. Since the parkway is in a floodway standby storage, this option may be further developed if there are larger tertiary water demands that make the construction of tertiary facilities more feasible or if the area around the Bowman channel is developed.

Evaporation/Percolation: Based on records search of the pond evaporation for similar areas, the Ridgecrest area could realize evaporation rates of 64.5 inches per year. The review of previous studies for the WWTP, indicates that the soil percolation in the area is approximately 1.0 inch per day. The combined disposal capacity of evaporation/percolation ponds is approximately 35.7 acre-feet per year. This rate of disposal capacity is significantly greater than the two disposal capacities described above. Since shallow evaporation/percolation ponds are relatively low costs to construct, this method of disposal is the preferred method. In addition, the underlying groundwater in the area is of bad water quality.

A separate letter report entitled “Disposal Facilities Evaluation” prepared by Carollo included an analysis with evaporation/percolation ponds for effluent disposal of 2.4 mgd and 3.0 mgd (Appendix K).

The 2.4 mgd analysis resulted in the recommendation to construct 64.8 acres of additional percolation/evaporation ponds. If the City’s undeveloped land surrounding the plant is available for ponds, this alternative is the most economically viable alternative for flows up to 2.4 and to 3.0 mgd.

Beyond 2.4 mgd, the City will need to develop the land east of San Bernardino Road and construct additional evaporation percolation ponds.

6.5 ALTERNATIVE 1-OXIDATION DITCH

This alternative will incorporate an Oxidation Ditch (extended aeration activated sludge) plant sized to treat 3.0 mgd. The oxidation ditch we propose is the current carousel design. The extended aeration process is recommended due to its flexibility and ease of operation. The extended aeration process is also easily modified to nitrify and denitrify the incoming ammonia. Due to the long sludge age in the extended aeration process, the WAS may be directed to the sludge beds without additional digestion. This alternative is shown on the facility site plan in Figure 6.1. The treatment units unique to this alternative are generally described below.

Oxidation Ditch: The screened effluent from the headworks will flow into the new oxidation ditch. The ditch will incorporate an integral anoxic zone so that it can be utilized for biological nitrification/de-nitrification.

Secondary Clarification: Two secondary clarifiers will be constructed to receive mixed liquor from the oxidation ditch as part of the Oxidation Ditch treatment process.

RAS/WAS Pump Station: A RAS/WAS pump station dedicated to the extended aeration activated sludge system will be needed for this alternative. This pump station would provide capacity to pump 120 percent of the average day maximum month flow for the range of flow in an extended aeration system. The WAS piping from the secondary clarifiers should allow for the WAS to be directed to the sludge holding tanks or directly to the sludge beds.

Irrigation Pump Station: Due to the increased need for further pumping and with the addition of effluent storage ponds, a new irrigation pump station is determined as necessary. The existing irrigation pump station will remain in operation as a backup pumping facility.

Effluent Pump Station: The effluent pump station can be utilized to pump final effluent to the evaporation and percolation ponds.

6.6 ALTERNATIVE 2 - MEMBRANE BIOREACTOR

This alternative will incorporate a MBR (Aeration Basins with submerged membranes) sized to treat 3.0 mgd. This process is explored as an option to the above units since it produces unrestricted re-use effluent (Title 22) with the addition of disinfection process. Producing an unrestricted re-use effluent allows the City to significantly reduce the additional effluent disposal facilities. The facilities necessary for incorporating an MBR plant is shown on Figure 6.2.

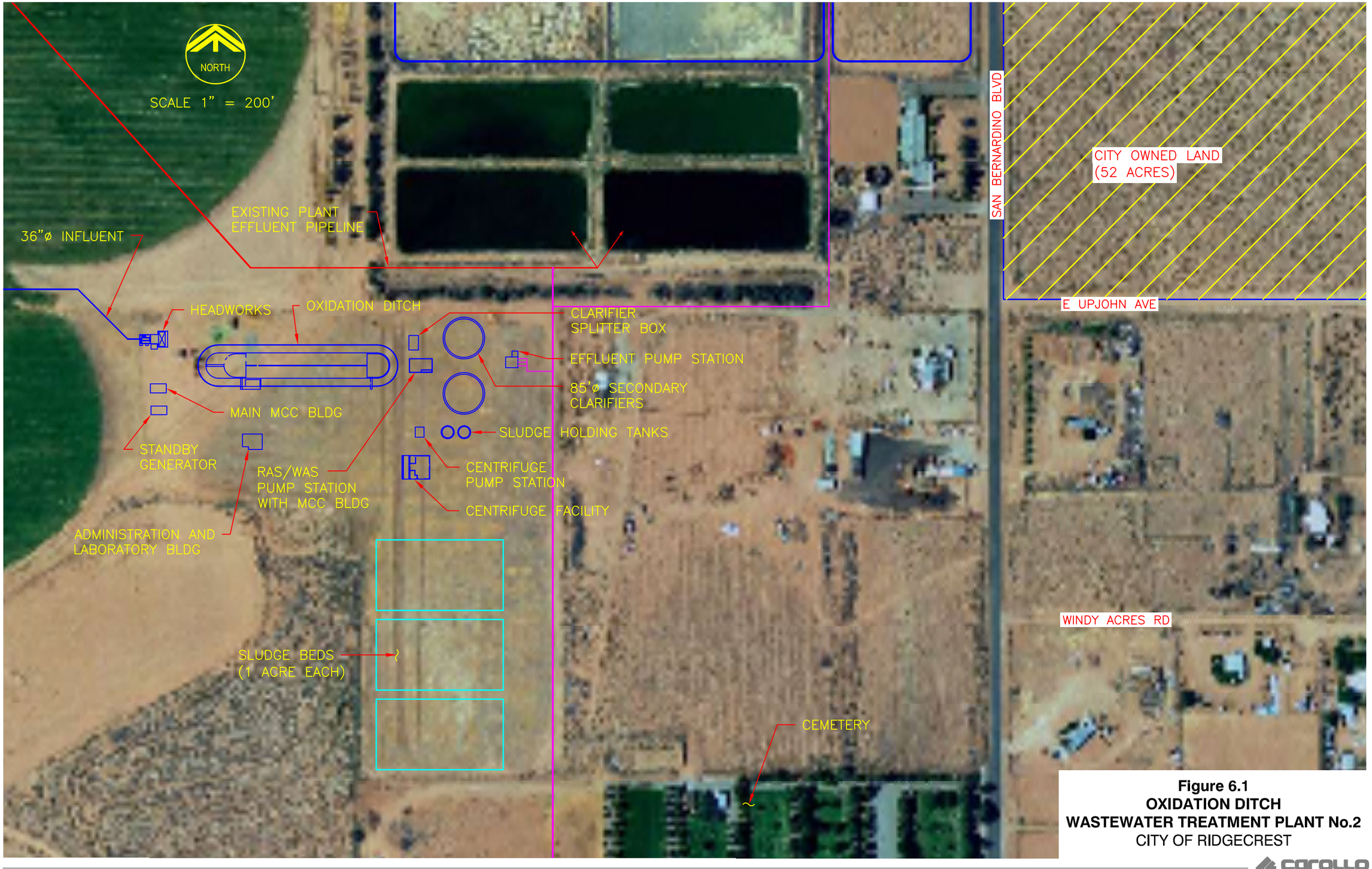

Figure 6.1
OXIDATION DITCH
WASTEWATER TREATMENT PLANT No.2
CITY OF RIDGECREST

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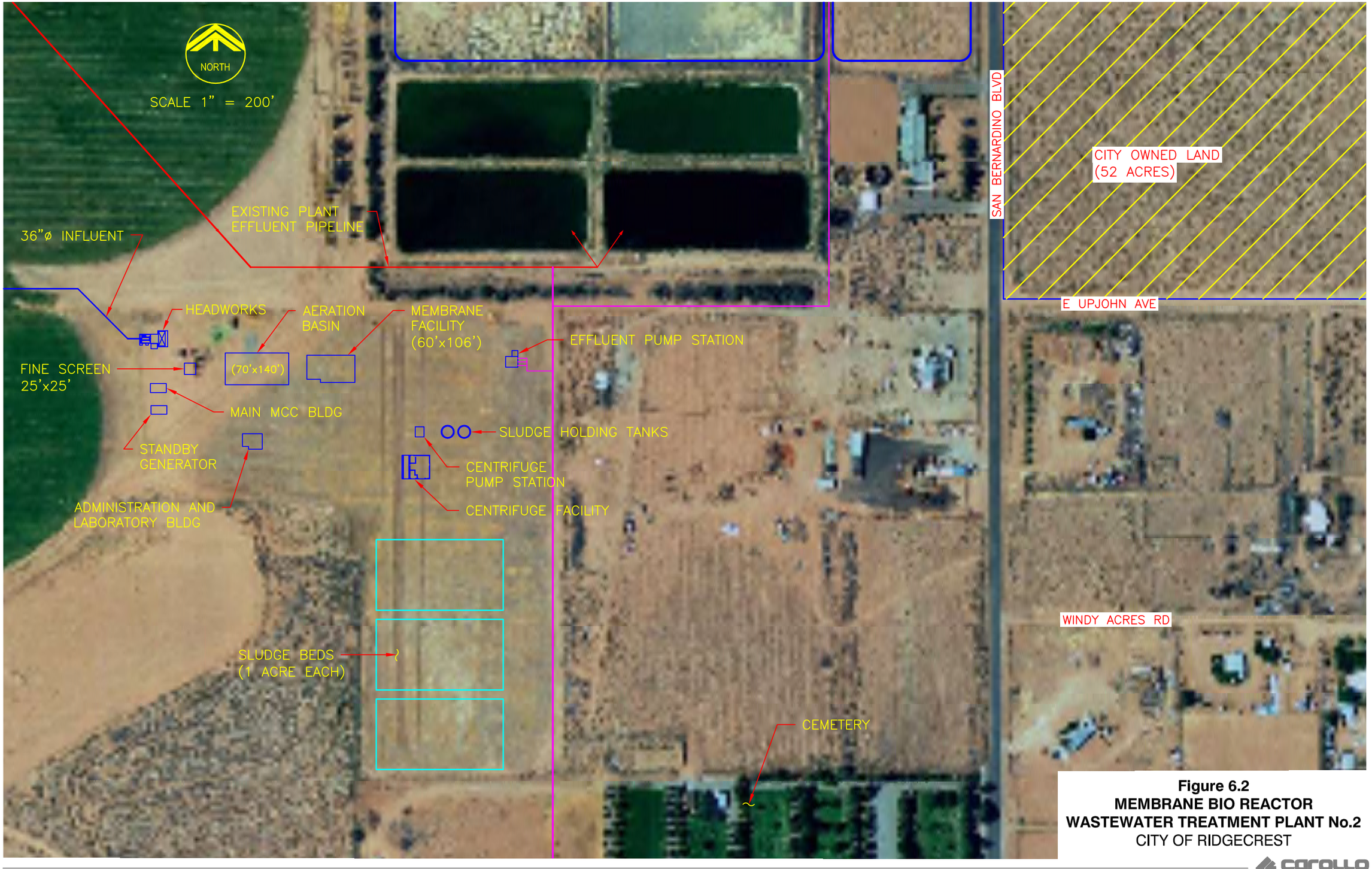

Figure 6.2
MEMBRANE BIO REACTOR
WASTEWATER TREATMENT PLANT No.2
CITY OF RIDGECREST

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The treatment process necessary for providing a parallel MBR plant is described below.

Headworks Treatment: The headworks will be replaced as described in Section 6.4 above.

Primary and Sludge Pumping: The primary and secondary sludge pump stations will continue to process sludge in the same manner.

Aeration Basin and Membrane Facilities: After fine screening of the influent flow, flow will be directed into the aeration basins of the MBR process. This process is supported by three blowers in a blower building. The membranes are housed in a separate downstream structure (membrane facilities) complete with permeate pumps and dedicated blowers. The 3.0 mgd is then subdivided into four membrane tanks to provide flexibility to remove one basin off-line for maintenance and repair while having a minor impact to the treatment.

Effluent Pump Station: The effluent pump station can be utilized to pump to the evaporation percolation ponds.

Irrigation Pump Station: Due to the increased need for further pumping and with the addition of effluent storage ponds, a new irrigation pump station is determined as necessary. The existing irrigation pump station will remain in operation as a backup pumping facility.

6.7 COMPARISON OF ALTERNATIVES

There are several factors to consider when constructing a new WWTP. These include capital costs, the ability to meet current and anticipated future regulatory requirements, and operational factors. These factors will be addressed briefly below.

6.7.1 Costs

The following table is a breakdown of the engineer's opinion of estimated capital costs for each project. A detailed cost breakdown for each alternative is shown in Appendix L.

Alternative	Estimated Cost (million)
Alternative No. 1 - Oxidation Ditch	$38.3
Alternative No. 2 - MBR	$39.8

At this juncture, the effluent disposal facilities necessary for a 3.0 mgd flow consists of adding 68 acres of percolation/evaporation pond and 3 acres of sludge beds.

6.7.2 Operations Costs

A detailed evaluation of the annual operations cost for each alternative was developed in a spreadsheet format and they are included in Appendix L with the capital cost comparison. The O&M costs summary is presented below. Both alternatives will require a full-time staff of an operations supervisor, two operators and a laboratory analyst. Although there may be opportunity for part-time staff after initial start-up, the operations cost considered full-time staff.

Alternative	Annual Operations Costs	30-yr O&M Costs
Alternative No. 1 - Oxidation Ditch	$1.48	$25.6
Alternative No. 2 - MBR	$2.29	$39.6
*Costs are in millions		

6.7.3 Regulatory Compliance

Recently the Regional Water Quality Control Board (RWQCB) has been concerned with groundwater degradation resulting from nitrogen percolation from the storage basins and from irrigation practices. To alleviate this problem the nitrogen can be readily removed from the wastewater biologically using either alternative. Both alternatives were considered because of there ability to meet a nitrogen effluent in the combined effluent of 10 mg/L for the design year.

Alternative No. 1 is an Extended Aeration Activated Sludge process that is a very forgiving process that is easy to operate. The extended aeration process handles wide fluctuation in influent flow and quality.

The WAS from the process is relatively stable and can generally be thickened, or applied directly to sludge beds without the need for additional stabilization. Additionally the extended aeration process if operated to nitrify and denitrify produces a well settling mixed liquor, provides an oxygen credit, and replenishes alkalinity used in the oxidation process easily adaptable to tertiary filters.

Alternative No. 2 is a MBR plant that provides the highest quality effluent and can be disinfected for Title 22 effluent. This allows the effluent to be irrigated on crops for human consumption as well as parks, golf courses and cemeteries. However, the MBR plant has the highest capital cost and considerably higher operating costs of than Alternative 2.

6.7.4 Recommended Wastewater Treatment Alternative

Even though the estimated capital costs of the MBR alternative is higher, the selection of a recommended wastewater alternative should be based on several factors and not solely on

the estimated capital costs. To determine the recommended alternative a decision matrix that ranks the alternatives and many factors including capital costs will be utilized. The factor ranking factors are as follows:

- The most desirable alternative for each factor is given a rating of one.
- The least desirable alternative for each factor is given a rating of three.

Based on this ranking system the alternative with the lowest ranking will be the recommended alternative, as shown below in Table 6.6 below.

Table 6.6 Comparison of WWTP Alternatives Wastewater Treatment Plant No. 2 City of Ridgecrest

Factors	Alternative No. 1 ExAAS	Alternative No. 2 MBR
Capital Costs	1	2
Effluent Quality	1	1
Biological Nitrification/ Denitrification	1	1
Easily Accommodate Varying Flows and Loadings	1	1
Ease of Operation	2	3
Process Flexibility	1	2
Nuisance Vectors (Snail and Filter Flies)	1	1
O_2 and Alkalinity Credit	1	1
WAS Stability and Solids Stabilization Options	1	1
Power and O&M Costs	1	2
Maximizes the Use of Existing Infrastructure	1	1
Meets the RWQCB BPTC	1	1
Total Ranking	**13**	**17**

Based on the results of the decision matrix, the parallel oxidation ditch is the recommended wastewater treatment alternative.

6.8 STAFFING REQUIREMENTS

Both plant alternatives will require a staff of an operations supervisor, two operators and a laboratory analyst. There maybe an opportunity.

RECOMMENDED FACILITIES

7.1 SUMMARY

This chapter outlines the recommended facilities necessary to treatment capacity the project flow of 3.0 million gallons per day (mgd). This is accomplished by constructing a 3.0 mgd oxidation ditch treatment facility. The total project costs and itemized construction costs are outlined. Section 7.6 provided an alternate phased plan approach.

7.2 RECOMMENDED PROJECT

The recommended wastewater treatment plant (Plant 2), will consist of the following:

Administration and Laboratory Building:

This building would house office and laboratory facilities for plant operations staff and sample testing equipment

Master Control Center (MCC) Building: This building will house the Master Control Center for the entire treatment facility

Headworks: The headworks would be sized for a peak hour flow of 6.0 mgd to accommodate the City's projected growth. It would include a parshall flume for influent flow metering, and two mechanical bar screens. The screens are sized for design flows with one out of service. A influent pump station would be constructed to pump the screened wastewater to the oxidation ditch. The pump station capacity would be 6.0 mgd peak hour flow with an average annual flow of 3.0 mgd.

Influent Pipeline: This pipeline will divert flow from the existing collection system to the headworks. The pipeline will consist of approximately 2,100 linear feet of 21-inch diameter section and approximately 1,100 linear feet of 36-inch diameter section.

Oxidation Ditch: The oxidation ditch and associated facilities would be designed to handle 3.0 mgd. The oxidation ditch would be designed to hold 3.7 million gallons (MG) with a 0.23 MG anoxic basin. The side water depth would be 15 feet. Two 85-foot diameter secondary clarifiers would be provided. A return activated sludge (RAS) Pump station would return the settled mixed liquor from the clarifiers to the oxidation ditch.

Effluent Pump Station: A new effluent pump station will be constructed to pump treated effluent to the evaporation/percolation ponds. The pump station would have three pumps, two active and one standby. The new pumps would have a capacity of approximately 2,100 gpm. This would provide a firm capacity of approximately 6.0 mgd. The new effluent pump station would discharge to the proposed evaporation/percolation ponds.

Sludge Beds: Three acres of sludge beds are required for a treatment capacity of 3.0 mgd. According to California Regional Water Quality Control Board (RWQCB) staff under future permits all beds will be required to be soil cement lined and have under drains.

Centrifuge Building: The centrifuge facility will be used for solids handling and dewatering of WAS. The facility will incorporate magnetic flow meters, polymer feed and injection systems, and two centrifuges.

Sludge Holding Tanks: The sludge holding tanks will be used to store waste activated sludge (WAS) before being processed in the centrifuge facility.

Emergency Generator: The minimum size for a generator will be 1,000 to 1,250 Kilowatt (kw).

Evaporation/Percolation Ponds: Disposal facilities will consist of 33.3 acres of farmland, 72 acres of evaporation/percolation ponds for 2.4 mgd and 93 acres for 3.0 mgd.

Miscellaneous: Associated yard piping, paving and grading, electrical controls needed to make the system completely compatible for SCADA control.

A layout of the Plant 2 facility is shown in Figures 7.1 and 7.2. This proposed layout will have the capacity to treat 3.0 mgd (based on Average Day Maximum Month Flow [ADMMF]). Table 7.1 outlines the proposed preliminary design criteria for the improvements.

Table 7.1 Design Criteria - Plant No. 2
Wastewater Treatment Plant No. 2
City of Ridgecrest

General	
Design Year	2030
Service Population	30,000
Per Capita Wastewater Flow Rate	97
Average Annual Wastewater Flow (AAWF) (mgd)	2.75
Average Day Maximum Month (ADMM)	3.0
Peak Hour Flow (mgd)	6.0
BOD_5 (mg/L) AA	250
BOD_5 (mg/L) ADMM	300
Effluent Limits	
Total Nitrogen (mg/L), Monthly Average	10
BOD_5 (mg/L), Monthly Average	40

Table 7.1	**Design Criteria - Plant No. 2 Wastewater Treatment Plant No. 2 City of Ridgecrest**
BOD_5 (mg/L), Daily Maximum	80
TSS (mg/L, Monthly Average	40
TSS (mg/L), Daily Maximum	80
Headworks	
Bar Screen	
Number of Screens	1
Peak Capacity (mgd)	8.0
Parshall Flume	
Number (each)	1
Capacity Range	8.0
Throat Size (inch)	12.0
Influent Pump Station	
Number of Pumps	2 + 1
Capacity, each (gpm)	2,500
Oxidation Ditch	
Number	1.0
Side Water Depth	15
Influent BOD (mg/L)	300
Detention Time (hrs)	24.6
BOD Loading at ADMM (pounds/1,000 cf)	19.5
Throat Size (in)	18
Secondary Clarifiers	
Number	2
Diameter (ft)	75
Side Water Depth (ft)	14
Detention Time (hrs)	8.7
Overflow Rate (gpd/sq ft)	340
RAS/WAS Pump Station	
Number (2 + 1 Standby)	3
Capacity, each RAS Pump (mgd)	2
WAS Capacity (firm, gpm)	25-250

Table 7.1	Design Criteria - Plant No. 2 Wastewater Treatment Plant No. 2 City of Ridgecrest
Centrifuge Facility	
Number	2
Capacity, each (gpm)	125
Estimated Cake Quality (%)	18-20
Sludge Holding Tanks	
Number	2
Diameter (ft)	26
Side Water Depth	25
Volume (each)	111,200
Sludge Beds	
1	3
Total area for beds with under drain (sq ft)	130,680
Effluent Pump Station	
Number of Pumps	2 + 1 Standby
Size (hp)	20
Evaporation/Percolation Ponds	
Numbers	6
Total Area (acres)	68

7.3 CONSTRUCTION COSTS

In addition to the facility components and costs for each alternative, there are additional common facility components required of each alternative. There components and the associated construction costs for the 3.0 mgd plant are on Table 7.1. The total construction costs for the recommended project becomes $34.26 million.

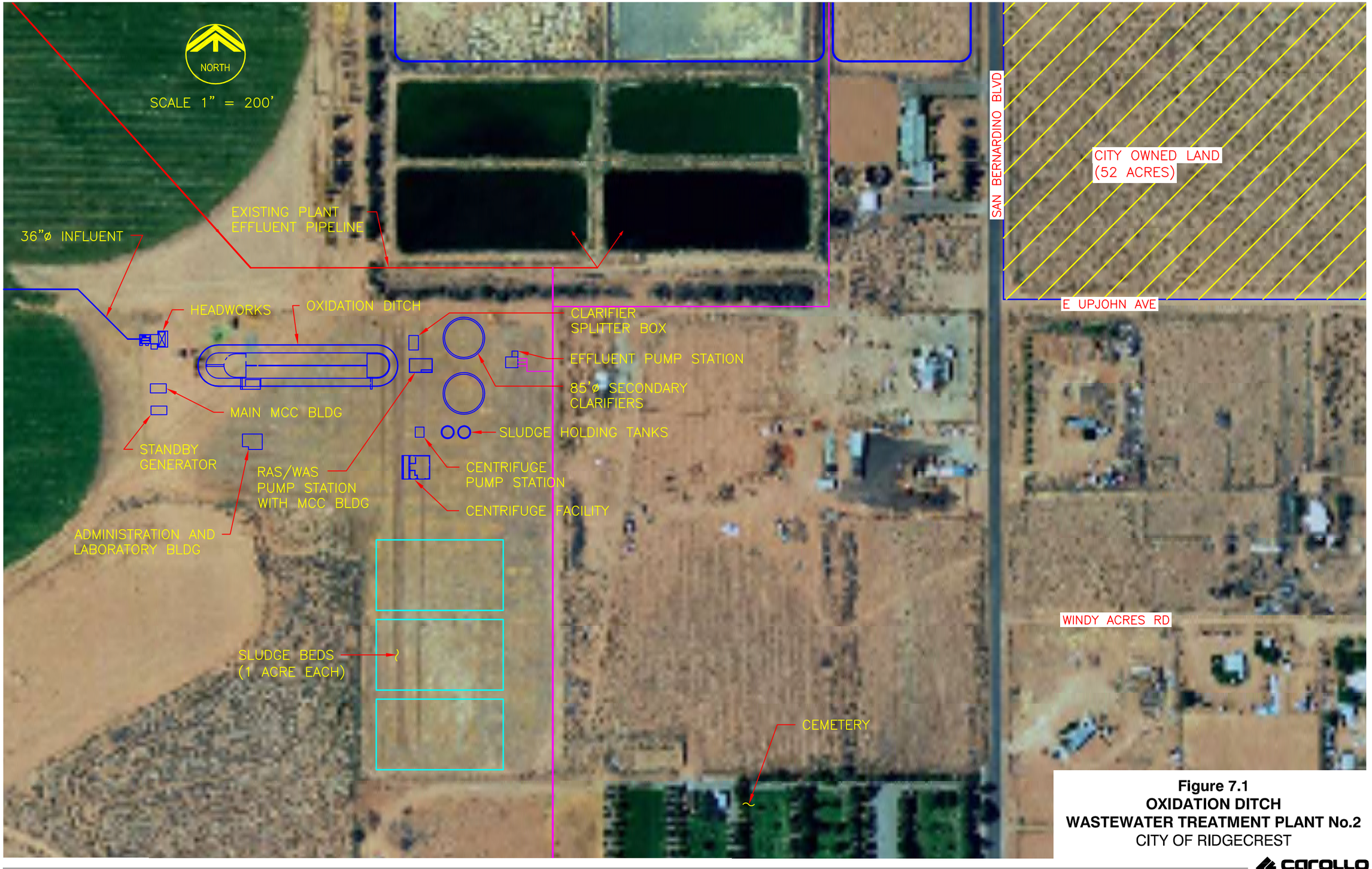

Figure 7.1
OXIDATION DITCH
WASTEWATER TREATMENT PLANT No.2
CITY OF RIDGECREST

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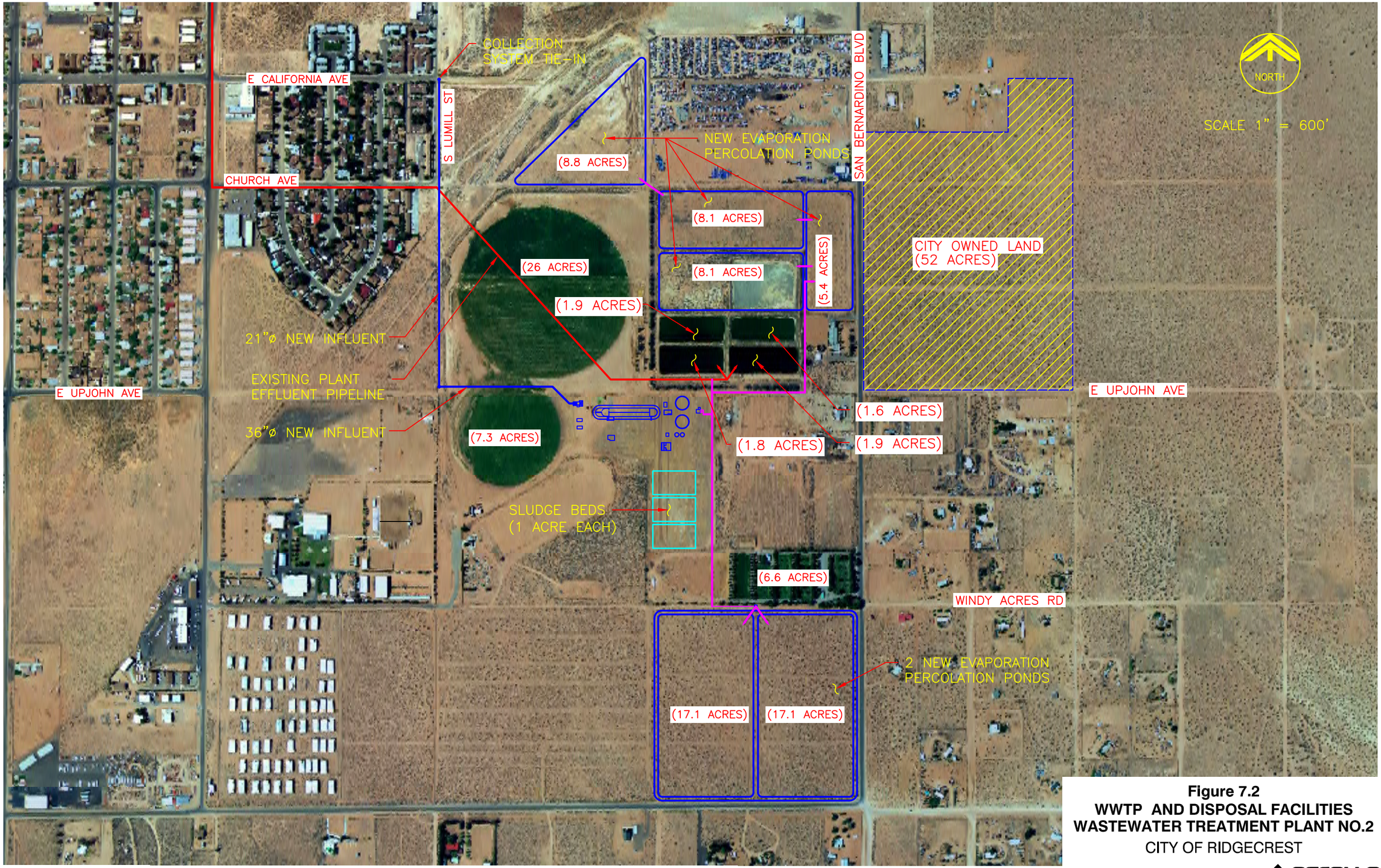

Figure 7.2
WWTP AND DISPOSAL FACILITIES
WASTEWATER TREATMENT PLANT NO.2
CITY OF RIDGECREST

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Table 7.2 Construction Costs for Recommended Project Wastewater Treatment Plant No. 2 City of Ridgecrest	
Component	**Cost[1]**
Mobilization	$88,000
Influent Pipeline	$1,255,000
Headworks	$1,371,000
Oxidation Ditch	$1,951,000
RAS/WAS Pump Station	$1,054,000
Secondary Clarifiers	$1,657,000
Centrifuge	$1,323,000
Sludge Holding Tanks	$720,000
Effluent Pump Station	$427,000
Effluent Disposal Facilities	$3,441,000
Sludge Beds	$515,000
Emergency Generator	$543,000
MCC Building	$662,000
Administration/Lab Building	$444,000
Yard Piping (15%)	$4,113,000
Paving & Grading (8%)	$2,194,000
Electrical & Instrumentation (20%)	$5,482,000
Startup	$94,000
De-Mobilization	$77,000
Subtotal	**$27,411,000**
Estimating Contingency (25%)	$6,853,000
Total Project Construction Costs	**$34,264,000**

Notes:
1. Based on July 2010 costs.

7.4 PROJECT COSTS

In addition to the construction costs, the project includes planning, environmental, engineering design and construction monitoring, legal and administrative costs. Since the State Revolving Fund (SRF) loan payment starts one-year after plant start-up and funds are dispersed at the start of construction, interest on the borrowed money is then added to the

project costs. Currently, the SRF interest is 2.5 percent. The total estimated project costs are $43.46 million dollars and are outlined in Table 7.3. Based on these costs the annual payment (principle and interest) for a 20-year loan from the SRF program, at 2.5 percent, is $2.79 million dollars per year.

Table 7.3 Total Project Cost
Wastewater Treatment Plant No. 2
City of Ridgecrest

Component	Cost[1]
Planning, Environmental, Engineering, Legal & Administration	
Planning (Project Report, Environmental, Revenue Program, Disposal Evaluation)	$400,000
Design Engineering - WWTP	$3,427,000
Construction Engineering - WWTP	$3,427,000
Administration & Legal	$100,000
Value Engineering	$85,000
Interest During Construction and First Year of Operation	$1,820,000
Project Construction Costs	**$34,264,000**
Total Project Cost	**$43,523,000**

Notes:
1. Based on July 2010 costs.

7.5 SCHEDULE

Table 7.4 outlines a preliminary Schedule of events for the City to participate in the State Water Resources Control Board (SWRCB) SRF Loan Program. This schedule shows a plant start-up in August 2010. This project may be slightly accelerated by starting the design while pursuing SWRCB SRF Staff approval. However, to be eligible for funding, plans cannot be bid until the SWRCB has given concept approval and eligibility determination.

Table 7.4 Project Schedule
Wastewater Treatment Plant Expansion
City of Ridgecrest

Event	Date
Planning	
Project Report Completed	September 2008
Preparation of the Environmental Impact Report (EIR)	October 2008 - May 2009
Draft Revenue Plan Completed	December 2008

Table 7.4 Project Schedule Wastewater Treatment Plant Expansion City of Ridgecrest	
Event	**Date**
City Council Consideration and Approval of Project Report, City Council Approve Draft Revenue Program and Final EIR	December 2008
Submit Final Environmental Documents, Final Project Report, and Draft Revenue Plan to SWRCB	May 2009
Final Rate Ordinance (adopted)	May 2009
SWRCB Concept Approval of Facilities Plan and Eligibility Determination	June 2009
Design	
Begin Design - WWTF and Disposal Facilities	March 2009
Plans and Specifications to SWRCB	November 2009
Fund Source Dedication Resolution (Final)	July 2009
Loan Contract Issued	August 2009
Bid Opening (WWTF)	January 2010
Construction	
Construction (Begin WWTF)	March 2010
Construction 90 percent Final Revenue Program, Rate Ordinance and Sewer Use Ordinance (adopted) to SWRCB	December 2011
Construction Complete	March 2012
New Plant Startup	April 2012
1st Year of Operation	April 2013

7.6 PHASED PLAN

The projected wastewater flows at the Plant 2 site start-up (year 2012) are estimated to be approximately 1.46 mgd (See Section 3.3.1). This is only if the entire collection system capture area for Plant 2 is directed to the site. However, the City may elect to only scalp a portion of the wastewater flows in the collection system capture area. This could be accomplished by constructing a flow diversion structure at the intersection of East California Avenue and South Lumill Street. The wastewater flows that are not diverted to the Plant No. 2 site would continue to be directed to the existing WWTP within the China Lake Naval Air Weapons Station (NAWS). The following sections are the breakdown of a two or three phase approach to building a full 3.0 mgd WWTP and the Plant 2 site. The two-phase approach is for two 1.5 mgd WWTPs and the three-phase approach is for three 1.0 mgd WWTP expansions.

7.6.1 Phased Expansions - Two 1.5 mgd WWTPs

Under a two-part 1.5 mgd approach for obtaining a full 3.0 mgd at the Plant 2 site, the City can scalp off only 1.5 mgd initially and then build a second 1.5 mgd expansion when total flows are closer to 2.0 mgd. The Phase 1 WWTP would involve all the components of the 3.0 mgd plant but with two smaller ditches and three smaller clarifiers. The influent line, headworks structure, effluent structure, administration and laboratory building, centrifuge facilities, and sludge holding tanks would all be sized for a 3.0 mgd WWTP. However, only the necessary pumping units for the 1.5 mgd and the 3.0 mgd would be installed as needed.

The effluent disposal ponds can be constructed in 1.0 mgd components as needed. The City may also want to provide tertiary treatment for the Bowman Channel Concept and thus less disposal ponds are needed. The sludge beds could also be constructed in increments on an as-needed basis. The initial phase would be the most expensive since the necessary infrastructure (piping, electrical, and structural) for the entire 3.0 mgd would be installed. In order to keep costs down on the initial stage, two smaller emergency generators, in phases, can be built for the full 3.0 mgd WWTP.

Tables 7.5 and 7.6 are the cost breakdowns for Phases 1 and 2 of a two-part 1.5 mgd expansion.

Table 7.5 Construction Costs for Two - 1.5 mgd Phases - Phase 1
Wastewater Treatment Plant No. 2
City of Ridgecrest

Component	Cost[1]
Mobilization	$88,000
Influent Pipeline	$1,255,000
Headworks	$1,371,000
Oxidation Ditch	$1,700,000
RAS/WAS Pump Station	$1,054,000
Secondary Clarifiers (2 at 60 feet)	$1,404,000
Centrifuge	$1,100,000
Sludge Holding Tanks	$450,000
Effluent Pump Station	$378,000
Effluent Disposal Facilities	$1,730,000
Sludge Beds	$515,000
Emergency Generator	$350,000
MCC Building	$520,000
Administration/Lab Building	$444,000

Table 7.5	**Construction Costs for Two - 1.5 mgd Phases - Phase 1 Wastewater Treatment Plant No. 2 City of Ridgecrest**
Component	**Cost[1]**
Yard Piping (15%)	$3,507,000
Paving & Grading (8%)	$1,870,000
Electrical & Instrumentation (20%)	$4,676,000
Startup	$94,000
De-Mobilization	$77,000
Subtotal	**$22,583,000**
Estimating Contingency (25%)	$5,646,000
Total Project Construction Costs	**$28,229,000**

Notes:
1. Based on July 2010 costs.

Table 7.6	**Construction Costs for Two - 1.5 mgd Phases - Phase II Wastewater Treatment Plant No. 2 City of Ridgecrest**
Component	**Cost[1]**
Mobilization	$88,000
Influent Pipeline	$30,000
Oxidation Ditch	$1,700,000
RAS/WAS Pump Station	$95,000
Secondary Clarifiers (1 at 60 feet)	$702,000
Centrifuge	$473,000
Sludge Holding Tanks	$360,000
Effluent Pump Station	$30,000
Effluent Disposal Facilities	$1,730,000
Sludge Beds	$225,000
Emergency Generator	$350,000
MCC Building	$200,000
Yard Piping (15%)	$489,000
Paving & Grading (8%)	$391,000
Electrical & Instrumentation (20%)	$1,468,000
Startup	$94,000

Table 7.6 Construction Costs for Two - 1.5 mgd Phases - Phase II Wastewater Treatment Plant No. 2 City of Ridgecrest	
Component	**Cost[(1)]**
De-Mobilization	$77,000
Subtotal	**$8,510,000**
Estimating Contingency (25%)	$2,128,000
Total Project Construction Costs	**$10,638,000**
Notes: 1. Based on July 2010 costs.	

Figure 7.3 is a plant layout for two 1.5 mgd WWTPs.

7.6.2 Phased Expansions - Three 1.0 mgd WWTPs

The Phase 1 WWTP would involve all the components of the 3.0 mgd plant with three smaller oxidation ditches and two smaller clarifiers. The influent line, headworks structure, effluent structure, administration and laboratory building, centrifuge facilities, and sludge holding tanks would all be sized for the 3.0 mgd WWTP. However, not all the necessary pumping units for 3.0 would be installed in Phase 1. The effluent disposal ponds would also be constructed in 1.0 mgd disposal capacities. With mechanical dewatering, the sludge bed area could be kept to a minimum and built on an as-needed basis. Sludge beds are relatively inexpensive and easy to construct. The Phase 1 WWTP would be the most expensive since the necessary infrastructure (piping, electrical and structural, etc.) for the entire 3.0 mgd would be installed in Phase 1. In order to offset costs, a smaller emergency generator can be built with Phase 1.

Phase 2 would only involve the addition of an oxidation ditch, two clarifiers, pumping units in the Phase 1 headworks, RAS/WAS pumping station, effluent pumping station. The necessary electrical motor control cabinets would be installed in the MCC buildings built in Phase 1. An additional 1.0 mgd of evaporation and percolation disposal ponds would be installed as needed.

A second emergency generator could be installed to operate Phases 2 and 3 expansions.

Phase 3 would only involve the addition of an oxidation ditch, one clarifier, pumping units in the Phase 1 headworks, RAS/WAS pumping station, effluent pumping station. The necessary electrical motor control cabinets would be installed in the MCC buildings built in Phase 1.

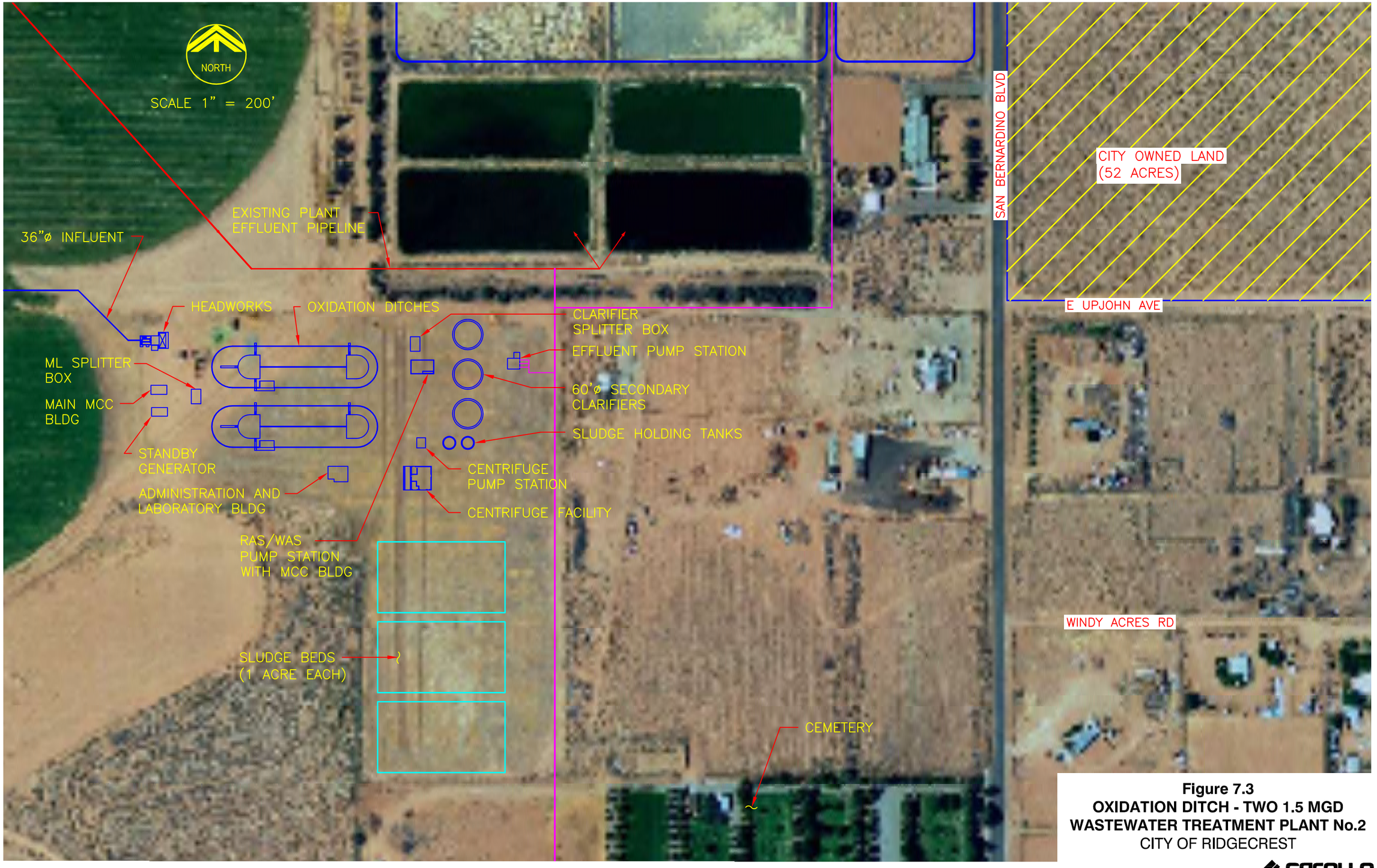

Figure 7.3
OXIDATION DITCH - TWO 1.5 MGD
WASTEWATER TREATMENT PLANT No.2
CITY OF RIDGECREST

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Table 7.7, 7.8 and 7.9 are the costs breakdowns for Phase 1, 2 and 3, respectively.

Table 7.7 Construction Costs for Three - 1.0 mgd Phases - Phase 1
Wastewater Treatment Plant No. 2
City of Ridgecrest

Component	Cost[1]
Mobilization	$88,000
Influent Pipeline	$1,255,000
Headworks	$1,371,000
Oxidation Ditch	$1,556,000
RAS/WAS Pump Station	$1,054,000
Secondary Clarifiers (2 @ 50 ft)	$977,000
Centrifuge	$1,100,000
Sludge Holding Tanks	$450,000
Effluent Pump Station	$378,000
Effluent Disposal Facilities	$1,150,000
Sludge Beds	$515,000
Emergency Generator	$350,000
MCC Building	$520,000
Administration/Lab Building	$444,000
Yard Piping (15%)	$3,008,000
Paving & Grading (8%)	$1,604,000
Electrical & Instrumentation (20%)	$4,010,000
Start-Up	$94,000
Demobilization	$77,000
Subtotal	**$20,001,000**
Estimating Contingency (25%)	$5,001,000
Total Project Construction Costs	**$25,002,000**

Notes:
1. Based on July 2010 costs.

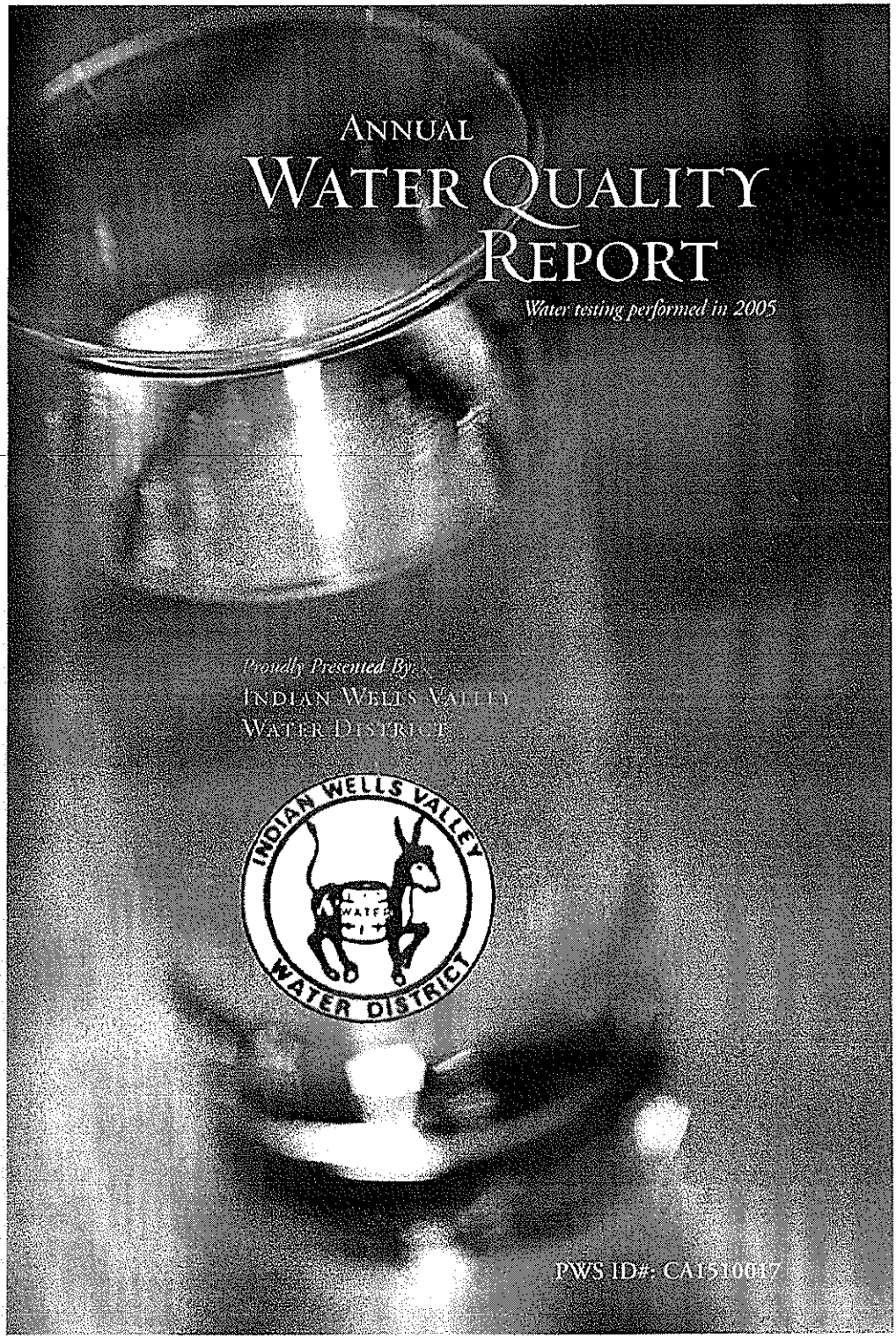
Table 7.8	**Construction Costs for Three - 1.0 mgd Phases - Phase 2 Wastewater Treatment Plant No. 2 City of Ridgecrest**
Component	**Cost[1]**
Mobilization	$88,000
Influent Pump	$30,000
Oxidation Ditch	$1,556,000
RAS/WAS Pump Station	$95,000
Secondary Clarifiers (2 @ 50 ft)	$977,000
Centrifuge	$473,000
Sludge Holding Tanks	$360,000
Effluent Pump	$30,000
Effluent Disposal Facilities	$1,150,000
Sludge Beds	$113,000
Emergency Generator	$350,000
MCC	$200,000
Yard Piping (5%)	$368,000
Paving & Grading (4%)	$294,000
Electrical & Instrumentation (15%)	$1,104,000
Start-Up	$94,000
Demobilization	$77,000
Subtotal	**$7,360,000**
Estimating Contingency (25%)	$1,840,000
Total Project Construction Costs	**$9,200,000**

Notes:
1. Based on July 2010 costs.

Table 7.9	**Construction Costs for Three - 1.0 mgd Phases - Phase 3 Wastewater Treatment Plant No. 2 City of Ridgecrest**
Component	**Cost[1]**
Mobilization	$88,000
Influent Pump	$50,000
Oxidation Ditch	$1,556,000
Secondary Clarifiers (1 @ 50 ft)	$494,000
Effluent Pump	$50,000
Effluent Disposal Facilities	$1,150,000
Sludge Beds	$113,000
MCC	$200,000
Yard Piping (5%)	$239,000
Paving & Grading (4%)	$191,000
Electrical & Instrumentation (10%)	$477,000
Start-Up	$94,000
Demobilization	$77,000
Subtotal	**$4,779,000**
Estimating Contingency (25%)	$1,195,000
Total Project Construction Costs	**$5,974,000**

Notes:
1. Based on July 2010 costs.

APPENDIX A - CONSUMER CONFIDENCE REPORT



Annual Water Quality Report

Water testing performed in 2005

Proudly Presented By:

Indian Wells Valley Water District

PWS ID#: CA1510017

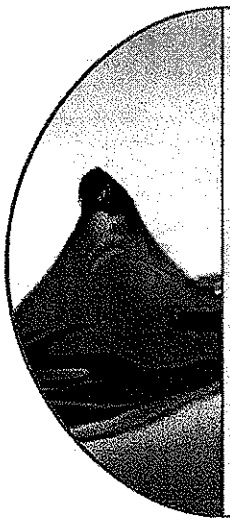
Continuing Our Commitment

Once again we proudly present our annual water quality report. This edition covers all testing completed from January through December 2005. We are pleased to tell you that our compliance with all state and federal drinking water laws remains exemplary. As in the past, we are committed to delivering the best quality drinking water. To that end, we remain vigilant in meeting the challenges of source water protection, water conservation, and community education while continuing to serve the needs of all of our water users.

For more information about this report, or for any questions relating to your drinking water, please call Tom Mulvihill, General Manager, at (760) 384-5555.

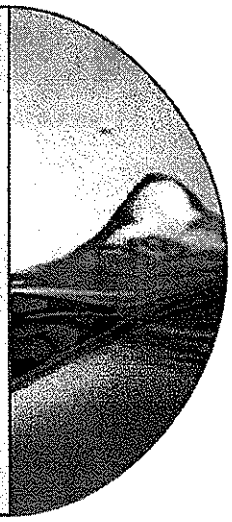
Community Participation

You are invited to participate in our public forum and voice your concerns about your drinking water. The regular meetings of the Board of Directors of the Indian Wells Valley Water District are held the second Monday of every month at 7:00 p.m. The meetings are located in the Board Room at the Water District Office.



Where Does My Water Come From?

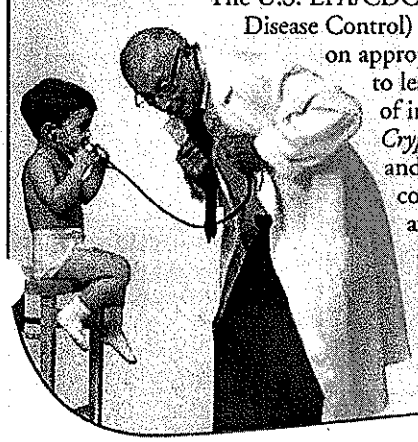
Our water comes from 12 wells that draw from the Indian Wells Valley aquifer. Water is pumped from these wells through transmission lines to nine water reservoirs with a storage capacity of approximately 14.6 million gallons. From there, the water is delivered through distribution lines to the customer by gravity, with the exception of one pressure service area. The Indian Wells Valley Water District delivers to our customers a monthly average of 360 million gallons of water during the summer and 125 million gallons of water during the winter.



Important Health Information

Some people may be more vulnerable to contaminants in drinking water than the general population. Immunocompromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers.

The U.S. EPA/CDC (Centers for Disease Control) guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline at (800) 426-4791.



Source Water Assessment

The California Department of Health Services (CDHS) conducted Source Water Assessments for all drinking water sources across the state. The purpose of the assessments was to determine the susceptibility of each drinking water source to potential contaminant sources and to establish a relative susceptibility rating of high, moderate, or low for each source. A high rating indicated the lowest susceptibility to contamination.

The Source Water Assessment for the Indian Wells Valley Water District was conducted in 2002. All district wells received a susceptibility rating of moderate. This rating is not an implication of water quality, but signifies a well's potential to become contaminated. The highest scores are given to those wells located in confined aquifers. A confined aquifer is relatively protected from surface contamination because of a confining layer above the aquifer, usually composed of clay or other impermeable material. The geology of the Indian Wells Valley does not make it possible to locate our wells in confined aquifers. Nevertheless, district wells conform to the highest standards and typically received the full amount of points possible by the CDHS.

The complete Source Water Assessment report is available at the Indian Wells Valley Water District. If you have questions about the assessment or would like a copy, please contact Renee Morquecho, District Engineer, at (760) 384-5520.

Water Conservation Tips

Water conservation measures are an important first step in protecting our water supply. Such measures not only save the supply of our source water, but can also save you money by reducing your water bill. Here are a few suggestions:

Conservation measures you can use inside your home:

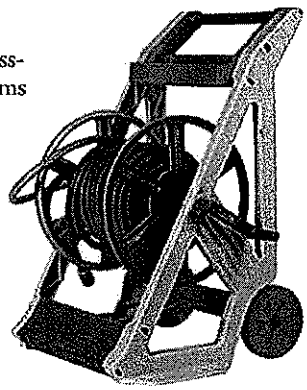
- Fix leaking faucets, pipes, toilets, etc.
- Replace old fixtures; install water-saving devices in faucets, toilets and appliances.
- Wash only full loads of laundry.
- Do not use the toilet for trash disposal.
- Take shorter showers.
- Do not let the water run while shaving or brushing teeth.
- Soak dishes before washing.
- Run the dishwasher only when full.

You can conserve outdoors as well:

- Water the lawn and garden in the early morning or evening.
- Use mulch around plants and shrubs.
- Repair leaks in faucets and hoses.
- Use water-saving nozzles.
- Use water from a bucket to wash your car, and save the hose for rinsing.

Information on other ways that you can help conserve water can be found at www.epa.gov/safewater/publicoutreach/index.html.

Contamination from Cross-Connections



Cross-connections that could contaminate drinking water distribution lines are a major concern. A cross-connection is formed at any point where a drinking water line connects to equipment (boilers), systems containing chemicals (air conditioning systems, fire sprinkler systems, irrigation systems) or water sources of questionable quality. Cross-connection contamination can occur when the pressure in the equipment or system is greater than the pressure inside the drinking water line (backpressure). Contamination can also occur when the pressure in the drinking water line drops due to fairly routine occurrences (main breaks, heavy water demand), causing contaminants to be sucked out from the equipment and into the drinking water line (backsiphonage).

Outside water taps and garden hoses tend to be the most common sources of cross-connection contamination at home. The garden hose creates a hazard when submerged in a swimming pool or when attached to a chemical sprayer for weed killing. Garden hoses that are left lying on the ground may be contaminated by fertilizers, cesspools or garden chemicals. Improperly installed valves in your toilet could also be a source of cross-connection contamination.

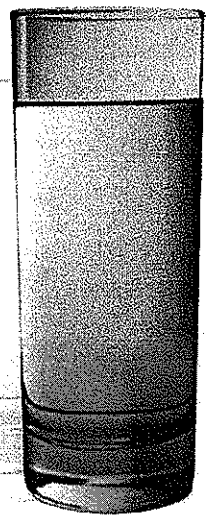
Community water supplies are continually jeopardized by cross-connections unless appropriate valves, known as backflow prevention devices, are installed and maintained. We survey industrial, commercial, and institutional facilities in the service area to make sure that all potential cross-connections are identified and eliminated or protected by a backflow preventer. We also require inspection and testing of each backflow preventer to make sure that it is providing maximum protection.

For more information, visit the Web site of the American Backflow Prevention Association (www.abpa.org) for a discussion on current issues.

Naturally Occurring Bacteria

The simple fact is, bacteria and other microorganisms inhabit our world. They can be found all around us: in our food; on our skin; in our bodies; and, in the air, soil and water. Some are harmful to us and some are not. Coliform bacteria are common in the environment and are generally not harmful themselves. The presence of this bacterial form in drinking water is a concern because it indicates that the water may be contaminated with other organisms that can cause disease. Throughout the year, we tested more than 700 samples (more than 60 samples every month) for coliform bacteria. In that time, none of the samples came back positive for the bacteria. Federal regulations now require that public water testing positive for coliform bacteria must be further analyzed for fecal coliform bacteria. Fecal coliforms are present only in human and animal waste. Because these bacteria can cause illness, it is unacceptable for fecal coliforms to be present in water at any concentration. Our tests indicate no fecal coliform is present in our water.

Lead in Drinking Water

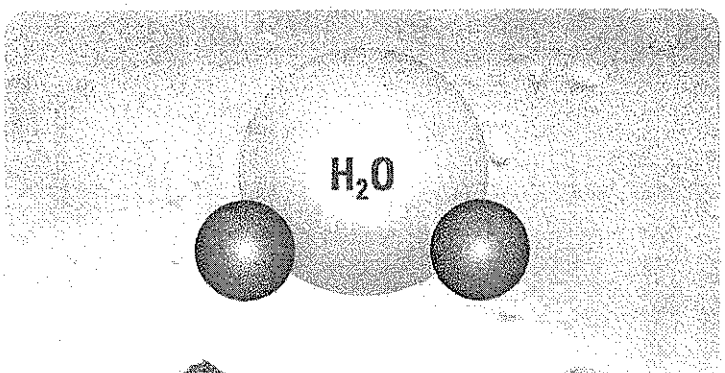


Lead is a naturally occurring element in our environment. Lead has also been used in household plumbing materials. Lead is rarely found in source water, but enters tap water through corrosion of plumbing materials. Homes built before 1986 are more likely to have lead pipes, fixtures, and solder. The U.S. EPA estimates that more than 40 million U.S. residents use water that can contain lead in excess of the EPA's Action Level of 15 ppb.

Lead in drinking water is a concern because young children, infants and fetuses appear to be particularly vulnerable to lead poisoning. A dose that would have little effect on an adult can have a big effect on a small body. On average, it is estimated that lead in drinking water contributes between 10% and 20% of the total lead exposure in young children.

Lead has not been detected in Indian Wells Valley Water District supplies. We maintain our drinking water at an optimum pH and mineral content level to help prevent corrosion in your home's pipes. If you are concerned about lead in your water, you should flush your cold-water pipes by running the water for around one minute before use and use only water from the cold-water tap for drinking, cooking, and especially for making baby formula. Hot water is likely to contain higher levels of lead.

For more information, please call the U.S. EPA's Safe Drinking Water Hotline at (800) 426-4791.



What Makes Water "Hard"?

Because more than 60% of the earth's water is groundwater, it travels through rock and soil, picking up minerals, including calcium or magnesium, along the way. If substantial amounts of either calcium or magnesium, both nontoxic minerals, are present in drinking water, the water is said to be "hard." Hard water does not dissolve soap readily, so making lather for washing and cleaning is difficult (hard). Conversely, water containing little calcium or magnesium is called "soft" water. In the Indian Wells Valley Water District service area, your water may be considered anywhere from "soft" to "very hard," depending upon which of the District's wells serve your area. If you have questions about your water, please call us at (760) 375-5086.

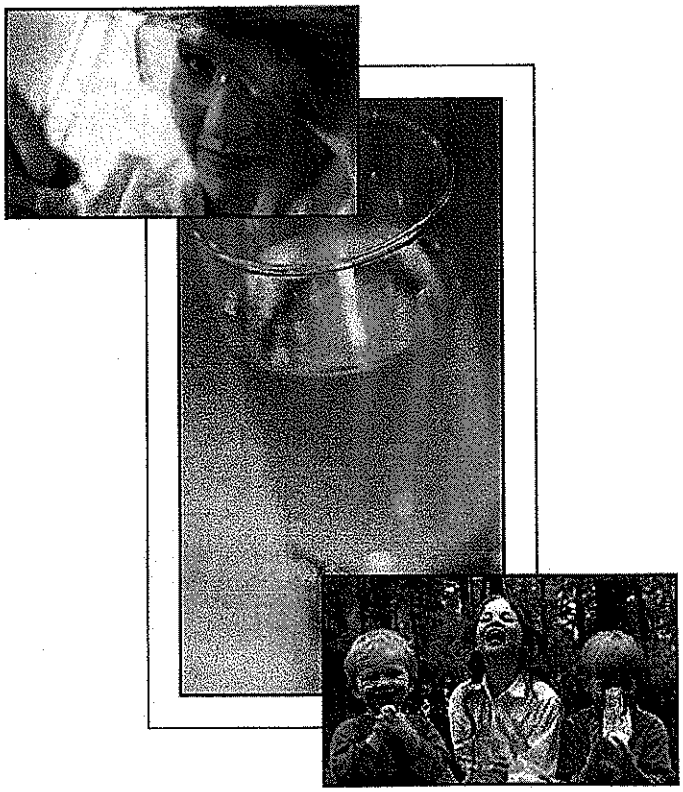


Table Definitions

AL (Action Level): The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.

MCL (Maximum Contaminant Level): The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs (or MCLGs) as is economically and technologically feasible. Secondary MCLs (2nd MCL) are set to protect the odor, taste and appearance of drinking water.

MCLG (Maximum Contaminant Level Goal): The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the U.S. EPA.

MRDL (Maximum Residual Disinfectant Level): The level of a disinfectant added for water treatment that may not be exceeded at the consumer's tap.

MRDLG (Maximum Residual Disinfectant Level Goal): The level of a disinfectant added for water treatment below which there is no known or expected risk to health. MRDLGs are set by the U.S. Environmental Protection Agency.

NA: Not applicable

ND: Not detected

NS: No standard

pCi/L (picocuries per liter): A measure of radioactivity.

PDWS (Primary Drinking Water Standard): MCLs for contaminants that affect health along with their monitoring and reporting requirements, and water treatment requirements.

PHG (Public Health Goal): The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California EPA.

ppb (parts per billion): One part substance per billion parts water (or micrograms per liter).

ppm (parts per million): One part substance per million parts water (or milligrams per liter).

TT (Treatment Technique): A required process intended to reduce the level of a contaminant in drinking water.

µmhos/cm (micromhos per centimeter): A measure of electrical conductance.

Substances That Might Be in Drinking Water

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

In order to ensure that tap water is safe to drink, the U.S. EPA and the California Department of Health Services (CDHS) prescribe regulations that limit the amount of certain substances in water provided by public water systems. CDHS regulations also establish limits for contaminants in bottled water, which must provide the same protection for public health. Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some substances. The presence of contaminants does not necessarily indicate that water poses a health risk.

Substances that may be present in source water include:

Microbial Contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife;

Inorganic Contaminants, such as salts and metals, which can be naturally occurring or may result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming;

Pesticides and Herbicides, which may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses;

Organic Chemical Contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and which can also come from gas stations, urban stormwater runoff, and septic systems;

Radioactive Contaminants, which can be naturally occurring or may be the result of oil and gas production and mining activities.

More information about contaminants and potential health effects can be obtained by calling the U.S. EPA's Safe Drinking Water Hotline at (800) 426-4791.

New Arsenic Regulation

Arsenic contamination of drinking water sources may result from either natural or human activities. Volcanic activity, erosion of rocks and minerals, and forest fires are natural sources that can release arsenic into the environment. Although about 90% of the arsenic used by industry is for wood preservatives, it is also used in paints, drugs, dyes, soaps, metals, and semiconductors. Agricultural applications, mining, and smelting also contribute to arsenic releases. Arsenic is usually found in the environment combined with other elements such as oxygen, chlorine, and sulfur (inorganic arsenic); or combined with carbon and hydrogen (organic arsenic). Organic forms are usually less harmful than inorganic forms.

Low levels of arsenic are naturally present in water -- about two parts arsenic per billion parts of water (ppb). Thus, you normally take in small amounts of arsenic in the water you drink. Some areas of the country have unusually high natural levels of arsenic in rock, which can lead to higher levels of arsenic in water.

In January 2001, the U.S. EPA lowered the arsenic Maximum Contaminant Level (MCL) from 50 to 10 ppb in response to research linking high arsenic levels in drinking water with certain forms of cancer. All water utilities are required to implement this new MCL starting in 2006.

Removing arsenic from drinking water is a costly procedure. For a more complete discussion visit the U.S. EPA's arsenic Web site at www.epa.gov/safewater/arsenic.html.

Sampling Results

We regularly sample the water to determine the presence of any radioactive, biological, inorganic, volatile organic or synthetic organic contaminants as required by the CDHS. The table below shows only those contaminants that were detected in the water. Although all of the substances listed here are under the Maximum Contaminant Level (MCL), we feel it is important that you know exactly what was detected and how much of the substance was present in the water. The state requires us to monitor for certain substances less than once per year because the concentrations of these substances do not change frequently. In these cases, the most recent sample data are included, along with the year in which the sample was taken.

The District has detected an unregulated contaminant beyond the Action Level established by CDHS. Action Levels are based on available scientific information and represent concentration levels of contaminants in potable water that have been determined to provide an adequate margin of safety to prevent risk to human health. The unregulated chemical detected was boron. This chemical is listed as a "chemical of interest" to be looked at for purposes of regulation in the future. At this time, no MCL has been established for this substance; therefore, the District meets current regulatory requirements.

PRIMARY DRINKING WATER STANDARD (Regulated In Order To Protect Against Possible Adverse Health Effects)

SUBSTANCE (UNITS)	YEAR SAMPLED	MCL [MRDL]	PHG (MCLG) [MRDLG]	AMOUNT DETECTED	RANGE LOW-HIGH	VIOLATION	TYPICAL SOURCE
Arsenic (ppb)[1]	2004	50	0.004	10.9	2.4-24	No	Erosion of natural deposits; runoff from orchards; glass and electronics production wastes
Chlorine (ppm)	2005	[4.0 (as Cl_2]	[4 (as Cl_2]	0.45	Trace-0.6	No	Drinking water disinfectant added for treatment
Fluoride (ppm)	2005	2.0	1	0.75	0.33-1.4	No	Erosion of natural deposits; water additive which promotes strong teeth; discharge from fertilizer and aluminum factories
Gross Alpha Particle Activity (pCi/L)	2004	15	(0)	2.7	0.7-5.3	No	Erosion of natural deposits
Nitrate [as nitrate, NO_3] (ppm)	2005	45	45	8.0	ND-13	No	Runoff and leaching from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits
Nitrate + Nitrite [as Nitrogen, N] (ppm)	2005	10	10	1.7	ND-2.7	No	Runoff and leaching from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits
TTHMs [Total Trihalomethanes] (ppb)	2005	80	NA	1.6	ND-1.9	No	By-product of drinking water chlorination

SECONDARY DRINKING WATER STANDARD (Regulated In Order To Protect The Odor, Taste And Appearance Of Drinking Water)

SUBSTANCE (UNITS)	YEAR SAMPLED	SMCL	PHG (MCLG)	AMOUNT DETECTED	RANGE LOW-HIGH	VIOLATION	TYPICAL SOURCE
Chloride (ppm)	2005	500	NS	91	24-280	No	Runoff/leaching from natural deposits; seawater influence
Specific Conductance (µmhos/cm)	2005	1,600	NS	277	150-590	No	Substances that form ions when in water; seawater influence
Total Dissolved Solids [TDS] (ppm)	2005	1,000	NS	355	210-700	No	Runoff/leaching from natural deposits

UNREGULATED SUBSTANCES

SUBSTANCE (UNITS)	YEAR SAMPLED	AMOUNT DETECTED	RANGE LOW-HIGH
Bicarbonate (ppm)	2005	120	93-140
Boron (ppb)[2]	2005	1,036	150-3,000
Calcium (ppm)	2005	21	2.9-53
Carbonate (ppm)	2005	14	ND-19
pH (Units)	2005	8.3	7.9-8.8
Potassium (ppm)	2005	2.5	1.0-6.5
Sodium (ppm)	2005	92	42-190
Total Alkalinity (ppm)	2005	111	84-140
Total Hardness (ppm)	2005	76	9.6-190
Vanadium (ppb)	2005	14	ND-32

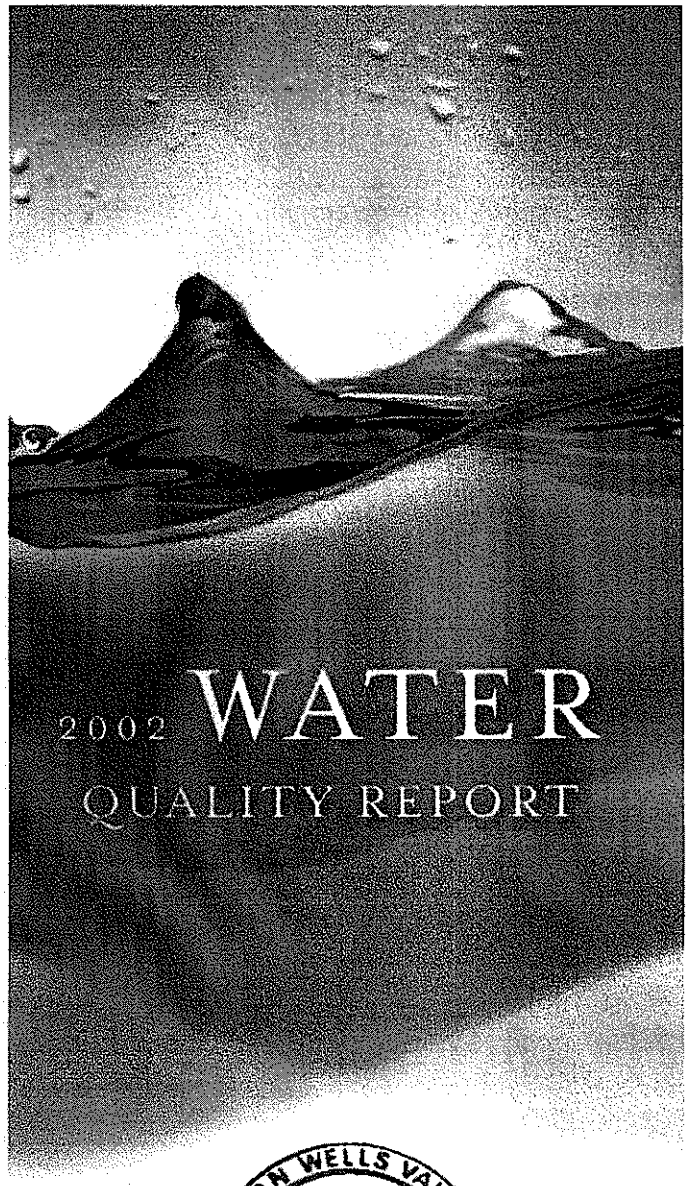
Footnotes

[1] Some people who drink water containing arsenic in excess of the MCL over many years could experience skin damage or problems with their circulatory system, and may have an increased risk of getting cancer.

[2] Action Level for boron is 1,000 ppb. The district's Wells 9A, 11, 13 and 19 have detected boron concentrations of 3,000, 1,000, 2,900 and 1,000 ppb, respectively. This substance is naturally occurring in these wells.

Information on the Internet

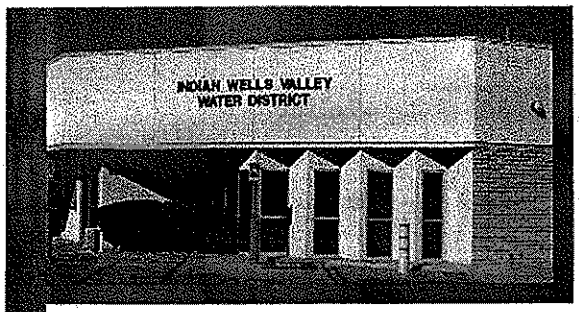
The U.S. EPA Office of Water (www.epa.gov/watrhome) and the Centers for Disease Control and Prevention (www.cdc.gov) Web sites provide a substantial amount of information on many issues relating to water resources, water conservation and public health. Also, the California Department of Health Services has a Web site (www.dhs.ca.gov) that provides information on drinking water regulations in our own state.



2002 WATER QUALITY REPORT

PWS ID#: CYA1510017

Este informe contiene información muy importante sobre su agua potable. Tradúzcalo o hable con alguien que lo entienda bien.



Continuing Our Commitment

Our goal is to provide to you a safe and dependable supply of drinking water. We are pleased to provide you with this year's Consumer Confidence Report. Keeping you informed is part of our service. The Environmental Protection Agency and the California Department of Health Services required format eliminates listing those substances not detected. Remember: All substances previously tested were again tested this year, but if they were not detected using both state and federally approved measures, they are not listed. If you need additional copies of this report, please visit the Indian Wells Valley Water District at 500 W. Ridgecrest Blvd., or call (760) 375-5086, or visit our Web site at www.iwvwd.com. If you have other water users at your location(s), such as renters, students, etc., we recommend you distribute the report to the water users at your location(s).

For more information about this report, or for any questions relating to your drinking water, please call Tom Mulvihill, General Manager, at (760) 375-5086.

Community Participation

You are invited to the regular meetings of the Board of Directors of the Indian Wells Valley Water District. Meetings are held on the second Monday of every month at 7:00 p.m. in the Board Room at the Water District Office.

Working Hard for You

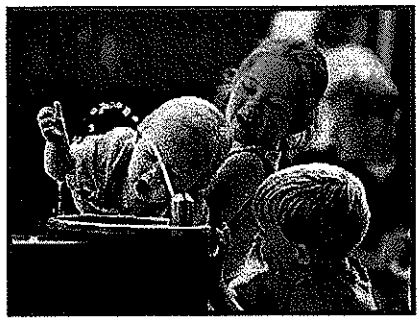
Under the Safe Drinking Water Act (SDWA), the U.S. Environmental Protection Agency (U.S. EPA) is responsible for setting national limits for hundreds of substances in drinking water and also specifies various treatments that water systems must use to remove these substances. Each system continually monitors for these substances and reports their findings to the U.S. EPA. The U.S. EPA uses these data to ensure that consumers are receiving clean water.

This publication conforms to the regulation under SDWA requiring water utilities to provide detailed water quality information to each of their customers annually. We are committed to providing you with this information about your water supply because customers who are well informed are our best allies in supporting improvements necessary to maintain the highest drinking water standards.

Special Health Information

Some people may be more vulnerable to contaminants in drinking water than the general population. People whose immunity has been compromised, such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants may be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC (Centers for Disease Control and Prevention) guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline at (800) 426-4791.

Where Does My Water Come From?



Our water source is from 12 wells that draw water from the Indian Wells Valley aquifer. It is pumped from these sources through transmission lines to eight water reservoirs with a storage capacity of approximately 14.6 million gallons and is delivered through distribution lines to the customer by gravity, except in one pressure service area. The Indian Wells Valley Water District delivers to our customers a monthly average of 360 million gallons of water during the summer and 125 million gallons of water during the winter.

Latest Improvements and Planned Developments

In addition to many smaller pipeline replacements, latest improvements for the District include the replacement of approximately two miles of 12-inch mainline on Ward Avenue. At this time, the District is completing the installation of over one mile of new transmission line along Kendall Avenue, the replacement of a key production well and planning for future well replacements.

Immediate future improvement projects include an additional 3,000,000 gallons of storage facilities in the "B" and "C" Zones. Additionally, two miles of new mainline is planned for the eastern end of the District along Richmond Road and Ridgecrest Boulevard.

The District will continue to make improvements to facilities to bring you great water today and tomorrow.

New Arsenic Regulation

Arsenic contamination of drinking water sources may result from either natural or human activities. Volcanic activity, erosion of rocks and minerals, and forest fires are natural sources that can release arsenic into the environment. Although about 90% of the arsenic used by industry is for wood preservation, it is also used in paints, drugs, dyes, soaps, metals, and semiconductors. Agricultural applications, mining, and smelting also contribute to arsenic releases. Arsenic is usually found in the environment combined with other elements such as oxygen, chlorine, and sulfur (inorganic arsenic); or combined with carbon and hydrogen (organic arsenic). Organic forms are usually less harmful than inorganic forms.

Low levels of arsenic are naturally present in water. Thus, you normally take in small amounts of arsenic in the water you drink. Some areas of the country have unusually high natural levels of arsenic in rock, which can lead to unusually high levels of arsenic in water.

In January 2001, the U.S. EPA lowered the arsenic maximum contaminant level (MCL) from 50 to 10 ppb in response to new research linking high arsenic levels in drinking water with certain forms of cancer. All water utilities are required to implement this new MCL starting in 2006.

Removing arsenic from drinking water is a costly procedure. For a more complete discussion visit the U.S. EPA's arsenic Web site at www.epa.gov/safewater/arsenic.html.

Substances Expected to Be in Drinking Water

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

In order to ensure that tap water is safe to drink, the U.S. EPA and the California Department of Health Services (CDHS) prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. CDHS regulations also establish limits for contaminants in bottled water that must provide the same protection for public health. Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. Contaminants that may be present in source water include:

Microbial Contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife;

Inorganic Contaminants, such as salts and metals, which can be naturally occurring or result from urban storm water runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming;

Pesticides and Herbicides, which may come from a variety of sources such as agriculture, urban storm water runoff, and residential uses;

Organic Chemical Contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban storm water runoff, and septic systems;

Radioactive Contaminants, which can be naturally-occurring or be the result of oil and gas production and mining activities.

More information about contaminants and potential health effects can be obtained by calling the U.S. EPA's Safe Drinking Water Hotline at (800) 426-4791.

Water Conservation Tips

Water conservation measures are an important first step in protecting our water supply. Such measures not only save the supply of our source water, but can also save you money by reducing your water bill.

Information on ways you can help conserve water can be found at www.epa.gov/safewater/publicoutreach/index.html.

Table Definitions

AL (Action Level): The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.

MCL (Maximum Contaminant Level): The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs (or MCLGs) as is economically and technologically feasible. Secondary MCLs (2nd MCL) are set to protect the odor, taste and appearance of drinking water.

MCLG (Maximum Contaminant Level Goal): The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the U.S. EPA.

NA: Not applicable

ND: Not detected

NS: No standard

NTU (Nephelometric Turbidity Units): Measurement of the clarity, or turbidity, of water.

pCi/L (picocuries per liter): A measure of radioactivity.

PDWS (Primary Drinking Water Standard): MCLs for contaminants that affect health along with their monitoring and reporting requirements, and water treatment requirements.

PHG (Public Health Goal): The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California EPA.

ppb (parts per billion): One part substance per billion parts water (or micrograms per liter).

ppm (parts per million): One part substance per million parts water (or milligrams per liter).

TT (Treatment Technique): A required process intended to reduce the level of a contaminant in drinking water.

µmhos/cm (micromhos per centimeter): A measure of electrical conductance.

What's in My Water?

We are pleased to report that during the past year, the water delivered to your home or business complied with, or did better than, all state and federal drinking water requirements. For your information, we have compiled the table below to show what substances were detected in our drinking water during 2002. Although all of the substances listed below are under the Maximum Contaminant Level (MCL) set by the U.S. EPA, we feel it is important that you know exactly what was detected and how much of the substance was present in the water.

PRIMARY DRINKING WATER STANDARD (Regulated in order to protect against possible adverse health effects)

SUBSTANCE (UNITS)	YEAR SAMPLED	MCL	PHG (MCLG)	AVERAGE AMOUNT DETECTED	RANGE (LOW-HIGH)	VIOLATION	TYPICAL SOURCE
Arsenic (As) (ppb)	2002	50	NA	5.92	ND-16	No	Erosion of natural deposits; runoff from orchards; glass and electronics production wastes
Fluoride (F) Temp. Depend. (ppm)	2002	2	1	0.78	0.36-1.3	No	Erosion of natural deposits; water additive which promotes strong teeth; discharge from fertilizer and aluminum factories
Gross Alpha Activity (pCi/L)	2002	15	NA	1.23	ND-3.2	No	Erosion of natural deposits
Gross Beta Activity (pCi/L)	2002	50	NA	3.39	ND-13	No	Decay of natural and man-made deposits
Nitrate (as NO_3) (ppm)	2002	45	45	7.33	ND-18	No	Runoff and leaching from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits
Nitrite + Nitrite as Nitrogen (N) (ppb)	2002	10	10	1.66	ND-4.1	No	Runoff and leaching from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits

SECONDARY DRINKING WATER STANDARD (Regulated in order to protect the odor, taste and appearance of drinking water)

SUBSTANCE (UNITS)	YEAR SAMPLED	SMCL	PHG (MCLG)	AVERAGE AMOUNT DETECTED	RANGE (LOW-HIGH)	VIOLATION	TYPICAL SOURCE
Chloride (Cl) (ppm)	2002	500	NS	83.25	20-260	No	Runoff/leaching from natural deposits; sea water influence
Lab Turbidity (NTU)	2002	5	NS	0.11	0.10-0.20	No	Soil runoff
Odor–Threshold (Units)	2002	3	NS	1	1-1	No	Naturally-occurring organic materials
Specific Conductance (E.C.) (µmhos/cm)	2002	900	NS	569.17	310-1,100	No	Substances that form ions when in water; seawater influence
Sulfate (SO_4) (ppm)	2002	500	NS	34.52	3.2-70	No	Runoff/leaching from natural deposits; industrial wastes
Total Filterable Residue@180C (TDS) (ppm)	2002	1,000	NS	307.50	180-570	No	Runoff/leaching from natural deposits

UNREGULATED AND ADDITIONAL SUBSTANCES

SUBSTANCE (UNITS)	YEAR SAMPLED	AVERAGE AMOUNT DETECTED	RANGE (LOW-HIGH)
Bicarbonate (HCO_3) (ppm)	2002	108.25	73-150
Calcium (Ca) (ppm)	2002	25.36	7.7-58
Carbonate (CO_3) (ppm)	2002	<12.02	ND-33
Magnesium (Mg) (ppm)	2002	4.35	ND-13
pH (Laboratory) (Std. Units)	2002	8.2	7.6-8.9
Potassium (K) (ppm)	2002	2.6	ND-5.5
Sodium (Na) (ppm)	2002	86.67	41-180
Total Alkalinity (as $CaCO_3$) (ppm)	2002	107.08	81-160
Total Hardness (as $CaCO_3$) (ppm)	2002	87.73	30-210
Vanadium (ppb)	2002	17.67	ND-29

We meet all state and federal standards. We test more often than state and federal agencies require. In our efforts to supply good quality water, it is necessary to make continual improvements in the district water system. In the year 2002 we replaced 6,078 linear feet of water distribution mains.

At the Indian Wells Valley Water District we work around the clock to provide top quality water to every tap. We ask that all our customers help protect our water source, which is the heart of our community, our way of life and our children's future.

Contamination from Cross-Connections

Cross-connections that could contaminate drinking water distribution lines are a major concern. A cross-connection is formed at any point where a drinking water line connects to equipment (boilers), systems containing chemicals (air conditioning systems, fire sprinkler systems, irrigation systems) or water sources of questionable quality. Cross-connection contamination can occur when the pressure in the equipment or system is greater than the pressure inside the drinking water line (backpressure). Contamination can also occur when the pressure in the drinking water line drops due to fairly routine occurrences (main breaks, heavy water demand) causing contaminants to be sucked out from the equipment and into the drinking water line (backsiphonage).

Outside water taps and garden hoses tend to be the most common sources of cross-connection contamination at home. The garden hose creates a hazard when submerged in a swimming pool or when attached to a chemical sprayer for weed killing. Garden hoses that are left lying on the ground may be contaminated by fertilizers, cesspools or garden chemicals. Improperly installed valves in your toilet could also be a source of cross-connection contamination.

Community water supplies are continually jeopardized by cross-connections unless appropriate valves, known as backflow prevention devices, are installed and maintained where needed in industrial, commercial, and institutional facilities in the service area. We also require inspection and testing of each backflow preventer to make sure that it is providing maximum protection.

For more information, visit the Web site of the American Backflow Prevention Association (www.abpa.org) for a discussion on current issues.

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PRIMARY DRINKING WATER STANDARD (Regulated in order to protect against possible adverse health effects.)

SUBSTANCE (UNITS)	YEAR SAMPLED	MCL	PHG (MCLG)	AMOUNT DETECTED	RANGE (LOW-HIGH)	VIOLATION	TYPICAL SOURCE
Arsenic (ppb)[1]	2003	50	NA	6.24	2.4-20	No	Erosion of natural deposits; runoff from orchards; glass and electronics production wastes
Fluoride (ppm)	2003	2	1	0.74	0.43-1.2	No	Erosion of natural deposits; water additive which promotes strong teeth; discharge from fertilizer and aluminum factories
Gross Alpha Particle Activity (pCi/L)	2003	15	NA	1.49	3.0-6.18	No	Erosion of natural deposits
Total Coliforms (% positive samples)	2003	5% positive samples	(0)	13.89	NA	Yes	Naturally present in the environment

SECONDARY DRINKING WATER STANDARD (Regulated in order to protect the odor, taste and appearance of drinking water.)

SUBSTANCE (UNITS)	YEAR SAMPLED	MCL	PHG (MCLG)	AMOUNT DETECTED	RANGE (LOW-HIGH)	VIOLATION	TYPICAL SOURCE
Chloride (ppm)	2003	500	NS	81	24-210	No	Runoff/leaching from natural deposits; seawater influence
pecific Conductance (µmhos/cm)	2003	1,600	NS	579	300-1,300	No	Substances that form ions when in water; seawater influence
Sulfate (ppm)	2003	500	NS	36.73	21-72	No	Runoff/leaching from natural deposits; industrial wastes

OTHER SUBSTANCES

SUBSTANCE (UNITS)	YEAR SAMPLED	AMOUNT DETECTED	RANGE (LOW-HIGH)	TYPICAL SOURCE
Bicarbonate [HCO_3] (ppm)	2003	119.1	90-150	Naturally occurring
Calcium [Ca] (ppm)	2003	32.89	7.5-63	Naturally occurring
Carbonate [CO_3] (ppm)	2003	4.45	ND-27	Naturally occurring
pH [Laboratory] (Units)	2003	7.81	7.1-8.5	Naturally occurring
Potassium [K] (ppm)	2003	2.51	1.2-5.9	Naturally occurring
Sodium [NA] (ppm)	2003	90.55	43-190	Naturally occurring
Total Alkalinity [as $CaCO_3$] (ppm)	2003	104.9	83-160	Naturally occurring
Total Hardness [as $CaCO_3$] (ppm)	2003	81	24-210	Naturally occurring

[1]While your drinking water meets the current standard for arsenic, it does contain low levels of arsenic. The standard balances the current understanding of arsenic's possible health effects against the costs of removing arsenic from drinking water. The CDHS continues to research the health effects of low levels of arsenic, which is a mineral known to cause cancer in humans at high concentrations and is linked to other health effects such as skin damage and circulatory problems.

Substances That Might Be in Drinking Water

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

In order to ensure that tap water is safe to drink, the U.S. EPA and the California Department of Health Services (CDHS) prescribe regulations that limit the amount of certain substances in water provided by public water systems. CDHS regulations also establish limits for contaminants in bottled water that must provide the same protection for public health. Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some substances. The presence of contaminants does not necessarily indicate that water poses a health risk.

Substances that may be present in source water include:

Microbial Contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife;

Inorganic Contaminants, such as salts and metals, which can be naturally occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming;

Pesticides and Herbicides, which may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses;

Organic Chemical Contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, and septic systems;

Radioactive Contaminants, which can be naturally occurring or can be the result of oil and gas production and mining activities.

More information about contaminants and potential health effects can be obtained by calling the U.S. EPA's Safe Drinking Water Hotline at (800) 426-4791.

New Arsenic Regulation

Arsenic contamination of drinking water sources may result from either natural or human activities. Volcanic activity, erosion of rocks and minerals, and forest fires are natural sources that can release arsenic into the environment. Although about 90% of the arsenic used by industry is for wood preservatives, it is also used in paints, drugs, dyes, soaps, metals, and semiconductors. Agricultural applications, mining, and smelting also contribute to arsenic releases. Arsenic is usually found in the environment combined with other elements, such as oxygen, chlorine, and sulfur (inorganic arsenic); or combined with carbon and hydrogen (organic arsenic). Organic forms are usually less harmful than inorganic forms.

Low levels of arsenic are naturally present in water. Thus, you normally take in small amounts of arsenic in the water you drink. Some areas of the country have unusually high natural levels of arsenic in rock, which can lead to unusually high levels of arsenic in water.

In January 2001, the U.S. EPA lowered the arsenic Maximum Contaminant Level (MCL) from 50 to 10 ppb in response to new research linking high arsenic levels in drinking water with certain forms of cancer. All water utilities are required to implement this new MCL starting in 2006.

Removing arsenic from drinking water is a costly procedure. For a more complete discussion, visit the U.S. EPA's arsenic Web site at www.epa.gov/safewater/arsenic.html.

What Makes Water "Hard"?

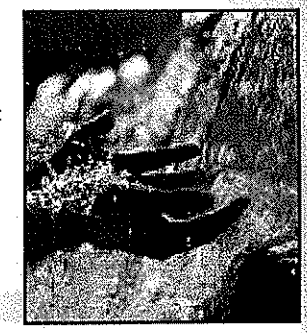
If substantial amounts of either calcium or magnesium, both nontoxic minerals, are present in drinking water, the water is said to be hard. Hard water does not dissolve soap readily, so making a lather for washing and cleaning is difficult (hard). Conversely, water containing little calcium or magnesium is called soft water.

Where Does My Water Come From?

Our water source is from 12 wells that draw water from the Indian Wells Valley aquifer. Water is pumped from these sources through transmission lines to eight water reservoirs with a storage capacity of approximately 14.6 million gallons. From there, the water is delivered through distribution lines to the customer by gravity, except in one pressure service area. The Indian Wells Valley Water District delivers to our customers a monthly average of 360 million gallons of water during the summer and 125 million gallons of water during the winter.

Community Participation

You are invited to the regular meetings of the Board of Directors of the Indian Wells Valley Water District which are held on the second Monday of every month at 7:00 p.m. in the Board Room at the Water District Office.



Naturally Occurring Bacteria

The simple fact is, bacteria and other microorganisms inhabit our world. They can be found all around us: in our food; on our skin; in our bodies; and, in the air, soil and water. Some are harmful to us and some are not. Coliform bacteria are common in the environment and are generally not harmful themselves. The presence of this bacterial form in drinking water is a concern because it indicates that the water may be contaminated with other organisms that can cause disease. Federal regulations now require that public water testing positive for coliform bacteria must be further analyzed for fecal coliform bacteria. Fecal coliform are present only in human and animal waste. Because these bacteria can cause illness, it is unacceptable for fecal coliform to be present in water at any concentration. Our tests indicate no *e-coli* or fecal coliform are present in our water.

Important Health Information

Some people may be more vulnerable to contaminants in drinking water than the general population. Immunocompromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. The U.S. EPA/CDC (Centers for Disease Control) guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline at (800) 426-4791.

About Our Violations

There was a violation of the total coliform MCL in September 2003 when positive samples for coliform on South Mahan were detected. The contamination came from a surge tank at Well No. 11, which allowed stagnant water to remain in the tank and affect the water quality of the distribution system. The surge tank was removed, and a new surge tank was installed in such a manner that the problem would not happen again. We had another total coliform MCL violation in November 2003 when positive samples were detected in the distribution system. The contamination came from well numbers 9A and 31. Well 9A was a new well that was not effectively chlorinated after construction. It was taken off line, and both the well and the gravel pack were chlorinated. The piping from Well 31 emptied when the well was shut down, allowing air to get to the interior surface of the pipe, which allowed contamination. Well 31 was chlorinated and a spring-loaded backpressure valve was installed which prevents the piping from emptying. Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other, potentially harmful, bacteria may be present. Coliforms were found in more samples than allowed and this was a warning of potential problems.

Water Conservation Tips

Water conservation measures are an important first step in protecting our water supply. Such measures not only save the supply of our source water, but also can save you money by reducing your water bill. Here are a few suggestions:

Conservation measures you can use inside your home include:

- Fix leaking faucets, pipes, toilets, etc.
- Replace old fixtures; install water-saving devices in faucets, toilets and appliances.
- Wash only full loads of laundry.
- Do not use the toilet for trash disposal.
- Take shorter showers.
- Do not let the water run while shaving or brushing teeth.
- Soak dishes before washing.
- Run the dishwasher only when full.

You can conserve outdoors as well:

- Water the lawn and garden in the early morning or evening.
- Use mulch around plants and shrubs.
- Repair leaks in faucets and hoses.
- Use water-saving nozzles.
- Use water from a bucket to wash your car, and save the hose for rinsing.

Information on other ways that you can help conserve water can be found at www.epa.gov/safewater/publicoutreach/index.html.

Continuing Our Commitment

Once again we proudly present our annual water quality report. This edition covers all testing completed from January through December 2003. As in the past, we are committed to delivering the best quality drinking water. To that end, we remain vigilant in meeting the challenges of source water protection, water conservation, and community education while continuing to serve the needs of all of our water users.

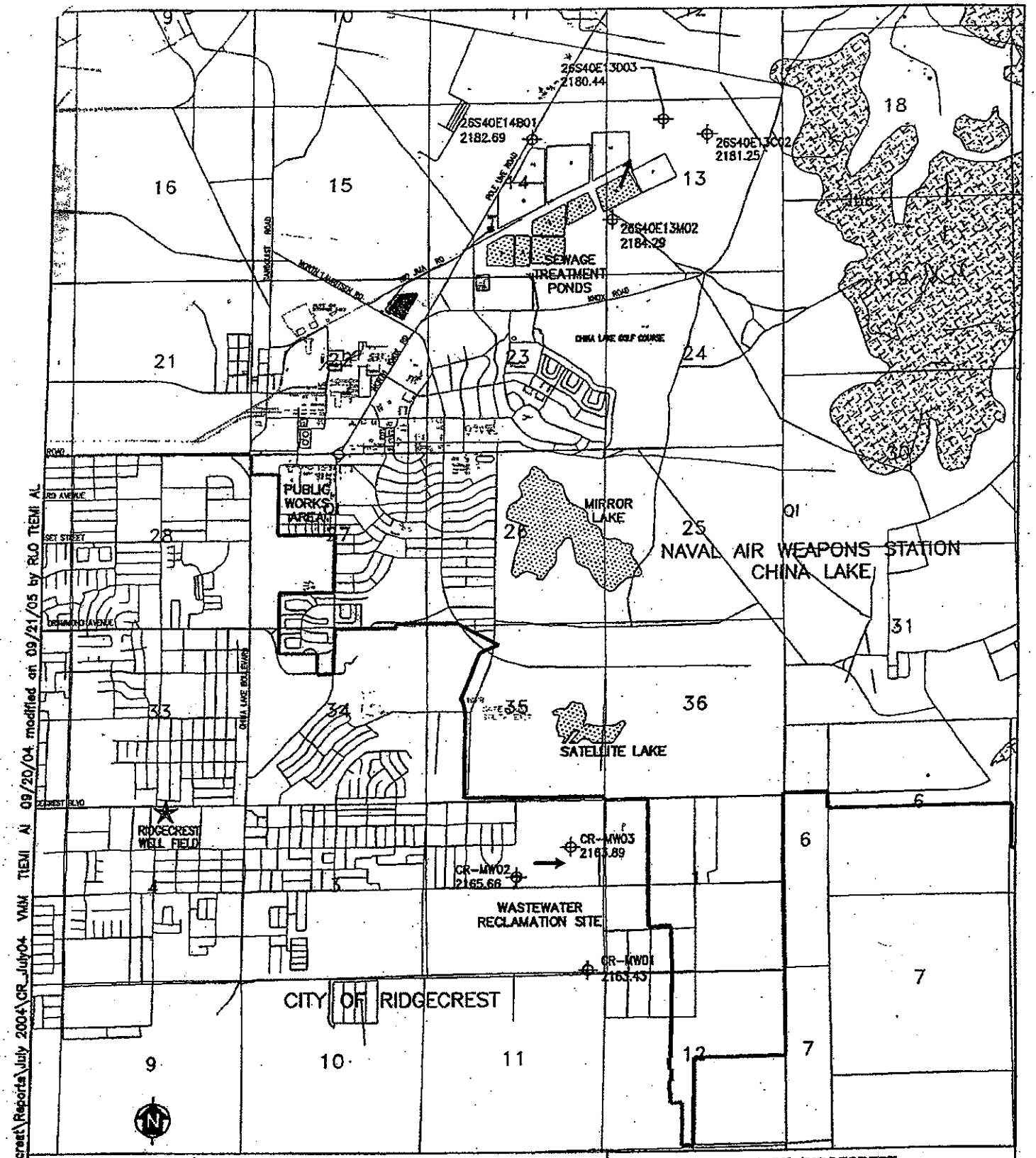
For more information about this report, or for any questions relating to your drinking water, please call Tom Mulvihill, General Manager, at (760) 375-5086.

Working Hard for You

Under the Safe Drinking Water Act (SDWA), the U.S. Environmental Protection Agency (U.S. EPA) is responsible for setting national limits for hundreds of substances in drinking water and also specifies various treatments that water systems must use to remove these substances. Each system continually monitors for these substances and reports their findings to the U.S. EPA. The U.S. EPA uses these data to ensure that consumers are receiving clean water.

This publication conforms to the regulation under SDWA requiring water utilities to provide detailed water quality information to each of their customers annually. We are committed to providing you with this information about your water supply because customers who are well informed are our best allies in supporting improvements necessary to maintain the highest drinking water standards.

APPENDIX B - GROUNDWATER MONITORING WELL DATA AND SITE LOCATIONS



26S40E14B01 2182.69 — MONITORING WELL WITH GROUNDWATER ELEVATION IN FEET ABOVE MEAN SEA LEVEL, MEASURED JULY 2005

NAVAL AIR WEAPONS STATION CHINA LAKE PROPERTY BOUNDARY

APPROXIMATE DIRECTION OF GROUNDWATER FLOW

2,000 0 2,000 4,000

SCALE IN FEET

CITY OF RIDGECREST
RIDGECREST, CALIFORNIA

FIGURE 3
MONITORING WELL LOCATIONS WITH GROUNDWATER ELEVATIONS

Tetra Tech EM Inc.

S:\DATASHAR\City of Ridgecrest\Reports\July 2004\CR_July04 VMM TIEMI AI 09/20/04 modified on 09/21/05 by RJO TIEMI AL

Well ID	Units	CR-MW01															CR-MW02																
Sample Date		Aug-00	Feb-01	Jul-01	Feb-02	Aug-02	Feb-03	Aug-03	Jan-04	Jul-04	Mar-05	Jul-05	Feb-06	Range			Aug-00	Feb-01	Jul-01	Feb-02	Aug-02	Feb-03	Aug-03	Jan-04	Jul-04	Mar-05	Jul-05	Feb-06	Range			
Sample ID		CR-1007	CR-1012	CR-3007	CR-4005	CR-6007	CR-7007	CR-8003	CR-907	CR-0704-07	CR-A007	CR-1207	CR-1305	Low	High	MCL	CR-1005	CR-1013	CR-3005	CR-4007	CR-6006	CR-7006	CR-8002	CR-906	CR-0704-0	CR-A005	CR-1206	CR-1307	Low	High	MCL	MCL Index
Anions and General Parameters																																	
Ammonia (NH_4^+)	mg/L	0.3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.12J	<0.2	0.3		0.2J	0.2J	<0.2	<0.2	<0.2	0.4	<0.2	<0.2	<0.2	<0.2	0.097J	0.094J	<0.2	0.4	NS	NS
Chloride	mg/L	466	460	550	491	487	490	510	510	502	628	569	711	460	628		340	336	345	333	355	326	332	320	332	322	325	373	320	373	250	s
Nitrate as Nitrogen	mg/L	2.28	2.20	2.34	1.8	2.6	2.4	2.6	2.7	2.6	2.6	2.5	2.3	1.8	2.7		3.05	2.76	2.67	2.1	2.7	2.8	2.5	2.4	3	3	3.1	2.7	2.1	3.05	45	p
Total Kjeldahl Nitrogen	mg/L	0.45	0.1J	0.85	<0.2	<0.2	0.25	<0.2	<0.2	<0.2	<0.2	0.12J	0.19J	<0.2	0.85		0.43	1.5	<0.2	0.56	<0.2	0.64	<0.2	<0.2	<0.2	0.18J	0.25J	0.17J	<0.2	0.64	NS	NS
Total Dissolved Solids	mg/L	1,270	1,130	1,240	1,180	1,210	1,310	1,660	1,380	1,440	1,430	1,450	640	1,130	1,660		1,360	1,110	1,110	1,020	1,210	1,090	1,330	1,210	1,040	1,160	1,030	983	983	1,360	500	s
Surfactants (MBAS)	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.039J	<0.1	<0.1		0.05J	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.047J	<0.1	<0.1	NS	NS
Metals																																	
Arsenic	µg/L	88.7	NM	82.3	NM	84.4	NM	96.1	NM	90.1	NM	93.4	NM	82.3	96.1		17.6	NM	15	NM	15.4	NM	19.8	NM	15.6	NM	16.9	NM	15	19.8	50	p
Cadmium	µg/L	0.33J	NM	<2	NM	0.62J	NM	1.4J	NM	<2	NM	<2	NM	<2	<2		<2	NM	<2	NM	0.26J	NM	1.7J	NM	<2	NM	<2	NM	<2	<2	5	p
Chromium	µg/L	0.92J	NM	1.9J	NM	1.1J	NM	11.4	NM	1.4J	NM	1.9J	NM	ND	11.4		3.6J	NM	5.5	NM	2.5J	NM	3.1J	NM	2.4J	NM	1.8J	NM	ND	5.5	50	p
Copper	µg/L	1.4J	NM	<10	NM	3.3J	NM	2.1J	NM	5.5J	NM	0.96J	NM	<10	<10		3.4J	NM	<10	NM	6.0J	NM	4.2J	NM	7.5J	NM	3.4J	NM	<10	<10	1000	s
Lead	µg/L	2.8J	NM	3.2J	NM	<5	NM	5.7	NM	<5	NM	<5	NM	<5	5.7		1.8J	NM	3.3J	NM	<5	NM	8.8	NM	<5	NM	2.5J	NM	<5	8.8	15	a
Mercury	µg/L	<0.5	NM	<0.5	NM	0.062J	NM	0.083J	NM	0.068J	NM	0.31J	NM	<0.5	<0.5		<0.5	NM	0.65	NM	0.10J	NM	0.051J	NM	0.082J	NM	0.31J	NM	<0.5	0.65	2	p
Molybdenum	µg/L	8.4	NM	7.9	NM	7.3	NM	9.4	NM	8.5	NM	8.6	NM	7.3	9.4		13.9	NM	17	NM	10.5	NM	14.0	NM	11.6	NM	13	NM	10.5	17	NS	NS
Nickel	µg/L	0.85J	NM	<5	NM	0.95J	NM	7.7	NM	<5	NM	0.79J	NM	<5	7.7		0.26J	NM	2.0J	NM	1.5J	NM	1.5J	NM	1.5J	NM	0.54J	NM	<5	<5	100	p
Selenium	µg/L	4.9J	NM	<10	NM	3.3J	NM	<10	NM	<10	NM	<10	NM	<10	<10		3.6J	NM	3.2J	NM	5.6J	NM	8.6J	NM	5.2J	NM	<10	NM	<10	<10	50	p
Silver	µg/L	1.2J	NM	2.2J	NM	<10	NM	<10	NM	1.2J	NM	3.3J	NM	<10	<10		1.1J	NM	1.4J	NM	<10	NM	1.3J	NM	1.4J	NM	2.1J	NM	<10	<10	3000	s
Zinc	µg/L	6.8J	NM	<10	NM	12.5	NM	17.0	NM	9.6J	NM	6.2J	NM	<10	17.0		2.5J	NM	12.9	NM	26.0	NM	6.9J	NM	6.1J	NM	2.4J	NM	<10	26.0	5000	s
Semivolitile Organic Compounds																																	
Bis(2-ethylhexyl)phthalate	µg/L	<10	NM	99	NM	33	NM	<9.6	NM	<9.6	NM	<9.6	NM	<10	99		<10	NM	75	NM	7J	NM	<9.6	NM	2J	NM	<9.6	NM	<10	75	4	p

Well ID	Units	CR-MW03															
Sample Date		Aug-00	Feb-01	Jul-01	Feb-02	Aug-02	Feb-03	Aug-03	Jan-04	Jul-04	Mar-05	Jul-05	Feb-06	Range			
Sample ID		CR-1006	CR-1014	CR-3006	CR-4006	CR-6005	CR-7005	CR-8001	CR-905	CR-0704-05	CR-A006	CR-1205	CR-1306	Low	High	MCL	MCL Index
Anions and General Parameters																	
Ammonia (NH_4^+)	mg/L	0.4	<0.2	<0.2	0.17J	0.2	0.15J	<0.2	<0.2	<0.2	<0.2	0.16J	0.079J	<0.2	0.4	NS	NS
Chloride	mg/L	331	292	310	284	342	409	412	414	327	379	323	288	284	414	250	s
Nitrate as Nitrogen	mg/L	2.41	2.36	2.48	1.8	2.5	2.3	2.8	2.1	2.1	2	1.8	1.8	1.8	2.8	45	p
Total Kjeldahl Nitrogen	mg/L	0.43	0.1J	0.1J	0.31	<0.02	0.65	<0.2	0.26	0.14J	0.14J	0.37	0.16J	<0.2	0.65	NS	NS
Total Dissolved Solids	mg/L	1,140	1,110	1,110	1,110	1,350	1,260	1,520	1,520	1,330	1,050	1,200	521	521	1,520	500	s
Surfactants (MBAS)	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.037J	0.054J	<0.1	<0.1	NS	NS
Metals																	
Arsenic	µg/L	19.3	NM	16.3	NM	15.2	NM	21.0	NM	16.5	NM	21.1	NM	15.2	21.1	50	p
Cadmium	µg/L	<2	NM	0.47J	NM	0.22J	NM	1.5J	NM	<2	NM	<2	NM	<2	<2	5	p
Chromium	µg/L	1.6J	NM	2.2J	NM	1.6J	NM	2.6J	NM	2.0J	NM	1.8J	NM	ND	ND	50	p
Copper	µg/L	3.1J	NM	3.3J	NM	6.3J	NM	2.8J	NM	7.0J	NM	2.7J	NM	<10	<10	1000	s
Lead	µg/L	3.4J	NM	7.7	NM	<5	NM	7.0	NM	<5	NM	<5	NM	<5	7.7	15	a
Mercury	µg/L	<0.5	NM	0.82	NM	0.15J	NM	0.13J	NM	0.066J	NM	0.23J	NM	<0.5	0.82	2	p
Molybdenum	µg/L	7.8	NM	5.6	NM	4.5J	NM	3.7J	NM	1.7J	NM	4.5J	NM	ND	7.8	NS	NS
Nickel	µg/L	1.2J	NM	3.7J	NM	1.1J	NM	1.2J	NM	0.50J	NM	0.83J	NM	<5	<5	100	p
Selenium	µg/L	15.5	NM	14.5	NM	12.4	NM	13.1	NM	13.4	NM	13.4	NM	12.4	15.5	50	p
Silver	µg/L	1.0J	NM	1.7J	NM	<10	NM	<10	NM	1.0J	NM	2J	NM	<10	<10	3000	s
Zinc	µg/L	3.4J	NM	36.8	NM	8.6J	NM	3.1J	NM	4.2J	NM	18.2	NM	<10	36.8	5000	s
Semivolitile Organic Compounds																	
Bis(2-ethylhexyl)phthalate	µg/L	<10	NM	17	NM	12	NM	<9.6	NM	2J	NM	<9.6	NM	<10	17	4	p

Well ID	Units	26S40E14B01														MCL	MCL Index	Background 95 UCL
Sampling Event		Aug-00	Feb-01	Jul-01	Feb-02	Aug-02	Feb-03	Aug-03	Jan-04	Jul-04	Mar-05	Jul-05	Feb-06	Range				
Sample ID		CR-1001	CR-1008	CR-3004	CR-4004	CR-6004	CR-7004	CR-8007	CR-904	CR-0704-04	CR-A001	CR-1203	CR-1304	Low	High			
Anions and General Parameters																		
Ammonia (NH_4^+)	mg/L	0.3	0.1J	0.1J	0.32	<0.2	0.38	0.22	0.67	0.11J	0.28	0.36	0.58	**<0.2**	**0.67**	NS	NS	NC
Chloride	mg/L	525	468	480	488	515	523	520	475	100	413	353	310	**100**	**525**	250	s	324
Nitrate as Nitrogen	mg/L	0.08J	<0.1	<0.1	<0.1	<0.1	0.060J	<0.1	<0.1	<0.1	0.19	<0.1	<0.2	**<0.1**	**0.19**	45	p	1.33
Total Kjeldahl Nitrogen	mg/L	1.7	1.1	1.3	1.7	1.4	1.5	1.6	1.4	1.1	1.1	1.1	1.2	**1.1**	**1.7**	NS	NS	NC
Total Dissolved Solids	mg/L	2,200	1,990	2,000	2,050	2,040	2,090	2,070	2,030	2,150	1,860	1,790	909	**909**	**2,200**	500	s	1,240
Surfactants (MBAS)	mg/L	0.2	0.26	0.2	0.16	0.33	0.22	0.19	0.18	0.25	0.23	0.25	0.19	**0.16**	**0.33**	NS	NS	NC
Metals																		
Arsenic	µg/L	772	NM	721	NM	681	NM	680.0	NM	770	NM	710	NM	**680**	**772**	50	p	45.6
Cadmium	µg/L	1.8J	NM	<2	NM	8.3	NM	5.1	NM	2.7	NM	<2	NM	**<2**	**8.3**	5	p	NC
Chromium	µg/L	1.2J	NM	1.3J	NM	0.59J	NM	2.2J	NM	2.1J	NM	1J	NM	**ND**	**ND**	50	p	NC
Copper	µg/L	15.7	NM	11.5	NM	13.2	NM	16.7	NM	14.2	NM	14	NM	**11.5**	**16.7**	1000	s	NC
Lead	µg/L	2.4J	NM	4.7J	NM	2.5J	NM	12.1	NM	16.7	NM	<5	NM	**<5**	**16.7**	15	a	NC
Mercury	µg/L	<0.5	NM	0.29J	NM	0.15J	NM	0.041J	NM	0.14J	NM	0.3J	NM	**<0.5**	**<0.5**	2	p	NC
Molybdenum	µg/L	61.6	NM	51.7	NM	67.9	NM	78.9	NM	62.3	NM	61.8	NM	**51.7**	**78.9**	NS	NS	72.6
Nickel	µg/L	8.4	NM	6.2	NM	7.8	NM	7.1	NM	7.6	NM	6.2	NM	**6.2**	**8.4**	100	p	NC
Selenium	µg/L	5.8J	NM	2.7J	NM	<10	NM	3.5J	NM	<10	NM	<10	NM	**<10**	**<10**	50	p	NC
Silver	µg/L	<10	NM	2.1J	NM	<10	NM	<10	NM	<10	NM	1.9J	NM	**<10**	**<10**	3000	s	NC
Zinc	µg/L	83.6	NM	62	NM	68.5	NM	66.4	NM	60.6	NM	55.4	NM	**55.4**	**83.6**	5000	s	NC
Semivolatile Organic Compounds																		
Bis(2-ethylhexyl)phthalate	µg/L	<10	NM	59	NM	20	NM	8J	NM	<9.6	NM	3J	NM	**<10**	**59**	4	p	NC

Well ID	Units	26S40E13D03														MCL	MCL Index	Background 95 UCL
Sampling Event		Aug-00	Feb-01	Jul-01	Feb-02	Aug-02	Feb-03	Aug-03	Jan-04	Jul-04	Mar-05	Jul-05	Feb-06	Range				
Sample ID		CR-1002	CR-1009	CR-3001	CR-4002	CR-6002	CR-7002	CR-8005	CR-903	CR-0704-02	CR-A003	CR-1201	CR-1303	Low	High			
Anions and General Parameters																		
Ammonia (NH_4^+)	mg/L	0.4	0.1J	<0.2	0.37	<0.2	0.21	<0.2	<0.2	<0.2	0.16J	0.67	0.59	**<0.2**	**0.67**	NS	NS	NC
Chloride	mg/L	442	398	395	409	422	472	435	429	415	474	445	612	**395**	**612**	250	s	324
Nitrate as Nitrogen	mg/L	0.05J	<0.1	0.5	<0.1	<0.1	<0.1	<0.1	<0.1	0.097J	<0.1	0.044J	<0.2	**<0.2**	**0.5**	45	p	1.33
Total Kjeldahl Nitrogen	mg/L	0.7	1.1	0.58	0.84	0.8	1.2	1.1	0.98	0.96	0.99	0.87	0.87	**0.7**	**1.2**	NS	NS	NC
Total Dissolved Solids	mg/L	1,550	1,540	1,630	1,580	1,560	1,600	1,730	1,790	1,800	1,660	1,660	815	**815**	**1,800**	500	s	1,240
Surfactants (MBAS)	mg/L	0.33	0.38	0.1	0.34	0.33	0.3	0.22	0.25	0.18	0.2	0.25	0.31	**0.1**	**0.38**	NS	NS	NC
Metals																		
Arsenic	µg/L	388	NM	387	NM	383	NM	425.0	NM	458	NM	510	NM	**383**	**510**	50	p	45.6
Cadmium	µg/L	0.79J	NM	<2	NM	4.8	NM	2.5	NM	1.1J	NM	<2	NM	**<2**	**4.8**	5	p	NC
Chromium	µg/L	1.1J	NM	2.1J	NM	0.56J	NM	20.6	NM	1.4J	NM	<5	NM	**<5**	**20.6**	50	p	NC
Copper	µg/L	5.8J	NM	7.5J	NM	7.5J	NM	7.6J	NM	6.1J	NM	8.4J	NM	**ND**	**ND**	1000	s	NC
Lead	µg/L	1.2J	NM	8.6	NM	2.0J	NM	8.0	NM	1.5J	NM	<5	NM	**<5**	**8.6**	15	a	NC
Mercury	µg/L	<0.5	NM	0.59	NM	0.16J	NM	0.035J	NM	0.11J	NM	0.17J	NM	**<0.5**	**0.59**	2	p	NC
Molybdenum	µg/L	57.4	NM	55.9	NM	52.2	NM	53.6	NM	56.6	NM	61.2	NM	**53.6**	**61.2**	NS	NS	72.6
Nickel	µg/L	3.7J	NM	8.3	NM	7	NM	12.8	NM	7.1	NM	9.5	NM	**ND**	**12.8**	100	p	NC
Selenium	µg/L	<10	NM	<10	NM	<10	NM	6.3J	NM	3.2J	NM	<10	NM	**<10**	**<10**	50	p	NC
Silver	µg/L	1.5J	NM	1.1J	NM	<10	NM	<10	NM	<10	NM	3.4J	NM	**<10**	**<10**	3000	s	NC
Zinc	µg/L	4.0J	NM	25.1	NM	7.3J	NM	4.9J	NM	9.1J	NM	60.1	NM	**ND**	**60.1**	5000	s	NC
Semivolatile Organic Compounds																		
Bis(2-ethylhexyl)phthalate	µg/L	18	NM	8J	NM	17	NM	12	NM	19	NM	6J	NM	**<10**	**19**	4	p	NC

Well ID	Units	26S40E13C02														MCL	MCL Index	Background 95 UCL
Sampling Event		Aug-00	Feb-01	Jul-01	Feb-02	Aug-02	Feb-03	Aug-03	Jan-04	Jul-04	Mar-05	Jul-05	Feb-06	Range				
Sample ID		CR-1003	CR-1010	CR-3002	CR-4001	CR-6001	CR-7001	CR-8004	CR-902	CR-0704-03	CR-A004	CR-1202	CR-1302	Low	High			
Anions and General Parameters																		
Ammonia (NH_4^+)	mg/L	0.2	<0.2	<0.2	<0.2	<0.2	0.26	<0.2	<0.2	<0.2	<0.2	0.1J	0.32	**<0.2**	**0.32**	NS	NS	NC
Chloride	mg/L	260	238	270	235	234	234	250	236	308	289	438	222	**222**	**438**	250	s	324
Nitrate as Nitrogen	mg/L	0.33	0.28	0.34	0.13	0.26	0.26	0.21	0.16	0.14	0.2	0.46	0.18J	**<0.1**	**0.46**	45	p	1.33
Total Kjeldahl Nitrogen	mg/L	0.64	0.43	0.6	0.63	0.4	1	0.47	0.46	0.36	0.43	0.26J	0.39	**<0.2**	**1**	NS	NS	NC
Total Dissolved Solids	mg/L	1,130	1,160	1,130	1,140	1,090	1,150	1,290	1,190	1,160	1,080	1,470	519	**519**	**1,470**	500	s	1,240
Surfactants (MBAS)	mg/L	0.1	0.2	<0.1	0.15	0.13	0.16	0.1	0.16	0.13	0.23	0.093J	0.11	**<0.1**	**0.23**	NS	NS	NC
Metals																		
Arsenic	µg/L	303	NM	306	NM	286	NM	318.0	NM	307	NM	364	NM	**303**	**364**	50	p	45.6
Cadmium	µg/L	0.64J	NM	<2	NM	3.8	NM	2.4	NM	0.69J	NM	<2	NM	**<2**	**3.8**	5	p	NC
Chromium	µg/L	0.88J	NM	0.84J	NM	2.5J	NM	1.1J	NM	<5	NM	1.3J	NM	**<5**	**<5**	50	p	NC
Copper	µg/L	5.1J	NM	4.0J	NM	7.5J	NM	4.5J	NM	4.0J	NM	4J	NM	**ND**	**ND**	1000	s	NC
Lead	µg/L	<5	NM	5.6	NM	3.7J	NM	7.7	NM	2.4J	NM	<5	NM	**<5**	**7.7**	15	a	NC
Mercury	µg/L	<0.5	NM	3.1	NM	0.16J	NM	0.071J	NM	0.13J	NM	0.26J	NM	**<0.5**	**3.1**	2	p	NC
Molybdenum	µg/L	27.8	NM	29.8	NM	29.6	NM	29.1	NM	28.2	NM	43.5	NM	**27.8**	**43.5**	NS	NS	72.6
Nickel	µg/L	4.9J	NM	7.4	NM	7.9	NM	5.5	NM	10.2	NM	3.1J	NM	**<5**	**10.2**	100	p	NC
Selenium	µg/L	<10	NM	3.7J	NM	<10	NM	4.5J	NM	4.4J	NM	10.1	NM	**<10**	**10.1**	50	p	NC
Silver	µg/L	1.2J	NM	1.5J	NM	<10	NM	<10	NM	<10	NM	0.81J	NM	**<10**	**<10**	3000	s	NC
Zinc	µg/L	3.1J	NM	30.3	NM	5.3J	NM	7.3J	NM	5.5J	NM	5.5J	NM	**<10**	**30.3**	5000	s	NC
Semivolatile Organic Compounds																		
Bis(2-ethylhexyl)phthalate	µg/L	31	NM	4J	NM	3J	NM	3J	NM	7J	NM	1J	NM	**<10**	**31**	4	p	NC

Well ID	Units	26S40E13M02														MCL	MCL Index	Background 95 UCL
Sampling Event		Aug-00	Feb-01	Jul-01	Feb-02	Aug-02	Feb-03	Aug-03	Jan-04	Jul-04	Mar-05	Jul-05	Feb-06	Range				
Sample ID		CR-1004	CR-1011	CR-3003	CR-4003	CR-6003	CR-7003	CR-8006	CR-901	CR-0704-01	CR-A002	CR-1204	CR-1301	Low	High			
Anions and General Parameters																		
Ammonia (NH_4^+)	mg/L	0.2	<0.2	<0.2	0.18J	<0.2	0.44	<0.2	<0.2	<0.2	0.11J	0.24	0.2	**<0.2**	**0.44**	NS	NS	NC
Chloride	mg/L	160	164	175	162	179	172	171	170	151	158	160	138	**138**	**179**	250	s	324
Nitrate as Nitrogen	mg/L	<0.1	<0.1	0.07J	<0.1	0.044J	0.14	1.15	<0.1	0.12	0.33	0.24	0.19J	**<0.1**	**1.15**	45	p	1.33
Total Kjeldahl Nitrogen	mg/L	0.8	0.49	0.45	0.53	0.51	0.56	0.67	0.56	0.39	0.52	0.5	0.44	**0.44**	**0.8**	NS	NS	NC
Total Dissolved Solids	mg/L	904	949	1,020	961	942	983	956	1,040	1,020	874	916	862	**862**	**1,040**	500	s	1,240
Surfactants (MBAS)	mg/L	0.22	0.34	0.2	0.19	0.19	0.17	0.13	0.17	0.15	0.2	0.16	0.15	**0.13**	**0.34**	NS	NS	NC
Metals																		
Arsenic	µg/L	357	NM	377	NM	417	NM	535.0	NM	559	NM	574	NM	**357**	**574**	50	p	45.6
Cadmium	µg/L	0.80J	NM	<2	NM	5.2	NM	5.3	NM	1.5J	NM	<2	NM	**<2**	**5.3**	5	p	NC
Chromium	µg/L	0.68J	NM	0.82J	NM	0.29J	NM	2.5J	NM	<5	NM	1.3J	NM	**<5**	**<5**	50	p	NC
Copper	µg/L	10.2	NM	7.1J	NM	8.7J	NM	8.2J	NM	6.5J	NM	7.3J	NM	**ND**	**10.2**	1000	s	NC
Lead	µg/L	<5	NM	3.2J	NM	1.6J	NM	17.3	NM	2.5J	NM	<5	NM	**<5**	**17.3**	15	a	NC
Mercury	µg/L	<0.5	NM	0.93	NM	0.16J	NM	0.029J	NM	0.17J	NM	0.34J	NM	**<0.5**	**0.93**	2	p	NC
Molybdenum	µg/L	20.6	NM	22.7	NM	25.1	NM	29.6	NM	24.2	NM	18.6	NM	**18.6**	**29.6**	NS	NS	72.6
Nickel	µg/L	5.8	NM	5.2	NM	6.3	NM	7.5	NM	6.8	NM	6.7	NM	**5.2**	**7.5**	100	p	NC
Selenium	µg/L	<10	NM	<10	NM	<10	NM	<10	NM	<10	NM	<10	NM	**<10**	**<10**	50	p	NC
Silver	µg/L	1.2J	NM	1.6J	NM	<10	NM	1.3J	NM	<10	NM	1.2J	NM	**<10**	**<10**	3000	s	NC
Zinc	µg/L	0.77J	NM	15.6	NM	2.4J	NM	2.3J	NM	3.1J	NM	3.7J	NM	**<10**	**15.6**	5000	s	NC
Semivolatile Organic Compounds																		
Bis(2-ethylhexyl)phthalate	µg/L	28	NM	5J	NM	180	NM	24	NM	<9.6	NM	40	NM	<9.6	**180**	4	p	NC

APPENDIX C - WZI REPORT

WZI INC.

City of Ridgecrest

Development Cost and Fee Study for Fire Facilities, Traffic Impacts, Park Development, Law Enforcement, and Storm Drainage Facilities

May 2, 2006

Submitted to:
City of Ridgecrest
100 W. California Ave.
Ridgecrest, CA

Prepared by:
WZI Inc.
4700 Stockdale Highway
Suite 120
Bakersfield, California 93309

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I. Introduction

At the request of the City of Ridgecrest, WZI Inc. has conducted a Developer Cost and Fee Study including an assessment of the anticipated demand on fire service facilities, park development, law enforcement, traffic impacts and storm drainage facilities within the City of Ridgecrest. New development will increase demand on existing urban services. Since the late 1970s, communities have increasingly turned to developers to finance needed improvements to services that are the result of the increased demand.

For the purposes of this study, "development fees" are defined as charges levied on new development on a one-time basis as a condition of approval to cover the cost of infrastructure or facilities needed by that development as authorized by Section 66000(b) of the California Government Code, (AB 1600). This study will identify appropriate development fees for fire service, park development, law enforcement, traffic and storm drainage facilities.

WZI Inc. is a professional services consulting firm with experience in community development, regulatory compliance, environmental engineering, geology, and municipal services. The members of WZI are State of California Registered Environmental Assessors, Registered Engineers and Geologists and a member of the American Institute of Certified Planners. WZI expresses no opinion as to disciplines, subjects and practices outside those specifically enumerated above. Further, WZI expresses no opinion herein as to any matters of California or federal law. This assessment is based on the foregoing and subject to the limitations, qualifications, exceptions and assumptions set forth herein.

In addition to the professional and technical expertise provided within the formulation of this document by WZI personnel, WZI Inc. contracted with Wally Crenshaw Associates, Traffic Engineers in order to obtain a survey of current and projected traffic needs within the City of Ridgecrest.

In order to facilitate the preparation of this study, the City of Ridgecrest City Manager's Office appointed the following members to the Developer Cost and Fee Task Force:

Task Force Member	Affiliation
Harvey Rose	Ridgecrest City Manager
Jim McRea	Deputy City Manager – Public Works
Gary Parsons	Community & Economic Development Director
Bernard Connolly	Coldwell Banker
Kathleen Vejtasa	Coldwell Banker
Mike Ferguson	Emerald Point Development
Mike Avery	Police Chief
Jim Ponek	Parks & Recreation Director
Matthew Alexander	WZI Inc. Consultant

The Task force met on four occasions during the months of November and December, 2005 and March 2006 for the purpose of refining and making more accountable the draft study that had been prepared by WZI Inc.

Further, the City of Ridgecrest Economic Development Committee and Infrastructure Committee reviewed this study and made recommendations during the months of February, March, April and May, 2006.

II. Project Description

The project consists of the 23 square miles that comprise the City of Ridgecrest, California located in northeast Kern County in the Northern Mojave Desert, (please note ***Exhibit 1 - Location Map***). The City of Ridgecrest abuts the San Bernardino County line to the east and includes portions of the United States China Lake Naval Weapons Station, (NAWS). Ridgecrest is located in the southern portion of the Indian Wells Valley, surrounded by four mountain ranges: the Sierra Nevada on the west, the Coso on the north, the Argus Range on the east and the El Paso Mountains on the South. As the only incorporated community in the Indian Wells Valley, Ridgecrest acts as the urban center for northeastern Kern County.

III. Government Code 66000 – 66008: Enabling Legislation for Impact Fees

66000. As used in this chapter:
(a) "Development project" means any project undertaken for the purpose of development. "Development project" includes a project involving the issuance of a permit for construction or reconstruction, but not a permit to operate.
(b) "Fee" means a monetary exaction other than a tax or special assessment, whether established for a broad class of projects by legislation of general applicability or imposed on a specific project on an ad hoc basis, that is charged by a local agency to the applicant in connection with approval of a development project for the purpose of defraying all or a portion of the cost of public facilities related to the development project, but does not include fees specified in Section 66477, fees for processing applications for governmental regulatory actions or approvals, fees collected under development agreements adopted pursuant to Article 2.5 (commencing with Section 65864) of Chapter 4, or fees collected pursuant to agreements with redevelopment agencies which provide for the redevelopment of property in furtherance or for the benefit of a redevelopment project for which a redevelopment plan has been adopted pursuant to the Community Redevelopment Law (Part 1 (commencing with Section 33000) of Division 24 of the Health and Safety Code.
(c) "Local agency" means a county, city, whether general law or chartered, city and county, school district, special district, authority, agency, any other municipal public corporation or district, or other political subdivision of the state.
(d) "Public facilities" includes public improvements, public services and community amenities.

66000.5. This chapter, Chapter 6 (commencing with Section 66010), Chapter 7 (commencing with Section 66012), Chapter 8 (commencing with Section 66016), and Chapter 9 (commencing with Section 66020) shall be known and may be cited as the Mitigation Fee Act.

66001. (a) In any action establishing, increasing, or imposing a fee as a condition of approval of a development project by a local agency on or after January 1, 1989, the local agency shall do all of the following:

(1) Identify the purpose of the fee.

(2) Identify the use to which the fee is to be put. If the use is financing public facilities, the facilities shall be identified. That identification may, but need not, be made by reference to a capital improvement plan as specified in Section 65403 or 66002, may be made in applicable general or specific plan requirements, or may be made in other public documents that identify the public facilities for which the fee is charged.

(3) Determine how there is a reasonable relationship between the fee's use and the type of development project on which the fee is imposed.

(4) Determine how there is a reasonable relationship between the need for the public facility and the type of development project on which the fee is imposed.

(b) In any action imposing a fee as a condition of approval of a development project by a local agency on or after January 1, 1989, the local agency shall determine how there is a reasonable relationship between the amount of the fee and the cost of the public facility or portion of the public facility attributable to the development on which the fee is imposed.

(c) Upon receipt of a fee subject to this section, the local agency shall deposit, invest, account for, and expend the fees pursuant to Section 66006.

(d) For the fifth fiscal year following the first deposit into the account or fund, and every five years thereafter, the local agency shall make all of the following findings with respect to that portion of the account or fund remaining unexpended, whether committed or uncommitted:

(1) Identify the purpose to which the fee is to be put.

(2) Demonstrate a reasonable relationship between the fee and the purpose for which it is charged.

(3) Identify all sources and amounts of funding anticipated to complete financing in incomplete improvements identified in paragraph (2) of subdivision (a).

(4) Designate the approximate dates on which the funding referred to in paragraph (3) is expected to be deposited into the appropriate account or fund.

When findings are required by this subdivision, they shall be made in connection with the public information required by subdivision (b) of Section 66006. The findings required by this subdivision need only be made for moneys in possession of the local agency, and need not be made with respect to letters of credit, bonds, or other instruments taken to secure payment of the fee at a future date. If the findings are not made as required by this subdivision, the local agency shall refund the moneys in the account or fund as provided in subdivision (e).

(e) Except as provided in subdivision (f), when sufficient funds have been collected, as determined pursuant to subparagraph (F) of paragraph (1) of subdivision (b) of Section 66006, to complete financing on incomplete public improvements identified in paragraph

(2) of subdivision (a), and the public improvements remain incomplete, the local agency shall identify, within 180 days of the determination that sufficient funds have been collected, an approximate date by which the construction of the public improvement will be commenced, or shall refund to the then current record owner or owners of the lots or units, as identified on the last equalized assessment roll, of the development project or projects on a prorated basis, the unexpended portion of the fee, and any interest accrued thereon. By means consistent with the intent of this section, a local agency may refund the unexpended revenues by direct payment, by providing a temporary suspension of fees, or by any other reasonable means. The determination by the governing body of the local agency of the means by which those revenues are to be refunded is a legislative act.

(f) If the administrative costs of refunding unexpended revenues pursuant to subdivision (e) exceed the amount to be refunded, the local agency, after a public hearing, notice of which has been published pursuant to Section 6061 and posted in three prominent places within the area of the development project, may determine that the revenues shall be allocated for some other purpose for which fees are collected subject to this chapter and which serves the project on which the fee was originally imposed.

66002. (a) Any local agency which levies a fee subject to Section 66001 may adopt a capital improvement plan, which shall indicate the approximate location, size, time of availability, and estimates of cost for all facilities or improvements to be financed with the fees.

(b) The capital improvement plan shall be adopted by, and shall be annually updated by, a resolution of the governing body of the local agency adopted at a noticed public hearing. Notice of the hearing shall be given pursuant to Section 65090. In addition, mailed notice

shall be given to any city or county which may be significantly affected by the capital improvement plan. This notice shall be given no later than the date the local agency notices the public hearing pursuant to Section 65090. The information in the notice shall be not less than the information contained in the notice of public hearing and shall be given by first-class mail or personal delivery.

(c) "Facility" or "improvement," as used in this section, means any of the following:

(1) Public buildings, including schools and related facilities; provided that school facilities shall not be included if Senate Bill 97 of the 1987 -88 Regular Session is enacted and becomes effective on or before January 1, 1988.

(2) Facilities for the storage, treatment, and distribution of nonagricultural water.

(3) Facilities for the collection, treatment, reclamation, and disposal of sewage.

(4) Facilities for the collection and disposal of storm waters and for flood control purposes.

(5) Facilities for the generation of electricity and the distribution of gas and electricity.

(6) Transportation and transit facilities, including but not limited to streets and supporting improvements, roads, overpasses, bridges, harbors, ports, airports, and related facilities.

(7) Parks and recreation facilities.

(8) Any other capital project identified in the capital facilities plan adopted pursuant to Section 66002.

66003. Sections 66001 and 66002 do not apply to a fee imposed pursuant to a reimbursement agreement by and between a local agency and a property owner or developer for that portion of the cost of a public facility paid by the property owner or developer which exceeds the need for the public facility attributable to and reasonably related to the development. This chapter shall become operative on January 1, 1989.

66004. The establishment or increase of any fee pursuant to this chapter shall be subject to the requirements of Section 66018.

66005. (a) When a local agency imposes any fee or exaction as a condition of approval of a proposed development, as defined by Section 65927, or development project, those fees or exactions shall not exceed the estimated reasonable cost of providing the service or facility for which the fee or exaction is imposed.

(b) This section does not apply to fees or monetary exactions

expressly authorized to be imposed under Sections 66475.1 and 66477.

(c) It is the intent of the Legislature in adding this section to codify existing constitutional and decisional law with respect to the imposition of development fees and monetary exactions on developments by local agencies. This section is declaratory of existing law and shall not be construed or interpreted as creating new law or as modifying or changing existing law.

66006. (a) If a local agency requires the payment of a fee specified in subdivision (c) in connection with the approval of a development project, the local agency receiving the fee shall deposit it with the other fees for the improvement in a separate capital facilities account or fund in a manner to avoid any commingling of the fees with other revenues and funds of the local agency, except for temporary investments, and expend those fees solely for the purpose for which the fee was collected. Any interest income earned by moneys in the capital facilities account or fund shall also be deposited in that account or fund and shall be expended only for the purpose for which the fee was originally collected.

(b) (1) For each separate account or fund established pursuant to subdivision (a), the local agency shall, within 180 days after the last day of each fiscal year, make available to the public the following information for the fiscal year:

(A) A brief description of the type of fee in the account or fund.

(B) The amount of the fee.

(C) The beginning and ending balance of the account or fund.

(D) The amount of the fees collected and the interest earned.

(E) An identification of each public improvement on which fees were expended and the amount of the expenditures on each improvement, including the total percentage of the cost of the public improvement that was funded with fees.

(F) An identification of an approximate date by which the construction of the public improvement will commence if the local agency determines that sufficient funds have been collected to complete financing on an incomplete public improvement, as identified in paragraph (2) of subdivision (a) of Section 66001, and the public improvement remains incomplete.

(G) A description of each interfund transfer or loan made from the account or fund, including the public improvement on which the transferred or loaned fees will be expended, and, in the case of an interfund loan, the date on which the loan will be repaid, and the rate of interest that the account or fund will receive on the loan.

(H) The amount of refunds made pursuant to subdivision (e) of Section 66001 and any allocations pursuant to subdivision (f) of Section 66001.

(2) The local agency shall review the information made available to the public pursuant to paragraph (1) at the next regularly scheduled public meeting not less than 15 days after this information is made available to the public, as required by this subdivision. Notice of the time and place of the meeting, including the address where this information may be reviewed, shall be mailed, at least 15 days prior to the meeting, to any interested party who files a written request with the local agency for mailed notice of the meeting. Any written request for mailed notices shall be valid for one year from the date on which it is filed unless a renewal request is filed. Renewal requests for mailed notices shall be filed on or before April 1 of each year. The legislative body may establish a reasonable annual charge for sending notices based on the estimated cost of providing the service.

(c) For purposes of this section, "fee" means any fee imposed to provide for an improvement to be constructed to serve a development project, or which is a fee for public improvements within the meaning of subdivision (b) of Section 66000, and that is imposed by the local agency as a condition of approving the development project.

(d) Any person may request an audit of any local agency fee or charge that is subject to Section 66023, including fees or charges of school districts, in accordance with that section.

(e) The Legislature finds and declares that untimely or improper allocation of development fees hinders economic growth and is, therefore, a matter of statewide interest and concern. It is, therefore, the intent of the Legislature that this section shall supersede all conflicting local laws and shall apply in charter cities.

(f) At the time the local agency imposes a fee for public improvements on a specific development project, it shall identify the public improvement that the fee will be used to finance.

66006.5. (a) A city or county which imposes an assessment, fee, or charge, other than a tax, for transportation purposes may, by ordinance, prescribe conditions and procedures allowing real property which is needed by the city or county for local transportation purposes, or by the state for transportation projects which will not receive any federal funds, to be donated by the obligor in satisfaction or partial satisfaction of the assessment, fee, or charge.

(b) To facilitate the implementation of subdivision (a), the Department of Transportation shall do all of the following:

(1) Give priority to the refinement, modification, and enhancement of procedures and policies dealing with right-of-way donations in order to encourage and facilitate those donations.

(2) Reduce or simplify paperwork requirements involving

right-of-way procurement.

(3) Increase communication and education efforts as a means to solicit and encourage voluntary right-of-way donations.

(4) Enhance communication and coordination with local public entities through agreements of understanding that address state acceptance of right-of-way donations.

66007. (a) Except as otherwise provided in subdivision (b), any local agency that imposes any fees or charges on a residential development for the construction of public improvements or facilities shall not require the payment of those fees or charges, notwithstanding any other provision of law, until the date of the final inspection, or the date the certificate of occupancy is issued, whichever occurs first. However, utility service fees may be collected at the time an application for utility service is received.

If the residential development contains more than one dwelling, the local agency may determine whether the fees or charges shall be paid on a pro rata basis for each dwelling when it receives its final inspection or certificate of occupancy, whichever occurs first; on a pro rata basis when a certain percentage of the dwellings have received their final inspection or certificate of occupancy, whichever occurs first; or on a lump-sum basis when the first dwelling in the development receives its final inspection or certificate of occupancy, whichever occurs first.

(b) Notwithstanding subdivision (a), the local agency may require the payment of those fees or charges at an earlier time if (1) the local agency determines that the fees or charges will be collected for public improvements or facilities for which an account has been established and funds appropriated and for which the local agency has adopted a proposed construction schedule or plan prior to final inspection or issuance of the certificate of occupancy or (2) the fees or charges are to reimburse the local agency for expenditures previously made. "Appropriated," as used in this subdivision, means authorization by the governing body of the local agency for which the fee is collected to make expenditures and incur obligations for specific purposes.

(c) (1) If any fee or charge specified in subdivision (a) is not fully paid prior to issuance of a building permit for construction of any portion of the residential development encumbered thereby, the local agency issuing the building permit may require the property owner, or lessee if the lessee's interest appears of record, as a condition of issuance of the building permit, to execute a contract to pay the fee or charge, or applicable portion thereof, within the time specified in subdivision (a). If the fee or charge is prorated pursuant to subdivision (a), the obligation under the contract shall be similarly prorated.

(2) The obligation to pay the fee or charge shall inure to the benefit of, and be enforceable by, the local agency that imposed the fee or charge, regardless of whether it is a party to the contract. The contract shall contain a legal description of the property affected, shall be recorded in the office of the county recorder of the county and, from the date of recordation, shall constitute a lien for the payment of the fee or charge, which shall be enforceable against successors in interest to the property owner or lessee at the time of issuance of the building permit. The contract shall be recorded in the grantor-grantee index in the name of the public agency issuing the building permit as grantee and in the name of the property owner or lessee as grantor. The local agency shall record a release of the obligation, containing a legal description of the property, in the event the obligation is paid in full, or a partial release in the event the fee or charge is prorated pursuant to subdivision (a).

(3) The contract may require the property owner or lessee to provide appropriate notification of the opening of any escrow for the sale of the property for which the building permit was issued and to provide in the escrow instructions that the fee or charge be paid to the local agency imposing the same from the sale proceeds in escrow prior to disbursing proceeds to the seller.

(d) This section applies only to fees collected by a local agency to fund the construction of public improvements or facilities. It does not apply to fees collected to cover the cost of code enforcement or inspection services, or to other fees collected to pay for the cost of enforcement of local ordinances or state law.

(e) "Final inspection" or "certificate of occupancy," as used in this section, have the same meaning as described in Sections 305 and 307 of the Uniform Building Code, International Conference of Building Officials, 1985 edition.

(f) Methods of complying with the requirement in subdivision (b) that a proposed construction schedule or plan be adopted, include, but are not limited to, (1) the adoption of the capital improvement plan described in Section 66002, or (2) the submittal of a five-year plan for construction and rehabilitation of school facilities pursuant to subdivision (c) of Section 17017.5 of the Education Code.

66008. A local agency shall expend a fee for public improvements, as accounted for pursuant to Section 66006, solely and exclusively for the purpose or purposes, as identified in subdivision (f) of Section 66006, for which the fee was collected. The fee shall not be levied, collected, or imposed for general revenue purposes.

IV. Methodology

In accordance with AB 1600, the City of Ridgecrest has conducted a study to identify necessary improvements needed to accommodate an increasing population.

The costs were then allocated to the projected development that is to occur over the next 10-year period. This cost allocation provides the direct relationship required of AB 1600 and is the nexus upon which the proposed Development Impact Fees are established. Consequently, new development does not pay for existing deficiencies. Rather, new development pays its fair share of the costs to provide the required services and improvements for the projects they propose.

Planning Period and Services:

The planning period through 2016 was considered to determine the population growth and its effect on needed housing and associated industrial and commercial developments. The following parameters were developed using the population projections:

1. Population increase by 2016 will be 15,000,
2. Estate and Rural Single-family residential growth will average 2.5 DU/acre,
3. Low Density Single-family residential growth will average 4.0 DU/acre,
4. Medium Density residential growth will average 12 DU/acre, and,
5. Commercial, Industrial and Office development acreage is projected to be 441 acres.

Cities within California no longer may depend upon a reliable revenue stream from property taxes. Therefore, the responsibility of providing capital infrastructure has fallen on those individuals responsible for the additional demand. Municipal government has the power to deny projects that place an unreasonable financial obligation upon the community's existing residents. By requesting approval for developing land, the builder/developer, in effect, must agree to pay his proportional share of the new infrastructure demand.

The City is authorized to levy fees when specific findings are made which respond to the need to expand facilities in order to maintain levels of service, to mitigate environmental impacts, and/or to comply with City of Ridgecrest General Plan policies and standards. General Plan goals, objectives and policies provide one reliable basis for levying fees or associated exactions, since the General Plan is acknowledged as the foundation document for all development requirements within the City of Ridgecrest. Courts have upheld development impact fees that are associated with the implementation of the adopted General Plan.

In order to determine the anticipated build out, this study utilized the City's adopted Future Land Use Map, (please see ***Exhibit 2*- Future Land Use Map**). *Table 1* indicates that the total amount of land within the City of Ridgecrest, (exclusive of the Naval Air

Weapons Station), anticipated to be developed within the next 10 years to be 2,847 acres or approximately 4.4 square miles.

Table 1
City of Ridgecrest Developable Undeveloped Land by General Plan Designation excluding NAWS

Land Use Category	Acres	Dwellings
Commercial	**275**	
Civic	**10**	
Industrial	**166**	
Medium Density Residential	**226** (x 12 DU/Acre)	2712
Low Density Residential	**527** (x 4 DU/Acre)	2108
Estate Density Residential	**690** (x 2.5 DU/Acre)	1725
Rural Density Residential	**128** (x 2.5 DU/Acre)	320
Total Undeveloped City excluding NAWS	**2022**	
Total Anticipated Dwelling Units		**6865**

This study shall establish the relationship between the proposed fees and the need for improvement. The effect of growth on the City of Ridgecrest and the demand for these amenities is essential to the establishment of development fees. It is anticipated that the City of Ridgecrest will add an additional 6,865 residential dwellings within the next ten years. This household increase is projected to add an additional 15,103 residents to the City's population, (obtained by multiplying the projected number of new dwellings by 2.2 [median household size]).

The following Sections shall address each of the five development impact fees under consideration by the City of Ridgecrest. They include the following:

- Chapter V - Fire Facilities Impact Fees
- Chapter VI - Traffic Impact Fees
- Chapter VII - Park Development Fees
- Chapter VIII - Law Enforcement Fees, and
- Chapter IX - Drainage Impact Fees

V. Fire Facilities

General Plan Policy Foundations:

The basis for establishing fire protection fees is derived from the City of Ridgecrest General Plan Safety Element. This adopted element is contained within *Appendix 3* of this report.

Goal:
Avoid risk to life, property and the well-being of city residents from natural or man made caused hazards including flooding, fire, aircraft operations and crime.

Fire Protection Policies:

- Coordinate with the Kern County Fire Department in considering the adequacy of available fire protection service in assessing proposed development;
- Support Kern County Fire Department efforts to reduce fire hazards through public education;
- Coordinate with the Kern County Fire Department in assessing on an annual basis the adequacy of available fire protection services (fire station, equipment, fire hydrants, roadways, building inspection) and recommend a strategy for achieving needed improvements to the responsible agencies.
- Seek a more concentrated pattern of urban development to reduce the need for fire protection beyond the distance associated with a five minute response from an existing fire station;
- Minimize fire and emergency response time through improvements to the traffic circulation system and expansion of the level of fire protection; and,
- Support Water District efforts to upgrade water mains to provide adequate fire flows in all parts of the City.

Facilities and Costs:

The City of Ridgecrest contracts with the Kern County Fire Department for fire prevention and protection services. KCFD Stations 74 and 77, located at 139 E. Las Flores and 815 W. Dolphin Avenue serve the City of Ridgecrest. According to the Department, these two fire stations are adequate to serve the current population. More sophisticated services provided by the KCFD, such as haz mat response equipment and personnel are also available for dispatch to the Ridgecrest area. A third station, KCFD, Station 73, is proximate to the Inyokern Airport located at 6919 Monache Mountain Avenue. Please note ***Exhibit 3*** – **Ridgecrest Area Fire Stations.**

New fire facilities will be required to serve 2016 development. Their timing and placement is based on a number of factors to be evaluated by the KCFD. These include

the location of new development, residential population density, and the type of land uses constructed. The Policies of the Ridgecrest Safety Element of the General Plan provides for one new fire company for each 14,000 to 15,000 residents. Based on an increase in population of 15000, 1 additional fire station will be required.

Stations added for population increment increases of 15,000 in 2016 will require an estimated $3,000,000 for land, buildings and equipment. Total cost for new fire facilities would thus be $3,000,000.

Cost Allocations:

This subsection identifies the need for the construction and operation of additional fire facilities to serve community growth.

As with other facilities that provide services to both residential and commercial/ industrial development, the costs of the necessary facilities to provide such services will be proportionately assessed based on estimated development area increments, utilizing the following cost-distribution methodology.

Table 2 identifies the proposed cost of new development required in order to absorb the fire service capital improvements necessary for 15,000 new residents.

Table 2
Cost Allocation for Fire Impact Fees

Type of Development	Acres	Units / Acre	FEE
Estate & Rural Residential	818	2.5	$596 per dwelling unit
Low Density Residential	527	4.0	$373 per dwelling unit
Medium Density Residential	226	12.0	$124 per dwelling unit
Commercial	275	--	$1,491 per acre
Civic	10	--	$1,491 per acre
Industrial	166	--	$1,491 per acre
TOTAL	**2022**		

VI. Traffic Impact Fees

In order to accurately estimate appropriate Circulation or Traffic impacts and impact fees, it is necessary to review the Circulation Element of the Ridgecrest General Plan.

General Plan Policy Foundations:

The basis for establishing traffic impact fees is derived from the City of Ridgecrest General Plan Circulation/Transportation Element. This adopted element is contained within *Appendix 2* of this report.

Goal:

Provide a transportation and circulation system coordinated with land use to ensure safe and efficient movement of people and goods to and within the city.

Circulation-Transportation Policies:

The adopted Circulation/Transportation Element of the Ridgecrest General Plan contains thirty-five policies broken down into eight categories, [including the number of policies for each sub group]: 1) General [3], 2) Motor Vehicle [15], 4) Parking [4], 5) Public Transportation [4], 6) Bicycle Circulation [3], 7) Pedestrian Circulation [3], and 8) Regional Circulation [3]. Further, please note ***Exhibit 4*** – **Proposed Road Widening and Signalized and Non-Signalized Intersections within Ridgecrest** in order to identify those intersections studied as part of this study.

Facilities and Costs:

The Traffic Impact Fees determined within this report are based upon three capital improvement costs which will be required to meet the demand posed by 15,000 new residents. These capital costs include the following:

1. Implementation of the proposed Arterial Street and Collector Roadway System contained within the Circulation Master Plan (Figure 2-1 of the Circulation Element) - 23 miles of street construction including: two lanes of pavement, (or significant widening to accommodate safety medians, sidewalks and/or bicycle paths), and base; right of way; removal of obstructions, environmental assessments, compliance and miscellaneous,
2. Fifteen Traffic Signalized Intersectional Improvements required due to the projected increased level of service, and
3. Twelve signalized intersection upgrades.

The costs for these capital improvements are as follows:

1. $1,750,000.00 per mile x 23		= $40,250,000
2. 15 traffic signals x $160,000.00		= $ 2,400,000
3. 12 signalized intersection upgrade x $80,000.00		= $ 960,000
	Total	= **$43,610,000**

Total new ADT per zoning from all anticipated new development in city 223,156 trips.

$$\frac{\$43,610,000}{237,070} = \$183.95/\text{ADT Trip round to } \$184$$

Example: Single family residential $184 x 9.6 Trips per unit = **$1,766 /average dwelling unit.**

Low Density Residential

Single Family, (R-1) 527 Acres x 4 lots per Acre =	2108
Rural & Estate, (E-1,2,&3) 818 Acres x 2.5 lots per Acre =	2045
Total Single Family Lots	**4153**

4153 lots x 9.57 ADT per lot = 39,744 ADT

Medium Density Residential

Multi-Family Residential, (R-2,3,&4) 226 Acres x 12 DU/Acre = **2712 Total Dwellings**

2712 Dwelling Units x 6.72 trips per unit =	18,225 ADT
Restaurants	50,464 ADT
Free Standing Discount Stores	16,940 ADT
General Retail Commercial	22,100 ADT
Service Stations	21,091 ADT
Shopping Centers	19,564 ADT
Office and Medical Commercial	35,488 ADT
Industrial	13,454 ADT
Total ADT	**237,070 ADT**

Cost Allocations:

Table 3 identifies the Traffic Impact fees necessary to establish the relationship between the proposed fees and the needed improvements required by the projected population increase.

Trip end rates for other than those listed above shall be determined using trip generation statistics in the Institute Transportation Engineers Trip Generation Manual, latest edition.

Trip ends for Commercial, Office, Theater, Restaurants and Industrial shall be reduced by 50%, while Trip ends for Gas Stations shall be reduced by 90% to reflect by-pass and captured trips. In order to explain why some activities have reductions while other activities do not, consider medical offices v. general offices. This study recommends a 50% reduction to the trips generated by medical and dental offices because many patients will return to work after their visit. On the other hand, general offices tend to be a daily destination in themselves.

Table 3
Cost Allocation for Traffic Impact Fees

CATEGORY	UNITS	TRIP ENDS	FEE
RESIDENTIAL			
Single Family	Dwelling Unit	9.6	$1766/DU
Multi-Family	Dwelling Unit	6.7	$1233/DU
COMMERCIAL			
Retail Commercial	1000 SF / building	46.6 (reduce to 23.3)[1]	$4,287/1000 SF build.
Service Stations	Fueling Position (gas pump)	166.0 (reduce to 14.1)[2]	$2,742/F. Position
Movie Theater	1000 SF / building	27.8 (reduce to 13.9)[2]	$2558/1000 SF build.
Automobile Sales	1000 SF / lot area	1.2	$221/1000 SF lot
Hotels / Motels	Room	0.7	$129/Room
RESTAURANTS			
Restaurant	1000 SF / building	36.6 (reduce to 18.3)[1]	$3,367/1000 SF build.
OFFICE BUILDINGS			
Medical-Dental	1000 SF / building	18.0 (reduce to 9.0)[1]	$1,656/1000 SF build.
General Office	1000 SF / building	6.1	$1,122/1000 SF build.
INDUSTRIAL			
Manufacturing	1000 SF / building	3.8 (reduce to 1.9)[1]	$350/1000 SF build.
Mini Warehousing	1000 SF / building	2.4 (reduce to 1.2)[1]	$221/1000 SF build.
Warehousing	1000 SF / building	2.2 (reduce to 1.1)[1]	$202/1000 SF build.
INSTITUTIONAL			
Schools / Churches	--	--	$00
Nursing Homes	Bed	0.2	$37/Bed

NOTES:

Rates - $184 per trip end

Trip end rates for other than those listed above shall be determined using trip generation statistics in the Institute Transportation Engineers Trip Generation Manual, latest edition.

[1]Trip ends for Commercial, Office, Restaurants, Theaters and Industrial shall be reduced by 50%, and,

[2] Trip ends for Gas Stations shall be reduced by 90% to reflect by-pass and captured trips.

Fee Methodology for Single-Family Homes:

Earlier *Developer Cost and Fee Study* Draft Reports included a fixed fee for all single family homes. At the March, 2006 City of Ridgecrest Economic Development Committee meeting, it was the consensus of the Committee that Traffic Impact fees for single-family homes be charged on a sliding scale. Therefore, this Study has been modified to include a Traffic Impact fee for single-family homes based on a sliding scale adjusted by the square footage of each dwelling unit. However, at a subsequent meeting, the Developer Fee Task Force decided that the City should NOT charge traffic fees based upon square footage. Rather, a per unit fee should be collected. The following methodology was used, in the event that the City decides to pursue a dwelling fee based upon square footage.

As noted earlier within this Study, the average fee per single-family home necessary to pay the needed capital improvement costs required for new roadway improvements is $1,766 per single-family home.

2005 has been taken as the benchmark year upon which to calculate the range and median size of single-family homes constructed within the City of Ridgecrest. During 2005, 212 building permits were issued to construct single-family homes within the City of Ridgecrest. The size of these 212 single family homes ranged from 1220 square feet to 3443 square feet.

The accumulated total square footage for the 212 homes for which building permits were pulled in 2005 equals 1,769 square feet. Therefore, in order to ensure adequate fees are charged on a square foot basis for future homes, the square footage costs equate to $0.95 per foot. Therefore, the fees charged for new single-family home construction is based on an average of $0.95 per square foot.

Table 4 provides comparisons of developer fees proposed within Ridgecrest and in other jurisdictions.

Table 4
Traffic Impact Fee Comparison for Commercial and Industrial

Jurisdiction	Office Building 3,500 sq. ft.	Supermarker 40,000 sq. ft.	Shopping Ctr. 90,000 sq. ft.	Mini Storage 30,000 sq. ft.
Ridgecrest (proposed)	$3,927	$171,480	$408,960	$7,020
Loma Linda	$5,121	$222,920	$501,570	$32,310
Hanford	$11,189	$519,515	$705,262	$21,720
Visalia	$11,918	$614,208	$1,381,968	$4,960
Kern County Tehachapi Area	$5,110	$209,840	$768,600	$11,025

VII. Park & Recreation Development Fees

The following issues and problems related to the City of Ridgecrest's park and recreation facilities have been identified within the adopted City of Ridgecrest *General Plan Open Space Element*:

1. *Compared to other municipal services and capital improvements, the City's parks and recreation facilities and services have been a low priority,*

2. *The City is deficient in park land and recreational facilities to meet projected needs in the year 2010,*

3. *The Parks and Recreation Department has identified a deficiency of tennis courts, softball fields, soccer fields, volleyball courts, swimming pools and facilities for cultural arts,*

4. *Ridgecrest has adopted the ratio of 3 acres of park land per 1000 City residents as an acceptable standard for park land. Development and construction standards have not been adopted for parks and recreational, and cultural facilities,*

5. *Acquiring, developing and maintaining parks and recreational facilities is expensive. City voters have shown a reluctance to provide additional financial support to offset costs.*

As the City grows, new park and recreation facilities will need to be constructed to meet adopted standards of service for the increase in population. These improvements may be provided in the form of additional park acreage improved in a manner similar to existing parks and recreation facilities, or as a combination of additional acreage and improvements to existing facilities to accommodate additional residents.

General Plan Policy Foundations:

Goal #4.1 of the City's adopted General Plan Open Space Element states:

Create an orderly process for the development of appropriate recreational and cultural facilities and for the preservation of desirable open space.

Park Development Objectives / Policies:

Objectives of the *General Plan Open Space Element* include the following:

- Assess recreational, cultural and open space needs and implement planning to meet those needs,

- Create recreational opportunities to a service level that would provide parks/recreational facilities within a reasonable distance of all residents of the city.

- Achieve conformance with standards established in this Element through a combination of public recreational and cultural facilities

- Acquire and/or develop additional park, recreational, and cultural facilities through available programs and funding mechanisms.

Facilities and Costs:

Table 5 identifies standards developed by the National Recreational Development Council as well as the additional facilities generated by the projected population growth within the City of Ridgecrest within the next 10 years.

Standards and the facilities needed due to the City's growth include categories for the following: Park Acreage, Basketball Courts, Tennis Courts, Soccer Fields, Swimming Pools, Baseball Fields and a Community Center.

The parkland demand and the facilities needed to meet the requirements within the City's adopted General Plan are projected over the next 10 years based upon an anticipated population growth of 15,000.

Table 5
City of Ridgecrest Park and Recreation Community Standards

Item	Facility	Standard	Additional Facilities Needed for 15,000 New Residents
Park Acreage	3 acres	Per 1,000 persons	45 acres
Basketball Courts	4 courts	Per 5,000 persons	3 facilities
Tennis Courts	4 courts	Per 10,000 persons	1.5 facilities
Soccer Field	1 field	Per 10,000 persons	1.5 facilities
Swimming Pool	1 pool	Per 30,000 persons	0.5 facilities
Baseball Field	1 field	Per 5,000 persons	3 facilities
Community Center	1 building	Per 15,000 persons	1 facility

Cost Allocations:

Table 6 identifies the cost for parkland and park & recreational facilities. It is not recommended that developer impact fees be utilized to acquire land within the City of Ridgecrest. Rather, it is recommended that the City of Ridgecrest adopt a Quimby Act enabling Ordinance permitting the City to assess fees for parkland acquisition to residential new development.

However, Developer Impact fees are proposed on new residential development based in order to facilitate the public construction of Basketball Courts, Tennis Courts, Soccer Fields, Swimming Pools, Baseball Fields and a Community Center.

Table 6 Required Park & Recreation Facilities in Ridgecrest to Accommodate New Growth			
Item	New Facilities Needed for New Development	Cost per Unit	Total
Park Acreage*	45 acres	$150,000 / acre	$6,750,000
* The Quimby Act is recommended as the method to facilitate parkland acquisition			
Basketball Courts	3 facilities (12 courts)	$ 12,000 / court	$ 144,000
Tennis Courts	1.5 facilities (6 courts)	$ 40,000 / court	240,000
Soccer Field	1.5 fields	$ 60,000 / field	90,000
Swimming Pool	1 pool	$800,000 / pool	800,000
Baseball Field	3 fields	$ 50,000 / field	150,000
Community Center	1 building	$3,500,000 / building	3,500,000
Total Cost of Facilities, (excluding land), Needed for New Growth			**$4,924,000**

Unlike other development fees identified within this study, only residential projects will be required to pay a park & recreation facilities fee. The total cost of the Park & Recreation facilities, (excluding land), needed to accommodate new growth within the City of Ridgecrest is $4,924,000. Fifteen thousand new residents are anticipated to create a total of 6,456 thousand new dwelling units. Therefore, the proposed park and recreation development fee per new dwelling unit is $763 per dwelling unit.

VIII. Law Enforcement Fees

The City of Ridgecrest provides police protection. The Police Department operates 14 patrol cars, 8 detective vehicles, 3 administrative vehicles, 3 animal control vehicles, 4 PACT vehicles, and 1 disaster preparedness vehicle.

Current replacement cost for patrol vehicles is $32,150 per vehicle.

General Plan Policy Foundations:

The basis for establishing law enforcement fees is derived from the City of Ridgecrest General Plan Safety Element. This adopted element is contained within *Appendix 3* of this report.

Goal:
Avoid risk to life, property and the well-being of city residents from natural or man made caused hazards including flooding, fire, aircraft operations and crime.

Law Enforcement Objective:

- Reduce the incidence of crimes against persons and property as measured on a per capita basis.

Facilities and Costs:

Anticipated growth in the City will require a new comprehensive radio system equipment and a sub station. Further, new marked and unmarked patrol units will be required.

Acquisition of new police vehicles, (over and above the normal replacement of vehicles necessary to serve 26,700 residents), a new comprehensive radio system and a new sub area Police Station will be needed to serve the 15,000 additional residents anticipated due to new development.

Based on maintaining the same level of service, 11new police vehicles will be required at a cost of $35,000 each. Therefore a total of $385,000, (2006 dollars), will be needed to maintain the same level of law enforcement services.

Based on the anticipated growth, a 10,000 square foot police sub station will be needed to accommodate the Police Department staffing over the next 10 years. Design, land and improvements for this facility is placed at approximately $3,000,000.

The new comprehensive radio system necessitated by the anticipated growth is $4,000,000. The radio equipment fair share generated by the new growth is $1,620,000.

Therefore, based upon the above capital needs, the added for population increment increases of 15,000 in 2016 will require an estimated $5,005,000 for acquisition of new police vehicles, a new comprehensive radio system and a new sub-area Police Station.

Cost Allocations:

Table 7 identifies the proposed cost of new development required in order to absorb the law enforcement capital improvements necessary for 15,000 new residents.

Table 7
Cost Allocation for Law Enforcement Impact Fees

Type of Development	Acres	Units / Acre	FEE
Estate & Rural Residential	818	2.5	$994 per dwelling unit
Low Density Residential	527	4.0	$621 per dwelling unit
Medium Density Residential	226	12.0	$207 per dwelling unit
Commercial	275	--	$2,486 per acre
Civic	10	--	$2,486 per acre
Industrial	166	--	$2,486 per acre
TOTAL	**2022**		

IX. Drainage Impact Fees

General Plan Policy Foundations:

The basis for establishing storm drainage protection fees is derived from the City of

Ridgecrest General Plan Safety Element. This adopted element is contained within *Appendix 3* of this report.

Goal:
Avoid risk to life, property and the well-being of city residents from natural or man made caused hazards including flooding, fire, aircraft operations and crime.

Issues and Problems:

- Portions of southeast and north Ridgecrest are subject to flooding, primarily sheet flow, during 100-year storm conditions;
- Ridgecrest has no community-wide drainage system, resulting in the flooding of many streets during even minor rains.

Objectives:

- Coordinate implementation of the Drainage Master Plan with development, street improvements and basin recharge.

Flooding Policies:

- Protect natural drainage ways in the study area from loss or encroachment to urban uses;
- Develop a comprehensive City-wide flood control system with adequate design capacity for 50-year storm conditions at a minimum and 100-year storm capacity where feasible;
- Pursue multiple use fold control features for recreational and open space uses, where feasible.

Facilities and Costs:

The *City of Ridgecrest Master Drainage Plan* was prepared in May, 1989 by James M. Montgomery, Consulting Engineers, Inc. a copy of this document is on file at the Public Works Department at Ridgecrest City Hall.

The *City of Ridgecrest Master Drainage Plan* is the comprehensive, technical document upon which the allocation of impact fees is based. *Table 8* includes the Recommended Drainage Fees according to the 40 projects identified broken down into eight priorities as identified within the *City of Ridgecrest Master Drainage Plan.* The total cost to accomplish the 40 projects identified within the *City of Ridgecrest Master Drainage Plan* was $49,335,000 in 1989 and $78,234,000 in 2006.

Table 8
Recommended Drainage Improvements

Priority	#	Project Description	Facility Numbers	1989 Project Cost	2006 Project Costs
Priority 1	1.1	Bowman Rd. Channel from Downs St. to Outfall	BW-07 to BW-23	$7,174,000	$11,367,000
	1.2	Brady Channel from Felspar Ave. to Outfall	RCW-21 to RCW-27	3,538,000	5,610,000
	Priority 1 Subtotal			10,712,000	16,987,000
Priority 2	2.1	Site Acquisition for Norma/Felspar Retention Basin	WCL-01	1,013,000	1,606,000
	2.2	Site Acquisition for Brady/Felspar Detention Basin	RCW-37	492,000	780,000
	2.3	Site Acquisition for Mahan/Sydnor Detention Basin	RCW-39	125,000	198,000
	2.4	Site Acquisition for Brady/Ridgecrest Detention Basin	RCW-38	360,000	571,000
	2.5	Right-of-Way Acquisition for Mahan Channel	RCW-10, RCW-14, RCW-17, RCW-20	496,000	787,000
	2.6	Right-of-Way Acquisition for Brady Channel from Felspar To Upjohn	RCW-28, RCW-31, RCW-32, RCW-34, RCW-35	231,000	366,000
	2.7	Site Acquisition for Two College Heights Detention Basins	RCW-17, RCW 18	0	0
	Priority 2 Subtotal			2,717,000	4,309,000
Priority 3	3.1	Downs Storm Drain and Pearson Park Detention Basin	RCW-01 to RCW-06, RCW-40	2,013,000	3,192,000
	3.2	French Ave Storm Drain	CH-10 to CH-13	1,728,000	2,740,000
	3.3	Church Ave Storm Drain	CH-01 to CH-04, CH-15	2,224,000	3,527,000
	Priority 3 Subtotal			5,965,000	9,459,000
Priority 4	4.1	Bowman Rd Channel from Brady St to Downs St	BW-01 to BW-06	616, 000	977,000
	4.2	Bowman Detention Basin and Brady Inlet Channel	BW-25, BW24	1,209,000	1,917,000
	4.3	Brady Channel from Felspar to Upjohn	RCW-28 to RCW 35	546,000	866,000
	4.4	Brady Detention Basins	RCW-37, RCW-38	926,000	1,468,000
	4.5	Right-of-Way Acquisition for College Heights Channel	CHW-08, CHW-10, CHW-12	637,000	1,010,000
	4.6	Right-of-Way Acquisition for China Lake Channel	CHW-14	446,000	707,000

Table 8
Recommended Drainage Improvements

Priority	#	Project Description	Facility Numbers	1989 Project Cost	2006 Project Costs
	4.7	Right-of-Way Acquisition for Norma Channel	CHW-05, CHW-06	24,000	38,000
	Priority 4 Subtotal			4,404,000	6,984,000
Priority 5	5.1	Norma/Felspar Retention Basin and all Tributary Drains	WCL-01 to WCL-09	2,259,000	3,582,000
	5.2	Ward Ave Storm Drain	DAW-01 to DAW-04	1,093,000	1,733,000
	5.3	Norma St Storm Drain	IK-01, IK-04 to IK-06	760,000	1,205,000
	5.4	Drains Tributary to French Ave Storm Drain	CH-09, CH-14	1,269,000	2,012,000
	5.5	Drains Tributary to Church Ave Storm Drain	UJ-01 to UJ-04	$1,507,000	$2,390,000
	5.6	Upjohn Detention basin	UJ-14	171,000	271,000
	Priority 5 Subtotal			7,059,000	11,194,000
Priority 6	6.1	College Heights Detention Basin Site 1	CHW-17	1,476,000	2,341,000
	6.2	College Heights Detention Basin Site 2	CHW-18, CHW-23	2,078,000	3,295,000
	6.3	Franklin and Sunland Channels	ECL-01 to ECL-06	2,257,000	3,579,000
	Priority 6 Subtotal			5,811,000	9,215,000
Priority 7	7.1	Mahan Channel	RCW-08 to RCW-20	985,000	1,562,000
	7.2	Mahan Detention Basin	RCW-39	117,000	186,000
	7.3	Upjohn Diversion Drains to Bowman Rd Channel	UJ-07 to UJ-13	2,386,000	3,784,000
	7.4	Southern Drains to Bowman Rd Channel	BW-30 to BW-37	1,460,000	2,315,000
	Priority 7 Subtotal			4,948,000	7,846,000
Priority 8	8.1	College Heights Channel	CHW-08 to CHW-13	1,026,000	1,627,000
	8.2	China Lake Channel	CHW-14 to CHW-16	752,000	1,192,000
	8.3	Norma Channel	CHW-04 to CHW-07	520,000	825,000
	8.4	College Heights Detention Basin Outlet Channels	CHW-01 to CHW-02	1,134,000	1,798,000
	8.5	Radar/Richmond Channels	ECL-07 to ECL-11	1,314,000	2,084,000
	8.6	El Paso Wash Levees	EPW-01 to EPW-03	2,224,000	3,527,000
	8.7	College Heights Drains	CHW-20 to CHW-22	749,000	1,188,000
	Priority 8 Subtotal			7,719,000	12,241,000
	Grand Total			49,335,000	78,234,000

Sources: *City of Ridgecrest Master Drainage Plan*, James M. Montgomery Engineers, May, 1989, and *Civil Works Construction Cost Index System*, U. S. Army Corps of Engineers, March, 2005

Cost Allocations:

Table 9 identifies the Drainage Impact Fees generated by new development based upon the demand for drainage facilities placed upon the City by new development. The following steps were taken in order to determine a fair share cost:

Residential:

1. Cost to implement Master Drainage Plan = $78,234,000, (2006 Construction Cost Index)
2. Percent of Drainage Improvements Required by New Residential Development = 36%
3. Cost to implement Master Drainage Plan allocated to New Residential Development = $28,164,000
4. Developable Acres within the City, (excluding NAWS), 1571 acres

Non-Residential:

1. Cost to implement Priorities 1 & 2 of Master Drainage Plan = $21,296, (2006 C. C. I.)
2. Percent of Drainage Improvements Required by New Non-Residential Development = 36%
3. Cost to implement Master Drainage Plan allocated to New Non-Residential Development = $7,666,560
4. Developable Acres within the City, (excluding NAWS), 451 acres

Table 9
Cost Allocation for Drainage Impact Fees

Land Use	Undeveloped Acres	Percent Impervious	Fair Share Cost	FEE per Acre	FEE per Dwelling
Estate & Rural Residential	818	10%	$3,409,250	$4,168	$1,667
Low Density Residential	527	23%	$5,051,775	$9,586	$2,396
Medium Density Residential	226	40%	$3,767,680	$16,671	$1,389
Commercial	275	85%	$2,652,128	$9,644	
Industrial	166	85%	$1,600,904	$9,644	
Civic	10	75%	$85,090	$8,509	
Total	**2022**				

X. Conclusion

According to the State of California Governor's Office of Planning and Research, the City of Ridgecrest population was estimated at 29,000 in 2000 and at 24,927 in 2005. However, population is expected to increase significantly during the next ten years. The projected increase in population of 15,000 is expected to greatly impact the City's infrastructure. The new growth will require that the City of Ridgecrest re-evaluate how it does business. No longer can the City afford to pass on the real costs of development to its existing residents.

Table 10 indicates that the total cost to of future capital improvements necessary to maintain the current level of fire, traffic, park and recreation, law enforcement and storm drainage facilities over the next 10 years is $135,552,000.

Table 10
City of Ridgecrest Capital Improvement Costs
Required by New Development, 2006 - 2016

#	Capital Improvement Category	Estimated Cost of Improvements to Maintain Existing Service Level*
1.	Fire Facilities required by new development	$ 3,000,000
2.	Traffic Improvements required by new development	43,610,000
3.	Park & Rec Facilities required by new development	4,924,000
4.	Law Enforcement Facilities required by new development	5,005,000
5.	Storm Drainage Facilities required by new development*	23,658,000
	TOTAL	**$ 80,197,000**

* Storm Drainage Fees are calculated for Residential paying 36% of Master D. P. priorities 1-8, and, Non – Residential paying 36% of master Drainage Plan priorities 1-2

Table 11 provides a comparative analysis of developer impact fees in other cities, including growing communities located within desert regions of the State.

Table 11
Examples of Developer Impact Fees for Single Family Homes

Jurisdiction	Fire	Traffic	Park	Police	Storm Drainage	Schools[1]	Other Fees[2]	Total
City of Apple Valley	$00	$5,301	$3,085	$140	$1,500	$6,156	$2,783	$18,965
City of Bakersfield	$00	$3,221 - $6460[3]	$1,430	$00	$00	$4,032 - $12,132	$2,500	$11,183 - $22,522
City of Banning	$543	$7,248	$999	$364	$2,786	$4,032	$9,243	$25,215
City of Hesperia	$266	$5,385	$00	$123	$1,284	$6,750	$1,109	$14,917
City of Tehachapi	$00	____4	$2,052	$2,632	$00	$4,032	$9,081	$17,797 plus traffic
City of Visalia	$00	$4,059	$1,546	$283	$2,366	$5,364	$5,785	$19,403
City of Ridgecrest EXISTING	$00	$00	$00	$00	$00	$3,852	$2,231	$6,083
City of Ridgecrest *PROPOSED*	*$373*	*$1766*	*$763*	*$621*	*$2,397*	-- --	-- --	*$5,920* T ***$12,003***

[1] square footage costs are calculated, based upon the fee paid for a 1800 sq. ft. home.

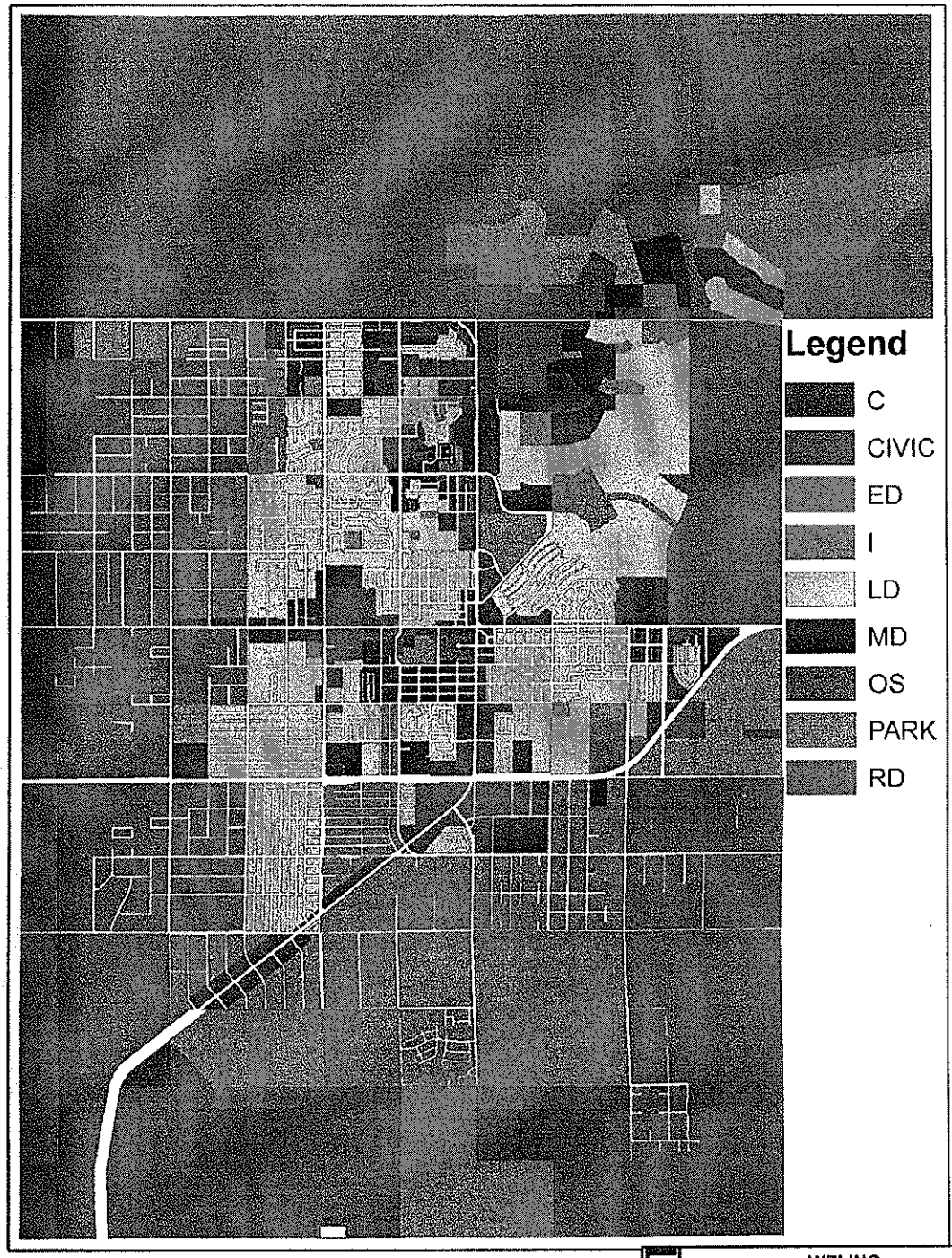
[2] *Other Fees* include: Animal Control, General Government, Habitat Conservation, Public Service & Sewer Connection Fees.

[3] $3,221 = core area, $6460 = non-core area

[4] To be determined by Traffic Engineer

XI. References

1. *Kern COG Impact Fee Program Brochure*, 2004
2. *Government Code Section 66000*, 2005, State of California
3. *City of Ridgecrest General Plan*, 1991, City of Ridgecrest
4. *Rosamond Impact Fee Update Document*, 2003, Kern County Planning Department
5. *City of Ridgecrest Master Drainage Plan*, May, 1989, JMM Consulting Engineers
6. *Southeastern Kern Nexus Study*, 2004, Omni Mears, Ltd.
7. *City of Hesperia*, Developer Impact Fee Study, 2001, Hesperia, CA
8. *Recreational Development Handbook*, 1981, Urban Land Institute, Washington, D.C.
9. *Trip Generation Manual*, 1987, Institute of Transportation Engineers, Washington, D.C.

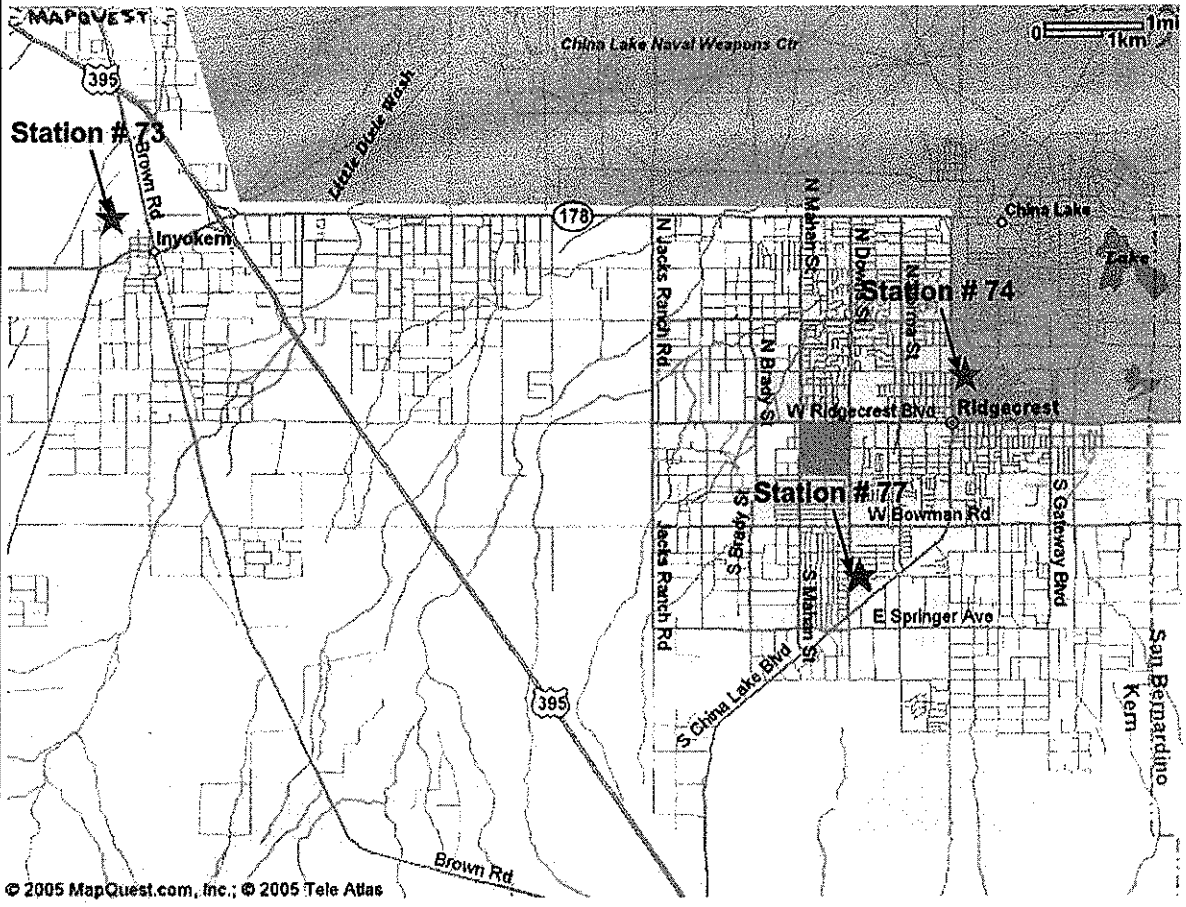


WZI INC.
BAKERSFIELD, CALIFORNIA

City of Ridgecrest
Development Cost and fee Study

City Future Land Use Map

DATE		EXHIBIT
10/05	18460020	2



Kern County Fire Department Stations - Ridgecrest Area

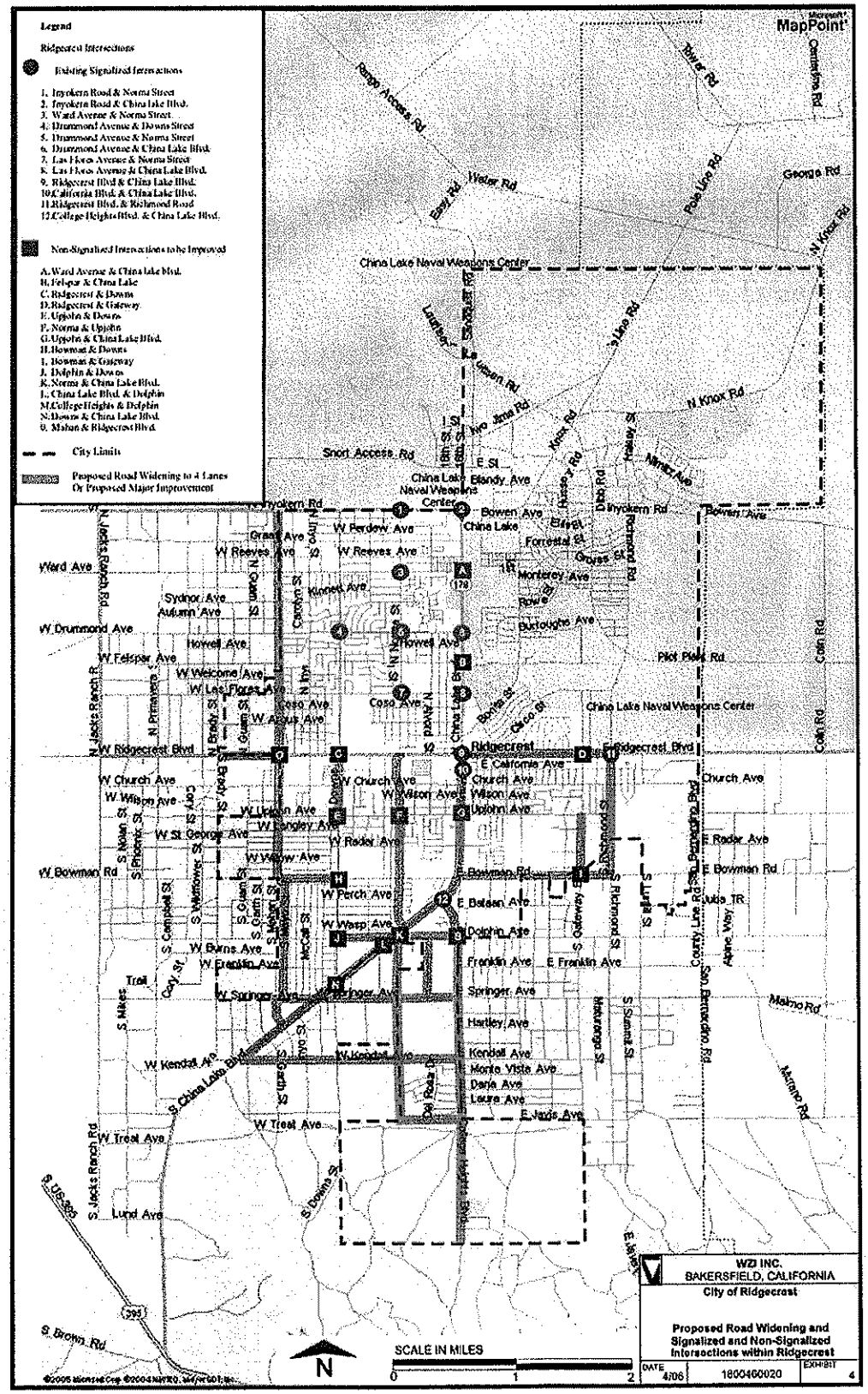
Station # 73 6919 Monach Mountain Ave., Inyokern, CA

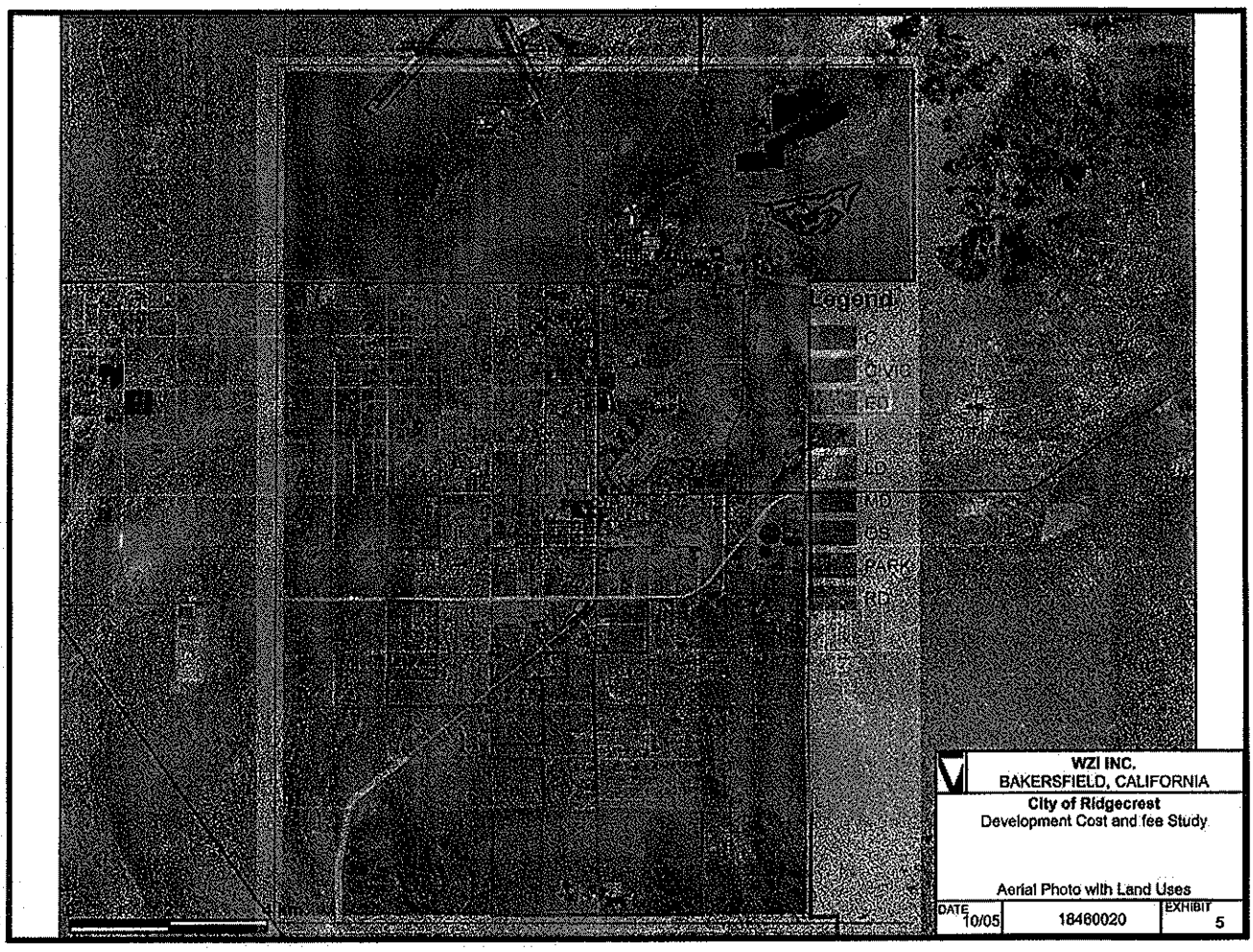
Station # 74 139 E. Las Flores., Ridgecrest, CA

Station # 77 815 W. Dolphin Ave., Ridgecrest, CA

N

WZI INC. BAKERSFIELD, CALIFORNIA	
City of Ridgecrest Development Cost and fee Study	
KCFD Stations	
DATE 10/05	18460020	EXHIBIT 3


Legend
Ridgecrest Intersections
Existing Signalized Intersections
1. Inyokern Road & Norma Street
2. Inyokern Road & China Lake Blvd.
3. Ward Avenue & Norma Street
4. Drummond Avenue & Downs Street
5. Drummond Avenue & Norma Street
6. Drummond Avenue & China Lake Blvd.
7. Las Flores Avenue & Norma Street
8. Las Flores Avenue & China Lake Blvd.
9. Ridgecrest Blvd & China Lake Blvd.
10. California Blvd. & China Lake Blvd.
11. Ridgecrest Blvd. & Richmond Road
12. College Heights Blvd. & China Lake Blvd.
Non-Signalized Intersections to be Improved
A. Ward Avenue & China Lake Blvd.
B. Felspar & China Lake
C. Ridgecrest & Downs
D. Ridgecrest & Gateway
E. Upjohn & Downs
F. Norma & Upjohn
G. Upjohn & China Lake Blvd.
H. Bowman & Downs
I. Bowman & Gateway
J. Dolphin & Downs
K. Norma & China Lake Blvd.
L. China Lake Blvd. & Dolphin
M. College Heights & Dolphin
N. Downs & China Lake Blvd.
O. Mahan & Ridgecrest Blvd.
City Limits
Proposed Road Widening to 4 Lanes Or Proposed Major Improvement
MapPoint
China Lake Naval Weapons Center
Ridgecrest
Inyokern Rd
Ward Ave
W Drummond Ave
W Felspar Ave
W Ridgecrest Blvd
E Ridgecrest Blvd
W Church Ave
W Bowman Rd
E Bowman Rd
W Kendall Ave
W Trest Ave
S US-395
S Brown Rd
Mahan Rd
N
SCALE IN MILES
0
1
2
WZI INC.
BAKERSFIELD, CALIFORNIA
City of Ridgecrest
Proposed Road Widening and Signalized and Non-Signalized Intersections within Ridgecrest
DATE 4/06
1800460020
EXHIBIT 4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WZI INC.
BAKERSFIELD, CALIFORNIA
City of Ridgecrest
Development Cost and fee Study
Aerial Photo with Land Uses
DATE
10/05
18460020
EXHIBIT
5

APPENDIX D - WWTP MONITORING DATA

Appendix D **WWTP Monitoring Data**
WWTP Plant No. 2
City of Ridgecrest

Month	Influent Flow MGD	Inf BOD mg/l	Inf COD mg/l	Inf TSS mg/l	EFF BOD mg/l	EFF COD mg/l	EFF TSS mg/l	EFF TDS mg/l	EFF NO_3-N mg/L	EFF TKN mg/L	EFF NH_4-N mg/L	EFF DO mg/L	EFF pH units	Sludge Production (lbs)	BOD Rem. %	Influent BOD (lbs/d)	Influent COD (lbs/d)	Influent TSS (lbs/d)	Effluent BOD (lbs/d)	Effluent COD (lbs/d)
Jan-01	2.4530	460	820		9.25	37.5								8,012	97.99%	9,411	16,776		189	767
Feb-01	2.4990	590	930		23	106.5								13,068	96.10%	12,297	19,383		479	2,220
Mar-01	2.4900	140	330			33.2								7,743		2,907	6,853		0	689
Apr-01	2.5340	160	350		22.5	52								10,072	85.94%	3,381	7,397		476	1,099
May-01	2.4790	160	390		38	84.5								11,781	76.25%	3,308	8,063		786	1,747
Jun-01	2.3210													6,150		0	0		0	0
Jul-01	2.5170	170	300		21.5	80.5								6,553	87.35%	3,569	6,298		451	1,590
Aug-01	2.6670	130	280		19	110								7,043	85.38%	2,892	6,228		423	2,447
Sep-01	2.6450	97	180		26.5	65								15,506	72.68%	2,140	3,971		585	1,875
Oct-01	2.5410	97	180		37	67								23,317	61.86%	2,056	3,815		784	1,420
Nov-01	2.5540	120	220		19.5	55								6,951	83.75%	2,556	4,688		415	1,172
Dec-01	2.5530	160	240		10.95	43								16,544	93.16%	3,407	5,110		233	918
Jan-02	2.4540	190	240		13	50								23,361	93.16%	3,889	4,912		266	1,023
Feb-02	2.3350	180	330		21	81.5								12,562	88.33%	3,505	6,426		409	1,587
Mar-02	2.3630	220	380		10.65	79								11,412	95.16%	4,336	7,489		210	1,557
Apr-02	2.4710	180	290		26	85.5								9,109	83.75%	3,297	5,976		535	1,762
May-02	2.5330	160	180		110	135								13,007	31.25%	3,380	3,803		2,324	2,852
Jun-02	2.5070	160	210		37	81								21,086	76.88%	3,345	4,391		774	1,694
Jul-02	2.6670	160	240		24.5	66.5								4,702	84.69%	3,559	5,338		545	1,479
Aug-02	2.6190	180	230		15	64.5								7,680	91.67%	3,932	5,024		328	1,409
Sep-02	2.6020	180	230		17.55	61.5								10,447	90.25%	3,906	4,991		381	1,335
Oct-02														3,499		0	0		0	0
Nov-02	2.4830	260	330		24	109.6								13,614	90.77%	5,384	6,834		497	2,268
Dec-02	2.4720	190	300		21	70								5,778	88.95%	3,917	6,185		433	1,443
Jan-03	2.3840	130	230		40	94								23,926	69.23%	2,596	4,592		799	1,877
Feb-03	2.6210	120	190		19.7	76.5								10,989	83.58%	2,623	4,153		431	1,672
Mar-03	2.5080	140	440		14.5	74								21,080	89.64%	2,928	9,203		303	1,548
Apr-03	2.5450	190	290		21	69.5								17,438	88.95%	4,034	6,158		446	1,478
May-03	2.5940	200	230		28	110								7,170	86.00%	4,327	4,876		606	2,380
Jun-03	2.6890	140	250		28.5	99.5								13,439	79.64%	3,140	5,831		639	2,231
Jul-03	2.6730	74	170		14.5	39.6								10,448	80.41%	1,650	3,790		323	887
Aug-03	2.6960	98	150		12	77								11,114	87.76%	2,203	3,373		270	1,731
Sep-03	2.7190	260	310		14	62								21,173	94.62%	5,896	7,030		317	1,406
Oct-03	2.5710	150	350		24	52.5									84.00%	3,216	7,505		515	1,126
Nov-03	2.4760	170	400		9.65	58									94.32%	3,510	8,260		199	1,198
Dec-03	2.4640	370	600		17.5	63.5									95.27%	7,603	12,330		360	1,305
Jan-04	2.4410	140	210		13	64								7,444	90.71%	2,850	4,275		265	1,303
Feb-04	2.3800	120	200		15	100								21,341	87.50%	2,382	3,970		298	1,985
Mar-04	2.4970	120	260		21.5	65.5								24,273	82.08%	2,499	5,414		448	1,364
Apr-04	2.5860	150	230		21	61								14,877	86.00%	3,235	4,960		453	1,316
May-04	2.5930	100	150		16.5	86								11,745	83.50%	2,163	3,244		357	1,860
Jun-04	2.5400	170	260		44.50	110								9,665	73.82%	3,601	5,508		943	2,330
Jul-04	2.6400	140	220		14.50	84								0	89.64%	3,082	4,844		319	1,849
Aug-04	2.7710	180	300		10.5	73								2,918	94.17%	4,160	6,933		243	1,687
Sep-04	2.6840	170	270		14.8	66.5								10,762	91.29%	3,805	6,044		331	1,466
Oct-04	2.4160	230	340		16.9	64								15,055	92.65%	4,634	6,851		341	1,290
Nov-04	2.3750	140	280		10	60.5								14,210	92.86%	2,774	5,548		198	1,199
Dec-04	2.3020	170	250		15	53.5								22,489	91.18%	3,264	4,800		288	1,027
Jan-05	2.4630	150	250		8.3	53			1.3	7.2	ND	2.5	7.05	11,153	94.47%	3,081	5,135		170	1,089
Feb-05	2.3420	170	200		15.5	72			4.7	9.6	ND	4	7.13	7,629	90.88%	3,320	3,906		303	1,406
Mar-05	2.5800	160	320		20.5	55			0.47	8.3	ND	2	7.3	12,958	87.19%	3,443	6,886		441	1,183
Apr-05	2.5850	150	320		14.5	74			ND	11	1.7	2	7.3	13,452	90.33%	3,235	6,902		313	1,596
May-05	2.5970	130	310		23.5	120			ND	24	18	3.35	7.05	5,495	81.92%	2,816	6,714		509	2,599
Jun-05	2.6010	180	240		30.15	79			ND	35	ND	2.75	7.05	0	83.25%	3,905	5,206		654	1,714
Jul-05	2.6480	170	250		21.5	83			ND	7.4	2.3	2.45	7.25	5,551	87.35%	3,754	5,521		475	1,833
Aug-05	2.8410	180	220		16.5	75			ND	15	ND	2.45	7.25	5,877	90.83%	3,965	4,846		383	1,652
Sep-05	2.4850	200	240		14.5	56			ND	4.9	ND	3.33	7.04	5,812	92.75%	4,145	4,974		301	1,161
Oct-05	2.4870	160	280		7.4	50			0.47	2.5	ND	3.09	7.25	7,954	95.38%	3,319	5,808		153	1,037
Nov-05	2.3350	82	180		19.5	49.5			1.1	2.1	ND	3.25	7.05	9,665	76.22%	1,597	3,505		380	964
Dec-05	2.4090	160	260		15	44			ND	3.8	1.1	3.25	7.05	9,142	90.63%	3,215	5,224		301	884
Jan-06	2.5130	130	240		28.5	76			2.9	6.1	1.9	3.35	7.05	7,183	78.09%	2,725	5,030		597	1,593
Feb-06	2.3750	130	220		23.5	69.5			2.2	12	4.3	4.25	7.55	8,794	81.92%	2,575	4,358		465	1,377
Mar-06	2.3300	140	200		21	60			3	8.7	5.1	6.9	7.45	14,292	85.00%	2,721	3,886		408	1,166
Apr-06	2.4810	130	200		12.3	57.5			5.9	4.8	0.78	6.9	7.45	12,780	90.54%	2,690	4,138		255	1,190
May-06	2.6040	200	280		20	77			3.6	5.8	1.4	1.44	8.2	7,187	90.00%	4,343	6,081		434	1,672
Jun-06	2.7320	150	270		21	68.5			ND	7.8	2.8	1.44	8.2	20,360	86.00%	3,418	6,152		478	1,561
Jul-06	2.7630	150	270		12.5	50.5			ND	4.9	1.6	1.59	7.8	0	91.67%	3,457	6,222		288	1,164
Aug-06	2.7680	140	230		6.3	54.5			ND	2.9	ND	1.59	7.8	0	95.50%	3,232	5,310		145	1,258
Sep-06	2.9010	170	260		7.35	49			ND	3.7	0.51	5.25	7.8	0	96.68%	3,688	5,640		159	1,063
Oct-06	2.5260	160	260		6.55	49.5			1.2	3.1	0.54	4.05	8.3	0	95.91%	3,371	5,477		138	1,043
Nov-06																0	0		0	0
Dec-06																0	0		0	0
Minimum	**2.3020**	**74**		**0**	**6.3**		**0.00**	**0**							**91.49%**	**1420.70**		**0.00**	**121**	
Maximum	**2.7710**	**590**		**0**	**110**		**0.00**	**0**							**81.38%**	**13634.98**		**0.00**	**2,542**	
Total	**174.6030**																			
Average	**2.5334**	**170**		**#DIV/0!**	**20**		**#DIV/0!**	**#DIV/0!**							**88.01%**	**3600.52**		**#DIV/0!**	**432**	

Clinical Laboratory of San Bernardino, Inc.

Analysis Report: Lab Job M63292

Client: City of Ridgecrest
100 W California Ave
Ridgecrest, CA 93555

Project: Wastewater Treatment Fac

Sampled By: DAVE
Date Sampled: 07/25/06 07:30:00
Date Received: 07/25/06 15:10:00
Date Started: 07/26/06
Date Completed: 08/11/06
Date Reported: 08/14/06 12:03:29

Project No.:
Contact: John Bracken
Phone: (760)446-4631

Lab Contact:
Job No.:
COC Log No.:
Lab ID No.: M63292-1A
Batch No.:
Instrument ID: VAR
Analyst ID: RADSTAFF
Matrix: WASTEWATER

Sample: POND #3

Analyte		CAS No.	Results	DLR	Method
Aluminum (Al)	ug/L	7429-90-5	96	50	EPA 200.7
Biochemical Oxygen Demand	mg/L	N/A	7.0	5.0	SM 5210-B
Chemical Oxygen Demand	mg/L	N/A	55	5.0	HACH 8000
Chloride (Cl)	mg/L	N/A	170	1.0	EPA 300.0
Dissolved Oxygen (Field)	mg/L	N/A	1.32	1.0	
Fluoride (F)	mg/L	N/A	1.0	0.10	EPA 340.2
Oil & Grease	mg/L	N/A	3.3	2.0	EPA 1664
Sodium (Na)	mg/L	7440-23-5	100	1.0	EPA 200.7
Source Temperature	C	N/A	25.5	0.0	
Sulfate (SO4)	mg/L	N/A	67	0.50	EPA 300.0
Total Filterable Residue/TDS	mg/L	N/A	640	5.0	SM 2540 C
Total Hardness (as CaCO3)	mg/L	N/A	80	5.0	SM 2340-C
pH (Field)	Std Units	N/A	7.7		
Antimony (Sb)	ug/L	7440-36-0	ND	6.0	SM 3113-B
Arsenic (As)	ug/L	7440-38-2	10	2.0	SM 3113-B
Barium (Ba)	ug/L	7440-39-3	ND	100	EPA 200.7
Beryllium (Be)	ug/L	7440-41-7	ND	1.0	SM 3113-B
Boron (B)	ug/L	7440-42-8	1000	100	EPA 200.7
Cadmium (Cd)	ug/L	7440-43-9	ND	1.0	SM 3113-B
Chromium (Total Cr)	ug/L	7440-47-3	ND	10	SM 3113-B
Cobalt (Co)	ug/L	7440-48-4	ND	10	EPA 200.7
Copper (Cu)	ug/L	7440-50-8	ND	50	EPA 200.7
Iron (Fe)	ug/L	7439-89-6	ND	100	EPA 200.7
Lead (Pb)	ug/L	7439-92-1	ND	5.0	SM 3113 B

ND = Not detected at or above indicated DLR; Detection limit for Reporting

Manager: _____ *Director:* _____

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Clinical Laboratory of San Bernardino, Inc.

Analysis Report: Lab Job M63292

Client: City of Ridgecrest
100 W California Ave
Ridgecrest, CA 93555

Project: Wastewater Treatment Fac

Sampled By: DAVE
Date Sampled: 07/25/06 07:30:00
Date Received: 07/25/06 15:10:00
Date Started: 07/26/06
Date Completed: 08/11/06
Date Reported: 08/14/06 12:03:29

Project No.:
Contact: John Bracken
Phone: (760)446-4631

Lab Contact:
Job No.:
COC Log No.:
Lab ID No.: M63292-1A
Batch No.:
Instrument ID: VAR
Analyst ID: RADSTAFF
Matrix: WASTEWATER

Sample: POND #3(cont.)

Analyte		CAS No.	Results	DLR	Method
Manganese (Mn)	ug/L	7439-96-5	ND	20	EPA 200.7
Molybdenum (Mo)	ug/L	7439-98-7	38	10	EPA 200.7
Nickel (Ni)	ug/L	7440-02-0	ND	10	SM 3113-B
Selenium (Se)	ug/L	7783-00-8	ND	5.0	SM 3113-B
Silver (Ag)	ug/L	7440-22-4	ND	10	SM 3113-B
Thallium (Tl)	ug/L	7440-28-0	ND	1.0	EPA 200.9
Vanadium (V)	ug/L	7440-62-2	7.8	3.0	EPA 200.9
Zinc (Zn)	ug/L	7440-66-6	ND	50	EPA 200.7
Mercury (Hg)	ug/L	7439-97-6	ND	1.0	EPA 245.1

ND = Not detected at or above indicated DLR; Detection Limit for Reporting

Manager: _____ Director: _____

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Clinical Laboratory of San Bernardino, Inc.

Analysis Report: Purgeable Organics by EPA 624 Lab Job M63292S

Client: City of Ridgecrest
100 W California Ave
Ridgecrest, CA 93555

Project No.:
Contact: John Bracken
Phone: (760)446-4631

Project: Wastewater Treatment Fac

Lab Contact:
Job No.:
COC Log No.:
Lab ID No.: M63292S-1A
Batch No.:
Instrument ID: VAR
Analyst ID: LAB7STAFF
Matrix: WASTEWATER

Sampled By: DAVE
Date Sampled: 07/25/06 07:30:00
Date Received: 07/25/06 15:10:00
Date Started: 07/29/06
Date Completed: 07/29/06
Date Reported: 08/08/06 16:05:21

Sample: POND #3

Analyte	CAS No.	Results (ug/L)	DLR (ug/L)
1,1,1-Trichloroethane (1,1,1-TCA)	71-55-6	ND	5.0
1,1,2,2-Tetrachloroethane	79-34-5	ND	5.0
1,1,2-Trichloroethane (1,1,2-TCA)	79-00-5	ND	5.0
1,1-Dichloroethane (1,1-DCA)	75-34-3	ND	5.0
1,1-Dichloroethylene (1,1-DCE)	75-35-4	ND	5.0
1,2-Dichlorobenzene (o-DCB)	95-50-1	ND	5.0
1,2-Dichloroethane	34531	ND	5.0
1,2-Dichloropropane	78-87-5	ND	5.0
1,3-Dichlorobenzene (m-DCB)	541-73-1	ND	5.0
1,4-Dichlorobenzene (p-DCB)	106-46-7	ND	5.0
2-Chloroethylvinyl Ether	100-75-8	ND	50
Acrolein	107-02-8	ND	100
Acrylonitrile	107-13-1	ND	100
Benzene	71-43-2	ND	5.0
Bromodichloromethane	75-27-4	ND	5.0
Bromoform	75-25-2	ND	5.0
Bromomethane (Methyl Bromide)	74-83-9	ND	5.0
Carbon Tetrachloride	56-23-5	ND	5.0
Chlorobenzene	N/A	ND	5.0
Chloroethane	75-00-3	ND	5.0
Chloroform (Trichloromethane)	67-66-3	ND	5.0
Chloromethane (Methyl Chloride)	74-87-3	ND	5.0
cis-1,3-Dichloropropene	10061-01-5	ND	5.0
Dibromochloromethane	124-48-1	ND	5.0
Dichlorodifluoromethane	75-71-8	ND	5.0
Ethyl Benzene	100-41-4	ND	5.0
Methyl tert-Butyl Ether	1634 04 4	ND	50
Dichloromethane (Methylene Chloride)	75-09-2	ND	30
Tetrachloroethylene (PCE)	127-18-4	ND	5.0
Toluene	108-88-3	ND	5.0
trans-1,2-Dichloroethylene (t-1,2-DCE)	156-60-5	ND	5.0
trans-1,3-Dichloropropene	10061-02-6	ND	5.0
Trichloroethylene (TCE)	79-01-6	ND	5.0
Trichlorofluoromethane (FREON 11)	75-69-4	ND	50
Vinyl Chloride (VC)	75-01-4	ND	5.0
m,p-Xylene	N/A	ND	5.0
o-Xylene	95-47-6	ND	5.0

Analysis performed by Babcock Laboratory, ELAP No. 1156

ND = Not detected at or above indicated DLR; Detection Limit for Reporting

Manager: _____ *Director:* _____

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Clinical Laboratory of San Bernardino, Inc.

Analysis Report: Semi-Volatile Organics by EPA 625 Lab Job M63292S

Client: City of Ridgecrest
100 W California Ave
Ridgecrest, CA 93555

Project No.:
Contact: John Bracken
Phone: (760)446-4631

Project: Wastewater Treatment Fac

Lab Contact:
Job No.:
COC Log No.:
Lab ID No.: M63292S-1A
Batch No.:
Instrument ID: VAR
Analyst ID: LAB7STAFF
Matrix: WASTEWATER

Sampled By: DAVE
Date Sampled: 07/25/06 07:30:00
Date Received: 07/25/06 15:10:00
Date Started: 08/03/06
Date Completed: 08/03/06
Date Reported: 08/08/06 16:05:22

Sample: POND #3

Analyte	CAS No.	Results (ug/L)	DLR (ug/L)
1,2,4-Trichlorobenzene	120-82-1	ND	10
1,2-Dichlorobenzene (o-DCB)	95-50-1	ND	10
1,2-Diphenylhydrazine	122-66-7	ND	10
1,3-Dichlorobenzene (m-DCB)	541-73-1	ND	10
1,4-Dichlorobenzene (p-DCB)	106-46-7	ND	10
2,4,6-Trichlorophenol	88-06-2	ND	10
2,4-Dichlorophenol	120-83-2	ND	10
2,4-Dimethylphenol	105-67-9	ND	10
2,4-Dinitrophenol	51-28-5	ND	50
2,4-Dinitrotoluene	121-14-2	ND	10
2,6-Dinitrotoluene	606-20-2	ND	10
2-Chloronaphthalene	91-58-7	ND	10
2-Chlorophenol	95-57-8	ND	10
2-Methyl-4,6-dinitrophenol	534-52-1	ND	50
2-Nitrophenol	88-75-5	ND	10
3,3'-Dichlorobenzidine	91-94-1	ND	20
4,4'-DDD	72-54-8	ND	10
4,4'-DDE	72-55-9	ND	10
4,4'-DDT	50-29-3	ND	10
4-Bromophenyl phenyl ether	101-55-3	ND	10
4-Chloro-3-methylphenol	59-50-7	ND	20
4-Chlorophenyl phenyl ether	7005-72-3	ND	10
4-Nitrophenol	100-02-7	ND	50
alpha BHC	319-84-6	ND	10
Acenaphthene	83-32-9	ND	10
Acenaphthylene	208-96-8	ND	10
Aldrin	309-00-2	ND	10
Anthracene	120-12-7	ND	10
Aroclor 1016	12674-11-2	ND	50
Aroclor 1221	11104-28-2	ND	50
Aroclor 1232	11141-16-5	ND	50
Aroclor 1242	53469-21-9	ND	50
Aroclor 1248	12672-29-6	ND	50
Aroclor 1254	11097-69-1	ND	50
Aroclor 1260	11096-82-5	ND	50
beta BHC	319-85-7	ND	10
Benzidine	92-87-5	ND	50
Benzo(a)anthracene	56-55-3	ND	10
Benzo(a)pyrene	50-32-8	ND	10
Benzo(b)fluoranthene	205-99-2	ND	10
Benzo(g,h,i)perylene	191-24-2	ND	10
Benzo(k)fluoranthene	207-08-9	ND	10
Bis(2-chloroethoxy)methane	111-91-1	ND	10
Bis(2-chloroethyl)ether	111-44-4	ND	10
Bis(2-chloroisopropyl)ether	108-60-1	ND	10
Bis(2-ethylhexyl)phthalate (DEHP)	N/A	3.2	3.0
Butylbenzyl phthalate	85-68-7	ND	10

ND = Not detected at or above indicated DLR; Detection Limit for Reporting

Manager: _____ *Director:* _____

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Clinical Laboratory of San Bernardino, Inc.

Analysis Report: Semi-Volatile Organics by EPA 625 Lab Job M63292S

Client: City of Ridgecrest
100 W California Ave
Ridgecrest, CA 93555

Project No.:
Contact: John Bracken
Phone: (760)446-4631

Project: Wastewater Treatment Fac

Lab Contact:
Job No.:
COC Log No.:
Lab ID No.: M63292S-1A
Batch No.:
Instrument ID: VAR
Analyst ID: LAB7STAFF
Matrix: WASTEWATER

Sampled By: DAVE
Date Sampled: 07/25/06 07:30:00
Date Received: 07/25/06 15:10:00
Date Started: 08/03/06
Date Completed: 08/03/06
Date Reported: 08/08/06 16:05:22

Sample: POND #3(cont.)

Analyte	CAS No.	Results (ug/L)	DLR (ug/L)
Chlordane	57-74-9	ND	10
Chrysene	218-01-9	ND	10
delta-BHC	319-86-7	ND	10
Di-n-butylphthalate	84-74-2	ND	10
Di-n-octylphthalate	117-84-0	ND	10
Dibenzo(a,h)anthracene	53-70-3	ND	10
Dieldrin	60-57-1	ND	10
Diethylphthalate	84-66-2	ND	10
Dimethylphthalate	131-11-3	ND	10
Endosulfan I	959-98-8	ND	10
Endosulfan II	33213-65-9	ND	10
Endosulfan sulfate	1031-07-8	ND	10
Endrin	72-20-8	ND	10
Fluoranthene	206-44-0	ND	10
Fluorene	86-73-7	ND	10
Heptachlor	76-44-8	ND	10
Heptachlor Epoxide	1024-57-8	ND	10
Hexachlorobenzene	118-74-1	ND	10
Hexachlorobutadiene	87-68-3	ND	10
Hexachlorocyclopentadiene	77-47-4	ND	50
Hexachloroethane	67-72-1	ND	10
Indeno(1,2,3-c,d)pyrene	193-39-5	ND	10
Isophorone	78-59-1	ND	10
N-Nitroso-di-n-propylamine	621-64-7	ND	10
N-Nitrosodimethylamine	62-75-9	ND	10
N-Nitrosodiphenylamine	86-30-6	ND	10
Naphthalene	91-20-3	ND	10
Nitrobenzene	98-95-3	ND	10
Pentachlorophenol (PCP)	87-86-5	ND	50
Phenanthrene	85-01-8	ND	10
Phenol	108-95-2	ND	10
Pyrene	129-00-0	ND	10
Toxaphene	8001-35-2	ND	50
gamma BHC	319-86-8	ND	10

Analysis performed by Babcock Laboratory, ELAP No. 1156

ND = Not detected at or above indicated DLR; Detection Limit for Reporting

Manager: _____ *Director:* _____

Post Office Box 329 • San Bernardino, CA 92402 • (909) 825-7693 • Fax (909) 825-7696 • ELAP Number 1088

APPENDIX E - CITY OF RIDGECREST AND US DEPARTMENT OF DEFENSE, CHINA LAKE NAVAL AIR WEAPONS STATION: WWTF BOARD ORDER NO. 6-00-56

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LAHONTAN REGION

BOARD ORDER NO. 6-00-56
WDID NO. 6B150116001

REVISED WASTE DISCHARGE REQUIREMENTS

FOR

CITY OF RIDGECREST AND U.S. DEPARTMENT OF DEFENSE, CHINA LAKE NAVAL AIR WEAPONS STATION; WASTEWATER TREATMENT FACILITY

Kern County

The California Regional Water Quality Control Board, Lahontan Region, (Regional Board) finds:

1. Discharger

For the purposes of this Regional Board Order (Order), the City of Ridgecrest China Lake Naval Air Weapons Station (CLNAWS) is referred to as the "Discharger". The US Government, Department of the Navy, (landowner) is referred to as the Primary User". Other offsite uses are regulated in accordance with separate Orders. The Discharger is responsible for compliance with this Permit, and the Primary User is responsible for public access restrictions to the water recycling site.

2. Facility

The City of Ridgecrest Wastewater Treatment Facility collects, treats and disposes domestic wastewater from the City of Ridgecrest and the CLNAWS. For the purposes of this Order, the City of Ridgecrest Wastewater Treatment Facility is referred to as the "Facility." The Facility discharges treated domestic wastewater.

3. Permit History

The Regional Board previously established Waste Discharge Requirements (WDRs) for the Facility under Board Order No. 6-93-85, which was adopted on August 12, 1993. Additionally, treated domestic wastewater recycling requirements are established under separate WDRs for the CLNAWS Golf Course (Board Order No. 6-84-36) and the City of Ridgecrest irrigation site (Board Order No. 6-93-85).

4. Reason for Action

The Regional Board is revising these WDRs as part of a statewide program to update backlogged WDRs and incorporate changes in the monitoring program.

5. Facility Location

The Facility is located approximately three miles northeast of the City of Ridgecrest, Kern County, within the CLNAWS. The Facility is located within Sections 13, 14, and 23, T26S, R49E, MDB&M, as shown on Attachment "A" which is made a part of this Order.

6. Description of Facility and Discharge

The treatment design capacity of the Facility is 3.6 million gallons per day (mgd). The Discharger collects, treats, and disposes of an average of 2.6 (mgd) of domestic wastewater generated by the City of Ridgecrest and the CLNAWS (a population of 26,000). After grit removal and primary treatment in three rectangular clarifiers (with a backup fourth circular clarifier) wastewater receives secondary treatment in two parallel series of bentonite clay lined oxidation ponds. Series A consists of ponds 1, 2 and 4. Series B consists of ponds 5, 6 and 7. Wastewater from ponds 4 and 7 is further treated in lined pond 3. Pond 3 has two pump stations. One pump station delivers disinfected secondary effluent to the CLNAWS Golf course for irrigation. Backwash from an installed filter system is discharged into pond 1. Another pump delivers undisinfected secondary effluent to the City of Ridgecrest irrigation site. Water recycling requirements are separately established under Board Order No. 6-84-36 for the CLNAWS Golf Course and Board Order No. 6-93-85 for the City of Ridgecrest irrigation site. Wastewater from pond 3 is disposed in unlined oxidation/percolation/evaporation ponds 8 and 11.

7. Authorized Disposal Sites

The evaporation/percolation ponds are the only authorized disposal sites for wastewater in addition to the recycling sites regulated under separate Board Orders. The ponds specified in Finding No. 6, above, are located on land owned by the Department of the Navy.

8. Sludge Treatment and Disposal

Sludge from the Discharger's primary clarifiers is treated by two anaerobic digesters and discharged to drying beds. The dried sludge is currently stockpiled onsite prior to disposal.

10. Site Geology

The wastewater treatment Facility overlies layers of recent alluvium consisting of silt, sand and freshwater marl cemented with calcareous tufa. The alluvium comprises the upper portion of the valley fill, which extends to a depth of at least 1,350 feet.

11. Site Hydrology

Depth to ground water at the treatment and disposal pond site is less than 20 feet. Ground water encountered in the vicinity of the treatment and disposal ponds is of marginal to poor quality for most beneficial uses. The ground waters in these areas have total dissolved solids concentration which range from 1,000 to 10,000 mg/L and the ground water is very high in boron. The wastewater discharge does not directly discharge to surface water but may have some effect on surface water flow at Lark Seep, one-mile northeast of the Facility, which contains the endangered Mojave Tui Chub fish.

12. Receiving Water

The receiving waters are the ground waters of the Indian Wells Valley Ground water Basin (DWR Ground Water Basin No.6-54).

13. Compliance History

The Board adopted Cease and Desist Order (CDO) No. 6-89-119 for the Discharger on May 11, 1989. The CDO was amended on March 14, 1991. The CDO was adopted in response to the ponding of wastewater on the ground surface adjacent to the Facility percolation ponds and the formation of a ground water mound. The Discharger has implemented recycling projects as part of a phased long-term compliance plan required in the CDO and repaired ponds 8 and 11 which were causing the localized ground water mounding. The CDO was rescinded with Board Order No. 6-93-85.

14. Lahontan Basin Plan

The Regional Board adopted the Water Quality Control Plan for the Lahontan Region (Basin Plan) which became effective on March 31, 1995. This Order implements the Basin Plan, as amended.

15. Ground Water Beneficial Uses

The beneficial uses of the ground waters of the Indian Wells Valley ground water basin (DWR # 6-54) as set forth and defined in the Basin Plan.

i. Municipal and Domestic Supply (MUN);
ii. Agricultural Supply (AGR);
iii. Industrial Service Supply (IND); and
iv. Freshwater Replenishment (FRSH).

16. California Environmental Quality Act (CEQA) Compliance

These revised WDRs apply to an existing discharge resulting from an existing Facility and are therefore exempt from the provisions of the CEQA (Public Resources Code Section 21000 et seq.) in accordance with Section 15301 of the CEQA Guidelines.

17. Notification of Interested Parties

The Regional Board has notified the Discharger and interested parties of its intent to revise WDRs for the discharge.

18. Consideration of Comments

The Regional Board, in a public meeting, heard and considered all comments pertaining to the discharge.

IT IS HEREBY ORDERED that the Discharger shall comply with the following:

I. DISCHARGE SPECIFICATIONS

A. Effluent/Discharge Limitations

1. The total effluent flow of wastewater during a 24-hour period shall not exceed 3.6 million gallons.

2. All wastewater discharged to the authorized disposal/recycling sites shall not contain concentrations of parameters in excess of the following limits:

Parameter	Units	Mean[1]	Maximum
BOD[2]	mg/l	30	45
Methylene Blue Active Substances	mg/l	1.0	2.0

3. All wastewater made available to the authorized disposal/recycling sites shall have a pH of not less the 6.0 pH units nor more the 9.0 pH units

4. All wastewater discharged to the authorized disposal/recycling sites shall have a dissolved oxygen concentration not less than 1.0 mg/l.

---

1 The arithmetic mean of lab results for effluent samples collected in a period of 30 consecutive days.

2 Biochemical Oxygen Demand (5 day, 20° C) of a filtered sample using a No.1 Whatman filter or equivalent and reseeded with an unfiltered sample.

B. Receiving Water Limitations

This discharge shall not cause a violation of any applicable water quality standard for receiving water adopted by the Regional Board or the State Water Resources Control Board (SWRCB) as required by the Federal Water Pollution Control Act and regulations adopted thereunder. If more stringent applicable water quality standards are promulgated or approved pursuant to Section 303 of the Federal Clean Water Act or amendments thereto, the Regional Board will revise and modify this Order in accordance with such more stringent standards. The discharge shall not cause the presence of the following substances or conditions in ground or surface waters or wetlands of the China Lake Hydrologic Area of the Indian Wells Hydrologic Unit.

1. Nondegradation

SWRCB Resolution No. 68-16 "Statement of Policy With Respect to Maintaining High Quality of Waters In California", known as the Nondegradation objective, requires maintenance of existing high quality in surface waters, ground waters, or wetlands. Whenever the existing quality of water is better than the quality of water established in the Basin Plan, such existing quality shall be maintained unless appropriate findings are made under Resolution No. 68-16.

2. Ground Waters

a. Bacteria - In Ground waters, the median concentration of coliform organisms over any seven day period shall be less than 1.1/100 milliliter.

b. Chemical Constituents

Ground waters shall not contain concentrations of chemical constituents in excess of the maximum contaminant level (MCL) or secondary maximum contaminant level (SMCL) based upon drinking water standards specified in the following provisions of Title 22 of the California Code of Regulations: Table 64431-A of Section 64431 (Inorganic Chemicals), Table 64431-B of Section 64431 (Fluoride), Table 6444-A of Section 64444 (Organic Chemicals), Table 64449-A of Section 64449 (Secondary Maximum Contaminant Levels-Consumer Acceptance Limits), and Table 64449-B of Section 64449 (Secondary Maximum Contaminant Levels-Ranges). This incorporation-by-reference is prospective including future changes to the incorporated provisions as the changes take effect.

Waters designated as AGR shall not contain concentrations of chemical constituents in amounts that adversely affect the water for beneficial uses (i.e., agricultural purposes).

Ground waters shall not contain concentrations of chemical constituents that adversely affect the water for beneficial uses.

c. Radioactivity - Radionuclides shall not be present in concentrations that are deleterious to human, plant, animal, or aquatic life, or that result in the accumulation of radionuclides in the food chain to an extent that it presents a hazard to human, plant, animal, or aquatic life. Waters shall not contain concentrations of radionuclides in excess of limits specified in the California Code of Regulations, Title 22, Chapter 15, Article 5, Section 64443.

d. Taste and Odors - Ground waters shall not contain taste or odor-producing substances in concentrations that cause nuisance or that adversely affect beneficial uses. For ground waters a minimum, concentrations shall not exceed adopted secondary maximum contaminant levels specified in Table 64449-A of Section 64449 (Secondary Maximum Contaminant Levels-Ranges), and Table 64449-B of Section 64449 (Secondary Maximum Contaminant Levels-Ranges) of Title 22 of the California Code of Regulations, including future changes as the changes take effect.

C. General Requirements and Prohibitions

1. There shall be no discharge, bypass, or diversion of raw or partially treated sewage, sewage sludge, grease, or oils from the collection, transport, treatment, or disposal facilities to adjacent land areas or surface waters.

2. Surface flow or visible discharge of sewage or sewage effluent from the authorized disposal sites to adjacent land areas or surface waters is prohibited.

3. The vertical distance between the liquid surface elevation and the lowest point of a pond dike or the invert of an overflow structure shall not be less than 1.0 foot in ponds one through seven, 2.0 feet in pond eight, and not less than 2.0 feet in ponds nine through 11, in accordance with the Discharger's Pond Management Plan.

4. The discharge shall not cause a pollution as defined in Section 13050(l) of the California Water Code, or a threatened pollution.

5. The collection, transport, treatment, storage, or discharge of waste shall not cause a nuisance as defined in Section 13050(m) of the California Water Code.

6. The disposal of waste residue, including biosolids, shall be in a manner approved by the Regional Board Executive Officer and in compliance with all local, state, and federal requirements. Waste biosolids shall be discharged only at a legal point of disposal in accordance with the provisions of Title 23 of the California Code of Regulations, Division 3, Chapter 15, and in accordance with 40 CFR Part 503.

7. Flow into sewerage facilities due to infiltration/inflow shall be minimized to the maximum practicable extent.

8. The discharge of wastewater except to the authorized disposal sites are prohibited.

9. The City of Ridgecrest operator of the Facility also operates the Facility in accordance with the General Industrial Storm Water Permit, Order No. 97-03-DWQ, NPDES Permit No. CAS000001, adopted by the SWRCB on April 17, 1997. The storm water permit is administered separately from this Order.

II. PROVISIONS

A. Rescission of Waste Discharge Requirements

Board Order No. 6-93-85 is hereby rescinded.

B. Operator Certificates

The Facility shall be supervised by persons processing a wastewater treatment plant operator certificate of appropriate grade, pursuant to Chapter 3, Subchapter 14, Title 23, California Code of Regulations.

C. Standard Provisions

The Discharger shall comply with the "Standard Provisions for Waste Discharge Requirements," dated September 1, 1994, in Attachment "B", which is made part of this Order.

D. Monitoring and Reporting

1. Pursuant to Section 13267(b) of the California Water Code, the Discharger shall comply with Monitoring and Reporting Program No. 00-56 as specified by the Executive Officer.

2. The Discharger shall comply with the "General Provisions for Monitoring and Reporting," dated September 1, 1994, which is attached to and made a part of the Monitoring and Reporting Program.

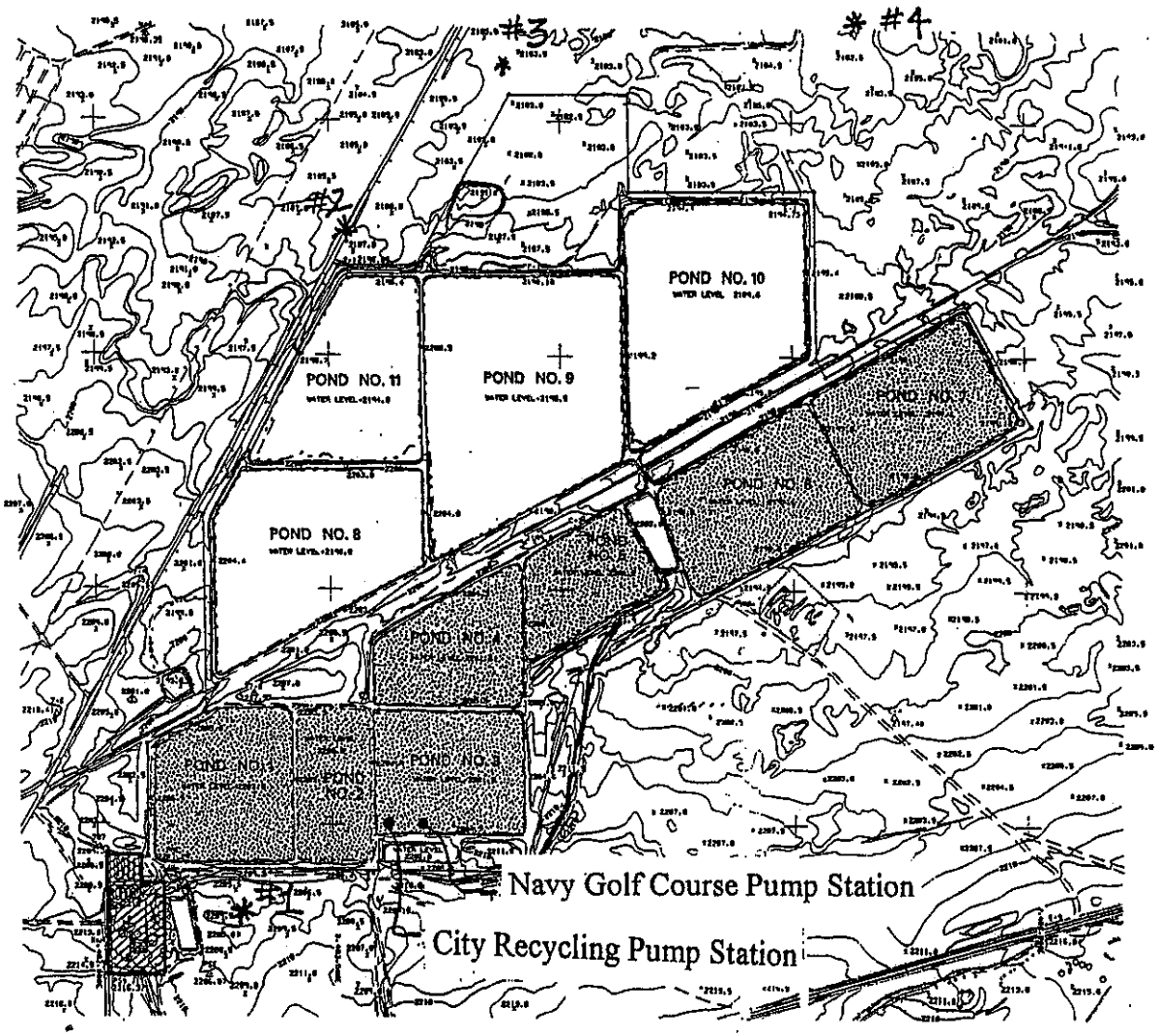
I, Harold J. Singer, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Lahontan Region, on June 14, 2000.

Harold J. Singer

HAROLD J. SINGER
EXECUTIVE OFFICER

Attachments: A. Site Location Map
B. Standard Provisions for Waste Discharge

6/2000 ridgecrestWDR



Legend

Lease Line

Faculative Treatment Pond

Evaporation/Storage Pond

Primary Treatment Plant Site

500 0 400 800

SCALE IN FEET

CITY OF RIDGECREST
WASTEWATER TREATMENT FACILITIES
MASTER PLANT

Existing Treatment Plant Site Plan
Figure 3-1

Attachment "A"

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

STANDARD PROVISIONS
FOR WASTE DISCHARGE REQUIREMENTS

1. Inspection and Entry

The Discharger shall permit Regional Board staff:

a. to enter upon premises in which an effluent source is located or in which any required records are kept;

b. to copy any records relating to the discharge or relating to compliance with the Waste Discharge Requirements;

c. to inspect monitoring equipment or records; and

d. to sample any discharge.

2. Reporting Requirements

a. Pursuant to California Water Code 13267(b), the Discharger shall immediately notify the Regional Board by telephone whenever an adverse condition occurred as a result of this discharge; written confirmation shall follow within two weeks. An adverse condition includes, but is not limited to, spills of petroleum products or toxic chemicals, or damage to control facilities that could affect compliance.

b. Pursuant to California Water Code Section 13260(c), any proposed material change in the character of the waste, manner or method of treatment or disposal, increase of discharge, or location of discharge, shall be reported to the Regional Board at least 120 days in advance of implementation of any such proposal. This shall include, but not limited to, all significant soil disturbances.

c. The Owners/Discharger of property subject to Waste Discharge Requirements shall be considered to have a continuing responsibility for ensuring compliance with applicable Waste Discharge Requirements in the operations or use of the owned property. Pursuant to California Water Code Section 13260(c), any change in the ownership and/or operation of property subject to the Waste Discharge Requirements shall be reported to the Regional Board. Notification of applicable Waste Discharge Requirements shall be furnished in writing to the new owners and/or operators and a copy of such notification shall be sent to the Regional Board.

d. If a Discharger becomes aware that any information submitted to the Regional Board is incorrect, the Discharger shall immediately notify the Regional Board, in writing and correct that information.

e. Reports required by the Waste Discharge Requirements, and other information requested by the Regional Board, must be signed by a duly authorized representative of the Discharger. Under Section 13268 of the California Water Code, any person failing or refusing to furnish technical or monitoring reports, or falsifying any information provided therein, is guilty of a misdemeanor and may be liable civilly in an amount of up to one thousand dollars ($1,000) for each day of violation.

f. If the Discharger becomes aware that their Waste Discharge Requirements (or permit) is no longer needed (because the project will not be built or the discharge will cease) the Discharger shall notify the Regional Board in writing and request that their Waste Discharge Requirements (or permit) be rescinded.

3. Right to Revise Waste Discharge Requirements

The Regional Board reserves the privilege of changing all or any portion of the Waste Discharge Requirements upon legal notice to and after opportunity to be heard is given to all concerned parties.

4. Duty to Comply

Failure to comply with the Waste Discharge Requirements may constitute a violation of the California Water Code and is grounds for enforcement action or for permit termination, revocation and reissuance, or modification.

5. Duty to Mitigate

The Discharger shall take all reasonable steps to minimize or prevent any discharge in violation of the Waste Discharge Requirements which has a reasonable likelihood of adversely affecting human health or the environment.

6. Proper Operation and Maintenance

The Discharger shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) that are installed or used by the Discharger to achieve compliance with the Waste Discharge Requirements. Proper operation and maintenance includes adequate laboratory control, where appropriate, and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems that are installed by the Discharger, when necessary to achieve compliance with the conditions of the Waste Discharge Requirements.

7. Waste Discharge Requirement Actions

The Waste Discharge Requirements may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Discharger for waste discharge requirement modification, revocation and reissuance, termination, or a notification of planned changes or anticipated noncompliance, does not stay any of the Waste Discharge Requirements conditions.

8. Property Rights

The Waste Discharge Requirements do not convey any property rights of any sort, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of federal, state or local laws or regulations.

Enforcement

The California Water Code provides for civil liability and criminal penalties for violations or threatened violations of the Waste Discharge Requirements including imposition of civil liability or referral to the Attorney General.

10. Availability

A copy of the Waste Discharge Requirements shall kept and maintained by the Discharger and be available at all times to operating personnel.

11. Severability

Provisions of the Waste Discharge Requirements are severable. If any provision of the requirements is found invalid, the remainder of the requirements shall not be affected.

12. Public Access

General public access shall be effectively excluded from disposal/treatment facilities.

13. Transfers

Providing there is no material change in the operation of the facility, this Order may be transferred to a new owner or operator. The owner/operator must request the transfer in writing and receive written approval from the Regional Board's Executive Officer.

14. Definitions

a. "Surface waters" as used in this Order, include, but are not limited to, live streams, either perennial or ephemeral, which flow in natural or artificial water courses and natural lakes and artificial impoundments of waters. "Surface waters" does not include artificial water courses or impoundments used exclusively for wastewater disposal.

b. "Ground waters" as used in this Order, include, but are not limited to, all subsurface waters being above atmospheric pressure and the capillary fringe of these waters.

15. Storm Protection

a. All facilities used for collection, transport, treatment, storage, or disposal of waste shall be adequately protected against overflow, washout, inundation, structural damage or a significant reduction in efficiency resulting from a storm or flood having a recurrence interval of once in 100 years.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LAHONTAN REGION

REVISED MONITORING AND REPORTING PROGRAM NO. 00-56
WDID NO. 6B150116001

FOR

CITY OF RIDGECREST AND U.S. DEPARTMENT OF DEFENSE, CHINA LAKE NAVAL AIR WEAPONS STATION; WASTEWATER TREATMENT FACILITY

Kern County

I. MONITORING

A. Flow Monitoring

The Discharger shall monitor and report the following:

1. The total volume, in million gallons, of wastewater flow to the Facility for each day.

2. The total volume in million gallons, of wastewater flow to the Facility calculated for each month.

3. The maximum instantaneous flow rate, in million gallons per day (mgd) of wastewater to the treatment Facility that occurs each day.

4. The average flow rate, in mgd, of wastewater flow to the Facility to the calculated for each month.

5. The freeboard (distance from the top of the lowest part of the dike to the wastewater surface in a pond) measured each month in each pond when the pond is accessible. If the pond does not contain wastewater, indicate that it is empty. If the ponds are inaccessible, indicate so and provide an explanation why they are inaccessible.

B. Facility Effluent Monitoring

Grab samples from the oxidation treatment pond three effluent (the last pond from which treatment occurs prior to percolation) shall be collected and analyzed to determine the magnitude of the following parameters:

Parameter	Units	Frequency
BOD[1]	mg/l	Twice per month
COD[2]	mg/l	Twice per month

Parameter	Units	Frequency
Dissolved Oxygen	mg/l	Twice per month
pH	pH units	Twice per month
Methylene Blue Active Substances[3]	mg/l	monthly
Oil & Grease[3]	mg/l	monthly
Kjeldahl Nitrogen[3]	mg/l as N	Monthly
Nitrate Nitrogen[3]	mg/l as N	Monthly
Ammonia Nitrogen[3]	mg/l as N	Monthly
Total Dissolved Solids[3] (TDS)	mg/l	Semi-annually
Chloride	mg/l	Semi-annually
Sodium	mg/l	Semi-annually
Sulfate	mg/l	Semi-annually
Total Hardness	mg/l as $CaCO_3$	Semi-annually
Boron	mg/l	Semi-annually
Fluoride	mg/l	Semi-annually
Chemical Oxygen Demand	mg/l	Semi-annually
Oil & Grease	mg/l	Semi-annually
Methyl tertiary Butyl Ether	ug/L	Semi-annually
Purgeable Organics[4]	ug/L	Annually
Base/Neutral Extractables Organics[4]	ug/L	Annually
Acid Extractable Organics[4]	ug/L	Annually
Heavy Metals[4]	ug/L	Annually

C. Ground Water Monitoring

Beginning immediately, grab samples from monitoring wells 1, 2, 3 and 4 shall be collected from the entire thickness or the upper 20 feet, whichever is less, of the uppermost ground water bearing zone and analyzed to determine the magnitude of the following parameters:

Parameter	Units	Frequency
Methylene Blue Active Substances	mg/l	Semiannually
Total Dissolved Solids	mg/l	Semiannually
Kjeldahl Nitrogen	mg/l as N	Semiannually
Nitrate Nitrogen	mg/l as N	Semiannually
Ammonia Nitrogen	mg/l as N	Semiannually
Chloride	mg/l	Semiannually
Purgeable Halocarbons	mg/l	Annually
Base/Neutral/Acid Extractable Organics	mg/l	Annually
Purgeable Aromatic Hydrocarbons	mg/l	Annually
Arsenic	mg/l	Annually

Parameter	Units	Frequency
Silver	mg/l	Annually
Cadmium	mg/l	Annually
Copper	mg/l	Annually
Chromium	mg/l	Annually
Lead	mg/l	Annually
Mercury	mg/l	Annually
Molybdenum	mg/l	Annually
Nickel	mg/l	Annually
Selenium	mg/l	Annually
Zinc	mg/l	Annually

1. Field Parameters - Each time a ground water monitoring well is sampled the following field parameters shall be monitored and reported.

Table 1

Parameter	Units
Standing Water Level (SWL)	Feet above msl
Electrical Conductivity (E_c)	µmhos/cm
Turbidity	NTU
pH	0-14
Temperature (T)	F° or C°

2. For each ground water sampling event submit a map showing well locations and groundwater contours. Include elevations from adjacent wells that are sampled by the US Navy Installation Restoration Program.

D. Sludge Monitoring

1. The Discharger shall submit a Sludge Management Plan (Plan) 90 days prior to any planned cleaning operation of the sludge drying bed. The Plan shall outline actions necessary for the Discharger to be in compliance with all local, state and federal laws and regulations. Copies of reports submitted to other agencies regarding sludge disposal operations shall be included in the Plan.

2. Date and quantity of sludge removed off site, location of use, recipient (including name and address) and sludge disposal method (including crops grown if appropriate) for all sludge removed off site.

3. Cumulative total quantity of sludge currently stockpiled on site including the quantity of sludge added to the stockpile during this monitoring period.

4. For sewage sludge removed to an authorized disposal site a representative sample shall be collected and analyzed for the following constituents:

   a. total kjeldahl nitrogen (as N);
   b. nitrate nitrogen (as N);
   c. ammonia nitrogen (as N);
   d. total phosphate as P; and
   e. parameters listed in Section 66261.24, Chapter 30, Division 4, Title 22 of the California Code of Regulations or 40 CFR 261.31.

The Discharger shall make a determination whether the analyses indicate that the sludge shall be considered a hazardous material.

E. Pretreatment

1. A summary of activities undertaken to monitor and regulate industrial wastewater sources shall be prepared and submitted with each annual report.

   a. an inventory of significant industrial users, including names, address, categories, industrial pollutants, and volumes. A significant industrial user is either:

      (1) an industrial user discharging more than 25,000 gallons per day to the Facility,

      (2) is a categorical industrial user as defined in 40 CFR 400-471, or

      (3) can pass through or cause interference to the Facility.

   b. A discussion of upset, interference, or pass through incidents, if any, at the Facility which the Discharger knows or suspects was caused by industrials users.

   c. A discussion of enforcement actions taken or proposed.

2. A summary of the pretreatment functions including, but not limited to:

   a. necessary legal authorities
   b. pretreatment requirements, and
   c. status of funding and personnel to implement the pretreatment program.

Attention Kathy 446-0420

F. Off-site Disposal

The Discharger shall include in each monitoring report the volume and type of all waste hauled off site for disposal. The person or company doing the hauling and the legal point of disposal shall also be recorded.

G. Operation and Maintenance

A brief summary of any operational problems and maintenance activities shall be submitted to the Board with each monitoring report.

This summary shall discuss:

1. Any modifications or additions to the wastewater conveyance system, treatment facilities, or disposal facilities.

2. Any major maintenance conducted on the wastewater conveyance system, treatment facilities, or disposal facilities.

3. Any major problems occurring in wastewater conveyance system, treatment facilities, or disposal facilities.

4. The calibration of any wastewater flow measuring devices.

II. REPORTING

A. General Provisions

1. The Discharger shall comply with the "General Provisions for Monitoring and Reporting," (GPMR) dated September 1, 1994, which is attached to and made part of this Monitoring and Reporting Program.

2. Pursuant to General Provisions 1.d of the GPMR, the Discharger shall submit by **July 30, 2000**, a Sampling and Analysis Plan (SAP) to the Regional Board for approval. The SAP shall define methods for sample collection, monitoring well purging, preservation and analysis shipment protocol, field procedures, laboratory Quality Assurance/Quality Control and data quality for all constituents listed in this order.

B. Submittal Periods

1. Beginning on **August 1,2000,** monthly monitoring reports including the preceding information shall be submitted to the Regional Board by the first day of the second month following each monthly monitoring period.

2. Beginning on **February 1, 2001**, annual monitoring reports shall be submitted on the first day of the second month after the 12-month period. The annual report shall contain tabular and graphical summaries of all the above information, summary of violations, the compliance status indicating corrective actions taken for each violation, and the names and grades of all the certified operators.

Ordered by: Harold J. Singer
HAROLD J. SINGER
EXECUTIVE OFFICER

Dated: **June 14, 2000**

Attachments: A. General Provisions for Monitoring and Reporting
B. Priority Pollutant List

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1 Biochemical Oxygen Demand (5 day, 20° C) of a filtered sample. Using a No. 1 Whatman filter or equivalent and reseeded with an unfiltered sample.
2 Chemical Oxygen Demand of a Filtered sample.
3 Grab Samples
4 Analysis shall be conducted for those substances included on the USEPA list of priority pollutants and all other toxic substances known to be discharged to the sewer system.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LAHONTAN REGION

GENERAL PROVISIONS
FOR MONITORING AND REPORTING

1. SAMPLING AND ANALYSIS

a. All analyses shall be performed in accordance with the current edition(s) of the following documents:

i. Standard Methods for the Examination of Water and Wastewater
ii. Methods for Chemical Analysis of Water and Wastes, EPA

b. All analyses shall be performed in a laboratory certified to perform such analyses by the California State Department of Health Services or a laboratory approved by the Regional Board. Specific methods of analysis must be identified on each laboratory report.

c. Any modifications to the above methods to eliminate known interferences shall be reported with the sample results. The method used shall also be reported. If methods other than USEPA approved methods or Standard Methods are used, the exact methodology must be submitted for review and must be approved by the Regional Board prior to use.

d. The Discharger shall establish chain-of-custody procedures to ensure that specific individuals are responsible for sample integrity from commencement of sample collection through delivery to an approved laboratory. Sample collection, storage and analysis shall be conducted in accordance with an approved Sampling and Analysis Plan (SAP). The most recent version of the approved SAP shall be kept at the facility.

e. The Discharger shall calibrate and perform maintenance procedures on all monitoring instruments and equipment to ensure accuracy of measurements, or shall ensure that both activities will be conducted. The calibration of any wastewater flow measuring device shall be recorded and maintained in the permanent log book described in 2.b, below.

f. A grab sample is defined as an individual sample collected in fewer than 15 minutes.

g. A composite sample is defined as a combination of no fewer than eight individual samples obtained over the specified sampling period at equal intervals. The volume of each individual sample shall be proportional to the discharge flow rate at the time of sampling. The sampling period shall equal the discharge period, or 24 hours, whichever period is shorter.

2. OPERATIONAL REQUIREMENTS

a. Sample Results

Pursuant to California Water Code Section 13267(b), the Discharger shall maintain all sampling and analytical results including: strip charts; date, exact place, and time of sampling; date analyses were performed; sample collector's name; analyst's name; analytical techniques used; and results of all analyses. Such records shall be obtained for a minimum of three years. This period of retention shall be extended during the course of any unresolved litigation regarding this discharge, or when requested by the Regional Board.

b. Operational Log

Pursuant to California Water Code Section 13267(b), an operation and maintenance log shall be maintained at the facility. All monitoring and reporting data shall be recorded in a permanent log book.

3. REPORTING

a. For every item where the requirements are not met, the Discharger shall submit a statement of the actions undertaken or proposed which will bring the discharge into full compliance with requirements at the earliest time and submit a timetable for correction.

b. Pursuant to California Water Code Section 13267(b), all sampling shall be made available to the Regional Board upon request. Results shall be retained for a minimum of three years. This period of retention shall be extended during the course of any unresolved litigation regarding this discharge, or when requested by the Regional Board.

c. The Discharger shall provide a brief summary of any operational problems and maintenance activities to the Regional Board with each monitoring report. Any modifications or additions to, or any major maintenance conducted on, or any major problems occurring to the wastewater conveyance system, treatment facilities, or disposal facilities shall be included in this summary.

d. Monitoring reports shall be signed by:

i. In the case of a corporation, by a principal executive officer at least of the level of vice-president or his duly authorized representative, if such representative is responsible for the overall operation of the facility from which the discharge originates;

ii. In the case of a partnership, by a general partner;

iii. In the case of a sole proprietorship, by the proprietor;

iv. In the case of a municipal, state or other public facility, by either a principal executive officer, ranking elected official, or other duly authorized employee.

e. Monitoring reports are to include the following:

i. Name and telephone number of individual who can answer questions about the report.

ii. The Monitoring and Reporting Program Number.

iii. WDID Number.

f. Modifications

This Monitoring and Reporting Program may be modified at the discretion of the Regional Board Executive Officer.

4. NONCOMPLIANCE

Under Section 13268 of the Water Code, any person failing or refusing to furnish technical or monitoring reports or falsifying any information provided therein, is guilty of a misdemeanor and may be liable civilly in an amount of up to one thousand dollars ($1,000) for each day of violation under Section 13268 of the Water Code.

126 Priority Pollutants

A. Chlorinated Benzenes
- Chlorobenzene
- 1,2-dichlorobenzene
- 1,3-dichlorobenzene
- 1,4-dichlorobenzene
- 1,2,4-trichlorobenzene
- Hexachlorobenzene

B. Chlorinated Ethanes
- Chloroethane
- 1,1-dichloroethane
- 1,2-dichloroethane
- 1,1,1-trichloroethane
- 1,1,2-trichloroethane
- 1,1,2,2-tetrachloroethane
- Hexachloroethane

C. Chlorinated Phenols
- 2-chlorophenol
- 2,4-dichlorophenol
- 2,4,6-trichlorophenol
- Parametachlorocresol (4-chloro-3-methyl phenol)

D. Other Chlorinated Organics
- Chloroform (trichloromethane)
- Carbon tetrachloride (tetrachloromethane)
- Bis(2-chloroethoxy)methane
- Bis(2-chloroethyl)ether
- 2-chloroethyl vinyl ether (mixed)
- 2-chloronaphthalene
- 3,3-dichlorobenzidine
- 1,1-dichloroethylene
- 1,2-trans-dichloroethylene
- 1,2-dichloropropane
- 1,2-dichloropropylene (1,3-dichloropropene)
- Tetrachloroethylene
- Trichloroethylene
- Vinyl chloride (chloroethylene)
- Hexachlorobutadiene
- Hexachlorocyclopentadiene
- 2,3,7,8-tetrachloro-dibenzo-p-dioxin (TCDD)

E. Haloethers
- 4-chlorophenyl phenyl ether
- 2-bromophenyl phenyl ether
- Bis(2-chloroisopropyl) ether

F. Halomethanes
- Methylene chloride (dichloromethane)
- Methyl chloride (chloromethane)

Alpha-BHC
Beta-BHC
Gamma-BHC (Lindane)
Delta-BHC
Toxaphene

L. DDT and Metabolites
4,4-DDT
4,4-DDE (p,p-DDX)
4,4-DDD (p,p-TDE)

M. Polychlorinated Biphenyls (PCBs)
PCB-1242 (Arochlor 1242)
PCB-1254 (Arochlor 1254)
PCB-1221 (Arochlor 1221)
PCB-1232 (Arochlor 1232)
PCB-1248 (Arochlor 1248)
PCB-1260 (Arochlor 1260)
PCB-1016 (Arochlor 1016)

N. Other Organics
Acrolein
Acrylonitrile
Benzene
Benzidine
2,4-dinitrotoluene
2,6-dinitrotoluene
1,2-diphenylhydrazine
Ethylbenzene
Isophorone
Naphthalene
Nitrobenzene
Toluene

O. Inorganics
Antimony
Arsenic
Asbestos
Beryllium
Cadmium
Chromium
Copper
Cyanide, total
Lead
Mercury
Nickel
Selenium
Silver
Thallium
Zinc

Methyl Bromide (bromomethane)
Bromoform (tribromomethane)
Dichlorobromomethane
Chlorodibromomethane

G. Nitrosamines
N-nitrosodimethylamine
N-nitrosodiphenylamine
N-nitrosodi-n-propylamine

H. Phenols (other than chlorinated)
2-nitrophenol
4-nitrophenol
2,4-dinitrophenol
4,6-dinitro-o-cresol (4,6-dinitro-2-methylphenol)
Pentachlorophenol
Phenol
2,4-dimethylphenol

I. Phthalate Esters
Bis(2-ethylhexyl)phthalate
Butyl benzyl phthalate
Di-N-butyl phthalate
Di-n-octyl phthalate
Diethyl phthalate
Dimethyl phthalate

J. Polnuclear Aromatic Hydrocarbons (PAHs)
Acenaphthene
1,2-benzanthracene (benzo(a) anthracene)
Benzo(a)pyrene (3,4-benzo-pyrene)
3,4-benzofluoranthene (benzo(b) fluoranthene)
11,12-benzofluoranthene (benzo(k) fluoranthene)
Chrysene
Acenaphthalene
Anthracene
1,12-benzoperylene (bonze(ghi) perylene)
Fluorene
Fluoranthene
Phenanthrene
1,2,5,6-bibenzanthracene (dibenzo(ah) anthracene)
Indeno (1,2,3-cd) pyrene (2,3-o-phenylene pyrene)
Pyrene

K. Pesticides and Metabolites
Aldrin
Dieldrin
Chlordane (technical mixture and metobolites)
Alpha-endosulfan
Beta-endosulfan
Endosulfan sulfate
Endrin
Endrin aldehyde
Heptachlor
Heptachlor epoxide (BHC-hexachlorocyclohexane)

APPENDIX F - CITY OF RIDGECREST WWTP WDR NO. 6-93-85

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LAHONTAN REGION

BOARD ORDER NO. 6-93-85
WDID NO. 6B150116001

REVISED WASTE DISCHARGE REQUIREMENTS

FOR

RIDGECREST WASTEWATER TREATMENT PLANT
CITY OF RIDGECREST REGIONAL
DOMESTIC WASTEWATER TREATMENT PLANT

Kern County

The California Regional Water Quality Control Board, Lahontan Region, (Board) finds:

1. Discharger

The City of Ridgecrest submitted a complete revised report of waste discharge for the City of Ridgecrest Regional Domestic Wastewater Treatment Plant on February 25, 1993. For the purposes of this Order, the City of Ridgecrest is referred to as the "Discharger."

2. Facility

The City of Ridgecrest Regional Domestic Wastewater Treatment Plant is the facility from which the discharge occurs. For the purposes of this Order the City of Ridgecrest Regional Domestic Wastewater Treatment Plant is referred to as the "Facility." The Facility discharges treated domestic wastewater.

3. Permit History

The Board originally established Waste Discharge Requirements (WDRs) for the Facility under Resolution No. 53-5, which was adopted on September 24, 1953. These WDRs were revised under Board Order Nos. 6-72-45, 6-75-9, 6-77-70, and 6-79-48, and most recently by Board Order No. 6-82-105, which was adopted on September 16, 1982.

The Board adopted Cease and Desist Order (CDO) No. 6-89-119 for the Discharger on May 11, 1989. The CDO was amended on March 14, 1991. The Order was adopted to enforce compliance with specification of WDRs according to a prescribed time schedule for specific compliance actions. The CDO was adopted in response to the ponding of wastewater on the ground surface adjacent to the Facility percolation ponds and the formation of a ground water mound. The Discharger has implemented reclamation projects as part of a phased, long-term compliance plan required in the CDO. The CDO is proposed to be rescinded at this meeting.

4. Reason for Action

The Board is revising these WDRs as part of a statewide program to periodically review and revise all outdated requirements and to adjust the freeboard requirements of the oxidation, and the evaporation/percolation ponds to better account for wave action due to high winds and the hydraulic interconnections between ponds.

5. Facility Location

The Facility is located approximately three miles northeast of the City of Ridgecrest, Kern County within the China Lake Naval Weapons Center. The Facility is located within Sections 13,14, and 23, T26S, R49E, MDB&M, as shown on Attachment "A" and "B", which is made a part of this Order.

6. Description of Facility and Discharge

The Discharger collects, treats, and disposes of an average of 3.3 million gallons per day (mgd) of domestic wastewater generated by the City of Ridgecrest and the China Lake Naval Weapons Center. Wastewater treatment is provided by preliminary treatment, primary clarifiers, and four oxidation ponds, and chlorination. Wastewater disposal is accomplished through discharge to seven evaporation/percolation ponds and two reclamation sites.

7. Proposed Facility Expansion

The Facility is currently operating at greater than 75 percent capacity. The Discharger has submitted a Draft Master Plan to the Board for a proposed expansion of the wastewater treatment plant. The expanded Facility will discharge secondary-treated effluent at a design capacity of 9.0 mgd.

8. Disposal Area

Effluent disposal is accomplished through discharge to seven evaporation/percolation ponds, and two reclamation sites. The two reclamation sites are the China Lake Naval Weapons Center golf course and the old treatment plant site where the wastewater is used for pasture and tree irrigation and a golf driving range. The effluent use for reclamation is chlorinated before being discharged. The golf course reclamation project is owned and operated by the Department of the Navy and is regulated by WDRs contained in Board Order No. 6-84-36. The effluent used for irrigation of pasture and tree irrigation and a golf driving range is separately regulated under Board Order No. 6-93-(PROPOSED).

9. Sludge Treatment and Disposal

Sludge from the Discharger's primary clarifiers is treated by two anaerobic digesters and discharged to drying beds. The dried sludge is currently stockpiled onsite. Disposal options are currently being evaluated and are pending the approval of the Executive Officer.

10. Authorized Disposal Sites

The evaporation/percolation ponds, are the only authorized disposal sites for wastewater. All authorized wastewater disposal sites are located on land owned by the Department of the Navy.

11. Site Geology

The wastewater treatment plant overlies layers of recent alluvium consisting of silt, sand and freshwater marl cemented with calcareous tufa. The alluvium comprises the upper portion of the valley fill, which extends to a depth of at least 1,350 feet. When this layer is saturated, it yields poor quality water. Underlying this material is older alluvium composed of unconsolidated weathered gravel, sand, silt, and clay. The good quality regional ground water travels through sand lenses of the older alluvial layer.

12. Site Hydrology

Depth to ground water at the treatment and disposal pond site is less than 20 feet. Ground water encountered in the vicinity of the treatment and disposal ponds is of marginal to poor quality for most beneficial uses. The ground waters in these areas have total dissolved solids concentration which range from 1,000 to 10,000 mg/l and the ground water is very high in boron. The wastewater discharge does not directly discharge to surface water but may have some effect on surface water flow at Lark Seep, one mile northeast of the Facility.

13. Receiving Water

The Facility lies within the China Lake Hydrologic Area of the Indian Wells Hydrologic Unit.

14. South Lahontan Basin Plan

The Regional Board adopted a Water Quality Control Plan for the South Lahontan Basin on May 8, 1975, and this Order implements the Plan as amended.

15. Beneficial Uses

The beneficial uses of the ground waters of the China Lake Hydrologic Area of the Indian Wells Hydrologic Unit as set forth and defined in the Water Quality Control Plan for the South Lahontan Basin are:

a. municipal and domestic supply
b. agricultural supply
c. industrial service supply
d. freshwater replenishment

16. California Environmental Quality Act Compliance

These revised WDRs apply to an existing discharge resulting from an existing Facility and are therefore exempt from the provisions of the California Environment Quality Act (Public Resources Code, Section 21000 et seq.) in accordance with Section 15302, Title 14, of the California Code of Regulations.

17. Notification of Interested Parties

The Board has notified the Discharger and interested parties of its intent to revise WDRs for the discharge.

18. Consideration of Comments

The Board, in a public meeting, heard and considered all comments pertaining to the discharge.

IT IS **HEREBY ORDERED** that the Discharger shall comply with the following:

I. DISCHARGE SPECIFICATIONS

A. EFFLUENT LIMITATIONS

1. The total effluent flow of wastewater during a 24-hour period shall not exceed 3.6 million gallons.

2. The maximum (peak) instantaneous flow rate of wastewater shall not exceed 5.4 mgd.

3. All wastewater made available to the authorized disposal/reclamation sites shall not contain concentration of parameters in excess of the following limits:

Parameter	Units	Mean[1/]	Maximum
BOD[2/]	mg/l	30	45
MBAS[3/]	mg/l	1.0	2.0

4. All wastewater made available to the authorized disposal/reclamation sites shall have a pH of not less the 6 pH units nor more the 9 pH units. A pH over 9.0 is allowed if it results from a biological process within the treatment plant.

5. All wastewater made available to the authorized disposal/reclamation sites shall have a dissolved oxygen concentration not less than 1.0 mg/l.

6. All effluent made available for reclamation shall comply with standard Department of Health Services reclamation requirements as specified in Chapter 3, Division 4, Title 22 of the California Code of Regulations. Specific reclamation criteria is specified in reclamation Waste Discharge Requirements for the individual reclamation sites.

B. Receiving Water Limitations

The discharge of waste shall not cause the presence of the following substances or conditions in ground waters of the Indian Wells Hydrologic Unit:

1. Any perceptible color, odor, taste or foaming.

2. Coliform organisms attributable to human wastes.

3. Toxic substances in concentrations that individually, collectively, or cumulatively cause detrimental physiological responses in human, plant, animal or aquatic life.

4. Identifiable chlorinated hydrocarbons, organophosphates, carbamates, and other pesticide and herbicide groups, in summation in excess of the lowest detectable levels.

C. General Requirements and Prohibitions

1. There shall be no discharge, bypass, or diversion of raw or partially treated sewage, sewage sludge, grease, or oils from the collection, transport, treatment, or disposal facilities to adjacent land areas or surface waters.

2. Surface flow or visible discharge of sewage or sewage effluent from the authorized disposal sites to adjacent land areas or surface waters is prohibited.

3. The vertical distance between the liquid surface elevation and the lowest point of a pond dike or the invert of an overflow structure shall not be less than 1.0 foot in ponds one through seven, 1.5 feet in pond eight, and not less than 2.0 feet in ponds nine through 11, in accordance with the Discharger's Pond Management Plan.

4. The discharge shall not cause a pollution as defined in Section 13050 of the California Water Code, or threatened pollution.

5. Neither the treatment nor the discharge shall cause a nuisance as defined in Section 13050 of the California Water Code.

6. The discharge of wastewater except to the authorized disposal sites is prohibited.

7. The Discharger shall comply with all existing federal and state laws and regulations that apply to sewage sludge use and disposal practices.

II. PROVISIONS

A. Rescission of Waste Discharge Requirements

Board Order No 6-82-105 is hereby rescinded.

B. Time Schedule

The Discharger shall comply with the following time schedule:

1. The Discharger shall submit a Final Environmental Impact Report and Master Plan to the Board by March 1, 1994.

2. The Discharger shall submit the engineering design for the expansion of the Facility by December 31, 1995.

3. The Discharger shall complete construction of the expanded Facility by December 31, 1997.

4. Standard Provisions

The Discharger shall comply with the "Standard Provisions for Waste Discharge Requirements," dated July 1, 1993 in Attachment "C", which is made a part of this Order.

C. Operators Certificates

The Dischargers Facility shall be supervised by persons processing a wastewater treatment plant operator certificate of appropriate grade, pursuant to Chapter 14, Division 3, Title 23, California Code of Regulations.

D. Monitoring and Reporting

1. Pursuant to Section 13267(b) of the California Water Code, the Discharger shall comply with Monitoring and Reporting Program No. 93-85, as specified by the Executive Officer.

2. The Discharger shall comply with the "General Provisions for Monitoring and Reporting," dated July 1, 1993, which is attached to and made a part of the Monitoring and Reporting Program.

I, Harold J. Singer, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Lahontan Region, on August 13, 1993.

Harold J. Singer

HAROLD J. SINGER
EXECUTIVE OFFICER

Attachments: A. Regional Location Map
B. Site Location Map
C. Standard Provisions for Waste Discharge Requirements

1/ The arithmetic mean of lab results for effluent samples collected in a period of 30 consecutive days.
2/ Biochemical Oxygen Demand (5 day, 20oC) of a filtered sample. Using a No. 1 Whatman filter or equivalent and reseeded with an unfiltered sample.
3/ Methylene Blue Active Substances

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LAHONTAN REGION

MONITORING AND REPORTING PROGRAM NO. 93-85
WDID NO. 6B150116001

FOR

CITY OF RIDGECREST

CITY OF RIDGECREST DOMESTIC
REGIONAL WASTEWATER TREATMENT PLANT

Kern County

I. MONITORING

The following shall be monitored.

A. Flow Monitoring

1. The total volume, in million gallons, of wastewater flow to the treatment plant for each day.

2. The total volume, in million gallons, of wastewater flow to the treatment plant for each month.

3. The average flow rate, in million gallons per day (mgd), of wastewater to the treatment plant calculated for each month.

4. The maximum instantaneous flow rate, in mgd, of wastewater to the treatment plants that occurs each day.

5. The total volume, in million gallons, of wastewater flow to the ponds, the irrigation land and golf course driving range, and the golf course for each month.

6. The freeboard (distance from the top of the lowest part of the dike to the wastewater surface in a pond) measured each month in each pond. If the pond does not contain wastewater, indicate that it is empty.

B. Plant Effluent Monitoring

1. 24-hour composite samples of the oxidation pond effluent shall be collected prior to chlorination and analyzed to determine the magnitude of the following parameters:

Parameter	Units	Frequency
BOD[1/]	mg/l	Twice per month
COD[2/]	mg/l	Twice per month

Parameter	Units	
Dissolved Oxygen	mg/l	Twice per month
pH	pH units	Twice per month
Methylene Blue Active Substances	mg/l	Twice per month
Frequency		
Oil & Grease	mg/l	Twice per month
Kjeldahl Nitrogen	mg/l as N	Monthly
Nitrate Nitrogen	mg/l as N	Monthly
Ammonia Nitrogen	mg/l as N	Monthly
Total Dissolved Solids (TDS)	mg/l	Semiannually
Chloride	mg/l	Semiannually
Sodium	mg/l	Semiannually
Sulfate	mg/l	Semiannually
Total Hardness	mg/l as $CaCO_3$	Semiannually
Boron	mg/l	Semiannually
Fluoride	mg/l	Semiannually

C. Ground Water Monitoring

1. By December 1, 1993, the Discharger shall submit a ground water monitoring system plan and a time schedule for installation of ground water monitoring wells described below.

   The monitoring system, at a minimum, shall include the following:

   a. The current monitoring wells shall be monitored annually to determine the gradient of the ground water.

   b. Additional wells shall be installed, if necessary, to ensure that at least one well is upgradient and one is downgradient of the Facility. The Discharger shall demonstrate that the downgradient well is located such that ground water potentially impacted by the Discharger will be monitored.

   c. The specific design and location of the wells shall be reviewed and approved by the Executive Officer.

d. An as-built design report shall be submitted within 60 days after the ground water monitoring system is installed. This shall include a statement of certification signed by a California registered Professional Engineer in Civil Engineering or Geologist regarding the placement, lithology, and construction of the wells.

e. By June 1, 1994, the ground water monitoring wells shall be installed at the disposal site in accordance with the submitted plan.

2. Beginning July 1, 1994, grab samples of the entire thickness or the upper 20 feet, whichever is less, of the uppermost ground water bearing zone shall be collected from the one upgradient and one downgradient monitoring well and analyzed to determine the magnitude of the following parameters:

Parameter	Units	Frequency
Methylene Blue Active Substances	mg/l	Semiannually[3/]
Total Dissolved Solids	mg/l	Semiannually[3/]
Kjeldahl Nitrogen	mg/l as N	Semiannually[3/]
Nitrate Nitrogen	mg/l as N	Semiannually[3/]
Ammonia Nitrogen	mg/l as N	Semiannually[3/]
Chloride	mg/l	Semiannually[3/]
Purgeable Halocarbons	mg/l	Annually
Base/Neutral/Acid Extractable Organics	mg/l	Annually
Purgeable Aromatic	mg/l	Annually
Arsenic	mg/l	Annually
Silver	mg/l	Annually
Cadmium	mg/l	Annually
Copper	mg/l	Annually
Chromium	mg/l	Annually
Lead	mg/l	Annually
Mercury	mg/l	Annually
Molybdenum	mg/l	Annually
Nickel	mg/l	Annually
Selenium	mg/l	Annually
Zinc	mg/l	Annually

a. The depth to ground water in each well shall be measured and recorded each time a well is sampled.

b. The velocity and direction of ground water flow under the Facility site shall be determined at least annually unless it can be shown that no changes have occurred. A graphical presentation of the direction of ground water flow shall be submitted annually.

D. Sludge Monitoring

1. Total quantity of sludge generated during the monitoring period.

2. Date and quantity of sludge removed off site, location of use, recipient (including name and address) and sludge disposal method (including crops grown if appropriate) for all sludge removed off site.

3. Cumulative total quantity of sludge currently stockpiled on site including the quantity of sludge added to the stock pile during this monitoring period.

4. For sewage sludge removed from the ponds, stockpiled on-site, or discharge off-site during the previous month, a representative sample shall be collected and analyzed for the following constituents:

   a. total kjeldahl nitrogen (as N);

   b. nitrate nitrogen (as N);

   c. ammonia nitrogen (as N);

   d. total phosphate (as P); and

   e. parameters listed in Section 66699 (b) and (c) of Chapter 30, Division 4, Title 22 of the California Code of Regulations.

   The Discharger shall make a determination whether the analyses indicate that the sludge shall be considered a hazardous material.

E. Pretreatment

1. A summary of activities undertaken to monitor and regulate industrial wastewater sources shall be prepared annually.

   a. an inventory of significant industrial users, including names, addresses, categories, industrial pollutants, and volumes. A significant industrial user is either:

      (1) an industrial user discharging more that 25,000 gallons per day to the Facility,

(2) is a categorical industrial user as defined in 40 CFR 400-471, or

(3) can pass through or cause interference to the Facility.

b. A discussion of upset, interference, or pass through incidents, if any, at the Facility which the Discharger knows or suspects was caused by industrial users.

c. A discussion of enforcement actions taken or proposed.

2. A summary of the pretreatment functions including, but not limited to:

a. necessary legal authorities,

b. pretreatment requirements, and

c. status of funding and personnel to implement the pretreatment program.

F. Off-site Disposal

The Discharger shall include in each monitoring report the volume and type of all waste hauled off site for disposal. The person or company doing the hauling and the legal point of disposal shall also be recorded.

G. Operation and Maintenance

A brief summary of any operational problems and maintenance activities shall be submitted to the Board with each monitoring report.

This summary shall discuss:

1. Any modifications or additions to the wastewater conveyance system, treatment facilities, or disposal facilities.

2. Any major maintenance conducted on the wastewater conveyance system, treatment facilities, or disposal facilities.

3. Any major problems occurring in wastewater conveyance system, treatment facilities, or disposal facilities.

4. The calibration of any wastewater flow measuring devices.

II. REPORTING

A. General Provisions

The Discharger shall comply with the "General Provisions for Monitoring and Reporting," dated July 1, 1993, which is attached to and made part of this Monitoring and Reporting Program.

B. Submittal Period

Beginning on October 15, 1993, monthly monitoring reports including the preceding information shall be submitted to the Board by the 15th day of the month following each monthly monitoring period.

Ordered by: Harold J. Singer
HAROLD J. SINGER
EXECUTIVE OFFICER

Dated: August 13, 1993

Attachments: A. General Provisions for Monitoring and Reporting

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1/ Biochemical Oxygen Demand (5 day, 20°C) of a filtered sample. Using a No. 1 Whatman filter or equivalent and reseeded with an unfiltered sample.

2/ Chemical Oxygen Demand of a filtered sample.

3/ Quarterly sampling for the first year and semi-annually thereafter.

APPENDIX G - NAVAL WEAPONS CENTER, CHINA LAKE RECLAMATION REQUIREMENTS BOARD ORDER 6-84-36

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LAHONTAN REGION

FACT SHEET

ITEM NO. 6a BOARD ORDER NO. 6-84-36

NAME OF WASTEWATER USER: Naval Weapons Center, China Lake

PROJECT NAME: Naval Weapons Center Golf Course Reclamation Project

OPERATION: Reuse of wastewater from the Ridgecrest Regional Wastewater Treatment Plant

LOCATION: Approximately 1.5 miles (2.4 km) northeast of the City of Ridgecrest

TYPE OF WASTE: Domestic wastewater

TREATMENT FACILITIES: Secondary treatment (provided by the City of Ridgecrest) and disinfection (provided by the Naval Weapons Center)

PRESENT FLOW: An average of approximately 1.4 mgd (61 l/S) during warm months

DESIGN FLOW: 1.4 mgd (61 l/S) for chlorination system

RECEIVING WATERS: Groundwaters of the Indian Wells Subunit of the Indian Wells Hydrologic Unit

BENEFICIAL USES: Municipal and domestic supply; agricultural supply; industrial service; and freshwater replenishment

CEQA COMPLIANCE: Categorically exempt - Minor alteration of an existing project

LANDOWNER: U.S. Government

LAND CONTROLLED BY: U.S. Department of the Navy; Naval Weapons Center, China Lake

NEARBY DEVELOPMENT: The nearest developments are homes located approximately 500 feet (153 m) from the golf course

RECLAMATION USE: Spray irrigation of the base golf course with reclaimed water

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LAHONTAN REGION

BOARD ORDER NO. 6-84-36

REVISED RECLAMATION REQUIREMENTS

FOR

NAVAL WEAPONS CENTER, CHINA LAKE
Kern County

The California Regional Water Quality Control Board, Lahontan Region finds:

1. Ms. Carol Hawkins, on behalf of the Naval Weapons Center, China Lake, submitted a revised reclamation report dated August 31, 1983 for the Naval Weapons Center golf course irrigation project.

2. The Board previously established reclamation requirements for the Naval Weapons Center under Board Order No. 6-82-20, which was adopted on February 11, 1982.

3. The Board is revising reclamation requirements to reflect the construction of a new chlorination system.

4. During warm months, the Naval Weapons Center uses approximately 1.4 mgd (61 l/S) of chlorinated secondary effluent to spray irrigate the base golf course. The quantity of reclaimed water needed for irrigation during the cold portions of the year is substantially smaller. The Ridgecrest Regional Wastewater Treatment Plant provides secondary treatment for the wastewater used on the golf course. This plant is owned and operated by the City of Ridgecrest. Disinfection of the secondary effluent is provided by facilities owned and operated by the Naval Weapons Center.

5. The reclamation site is located approximately 1.5 miles (2.4 km) northeast of the City of Ridgecrest. The treatment facilities and reclamation site are located in the Indian Wells Subunit of the Indian Wells Hydrologic Unit within Sections 14, 23 and 24, T26S, R40E, MDB&M as shown on Attachment "A", which is made a part of this order. The Naval Weapons Center may plan to use reclaimed wastewater to irrigate additional landscape areas other than the golf course sometime in the future.

6. The Ridgecrest Regional Wastewater Treatment Plant, which provides secondary treatment for the golf course irrigation water, has a design capacity of 3.12 mgd (137 l/S). The plant treats wastewater generated by the Naval Weapons Center and the City of Ridgecrest. Treatment at the plant is provided by preliminary treatment facilities, primary clarifiers and four oxidation ponds. The Naval Weapons Center currently pumps secondary effluent from the city's last oxidation pond, disinfects it in an earthen lined chlorine contact chamber and then uses the disinfected effluent for golf course irrigation.

7. During warm months the Naval Weapons Center has violated disinfection requirements for total coliform. Inadequacies in the design of the existing chlorination facility are believed to be the primary cause for the violations. The Naval Weapons Center is proposing to construct a new concrete lined chlorine contact chamber and modify existing chlorination equipment prior to the summer of 1984. The capacity of the new facilities will be 1.4 mgd (61 l/s).

8. Groundwater in the reclamation area is considered to be of marginal to poor quality for most beneficial uses. Depth to groundwater in the vicinity of the golf course is estimated to be less than 70 feet (20 m).

9. The reclamation site is located on land owned by the U.S. Government and controlled by the Naval Weapons Center, China Lake.

10. The quality of the reclaimed water conveyed to the chlorination facility will conform to the waste discharge requirements for the Ridgecrest Regional Wastewater Treatment Facility, Board Order No. 6-82-105, Discharge Specification Nos. A.3., A.4., and B.1.

11. The Board has notified the user (Naval Weapons Center, China Lake) and the interested agencies of its intent to revise reclamation requirements for the reuse.

12. The State Department of Health Services has established state-wide reclamation criteria for the use of reclaimed water for golf course irrigation.

13. In accordance with Section 13523 of the California Water Code, the Regional Board consulted with and received the recommendations of the State Department of Health Services concerning reclamation requirements which are incorporated within this order.

14. The proposed chlorination facilities result only in a minor alteration to the Naval Weapons Center's existing reclamation project and is therefore exempt from the provisions of the California Environmental Quality Act (Public Resources Code, Section 21000 et seq.) in accordance with Section 15301, Chapter 3, Title 14, California Administrative Code.

IT IS HEREBY ORDERED, that the Naval Weapons Center, China Lake, shall comply with the following:

I. DISCHARGE SPECIFICATIONS

A. EFFLUENT LIMITATION

1. The total flow of wastewater to the chlorination facilities during a 24-hour period shall not exceed 1.4 million gallons (5.3 megaliters).

B. RECLAMATION REQUIREMENTS

1. Reclaimed water used for the irrigation of the Naval Weapons Center's golf course and landscapes in other areas where the public has similar access or

exposure shall be at all times an adequately disinfected, oxidized wastewater. The wastewater shall be considered adequately disinfected if the median number of coliform organisms in the effluent does not exceed 23 per 100 milliliters, as determined from the bacteriological results of the last 7 days for which analyses have been completed, and the number of coliform organisms does not exceed 240 per 100 milliliters in any two consecutive samples.

C. GENERAL REQUIREMENTS

1. All facilities used for transport and treatment of reclaimed wastewater shall be adequately protected against damage resulting from overflow, washout or inundation from a storm or flood having a recurrence interval of once in 100 years.

2. The use of reclaimed wastewater shall not cause a nuisance.

3. The reclaimed wastewater shall be confined to lands owned or controlled by the user as described in Finding No. 5.

II. PROVISIONS

1. Board Order No. 6-82-20 is hereby rescinded.

2. The primary user shall include the following conditions in any oral or written provision for disposition of reclaimed water.

   a. Any subsequent user of reclaimed water from the above primary user hereby authorizes, at all reasonable times, the primary user or any authorized representatives of the Regional Board to enter upon his property where the reclaimed water is being used and to investigate such person's use of reclaimed water.

   b. Any subsequent user of reclaimed water from the above primary user shall report to the primary user at least once each month the type of use of reclaimed water during such period. Such user of reclaimed water from the above named primary user agrees to insert the substance of this clause in any oral or written provision for disposition of reclaimed water.

3. The Naval Weapons Center shall comply with Monitoring and Reporting Program No. 84-36 as specified by the Executive Officer.

4. The Naval Weapons Center shall immediately notify the Regional Board by telephone whenever an adverse condition occurs as a result of this discharge; written confirmation shall follow.

5. Any proposed material change in the character of the waste, manner or method of treatment or disposal, increase of discharge, or location of discharge shall be reported to this Regional Board at lease ninety (90) days in advance of implementation of any such proposal.

6. The California Regional Water Quality Control Board, Lahontan Region, hereby reserves the privilege of changing all or any portion of this order upon legal notice to and after opportunity to be heard is given to all concerned parties.

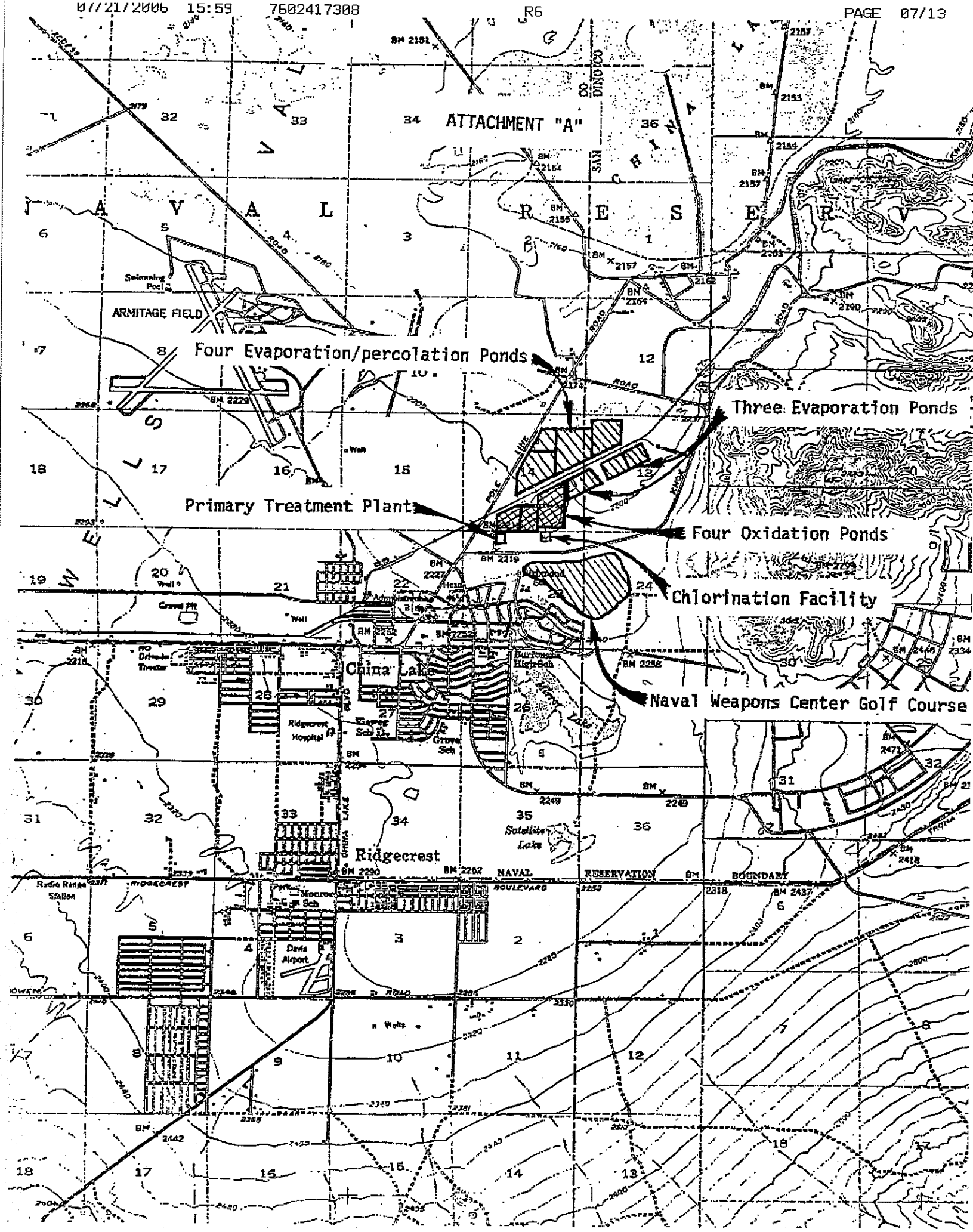
7. The Naval Weapons Center disinfection facility shall be supervised by persons possessing either a water or a wastewater treatment plant operator certificate of appropriate grade pursuant to Chapter 3, Subchapter 14, Title 23, California Administrative Code.

8. A copy of this order and the monitoring and reporting program shall be available at all times at the disinfection facility for immediate reference by the operator.

I, Roy C. Hampson, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of an order adopted by the California Regional Water Quality Control Board, Lahontan Region, on March 8, 1984.

Roy C. Hampson

ROY C. HAMPSON
EXECUTIVE OFFICER


ATTACHMENT "A"
Four Evaporation/percolation Ponds
Three Evaporation Ponds
Primary Treatment Plant
Four Oxidation Ponds
Chlorination Facility
Naval Weapons Center Golf Course
ARMITAGE FIELD
China Lake
Ridgecrest
NAVAL RESERVATION BOUNDARY

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LAHONTAN REGION

MONITORING AND REPORTING PROGRAM NO. 84-36

FOR

NAVAL WEAPONS CENTER
CHINA LAKE
Kern County

FLOW MONITORING

The following shall be recorded:

1. The daily volume of wastewater flow to the chlorination facility for each day of the monthly monitoring period.

EFFLUENT MONITORING

Grab samples shall be collected of the effluent from the chlorine contact chamber. These samples shall be analyzed to determine the magnitude of the following parameters:

PARAMETER	UNITS	SAMPLING FREQUENCY
Total Coliform	MPN/100 ml	Daily a/
Chlorine Residual	mg/l	Daily a/

OPERATION AND MAINTENANCE

A brief summary of any operational problems and maintenance activities shall be submitted to the Regional Board with each monitoring report.

This summary shall discuss:

Any modifications or additions to the wastewater conveyance system or chlorination facilities.

Any major maintenance conducted on the wastewater conveyance system or chlorination facilities.

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a/ The above samples shall be collected during days when wastewater is being used for golf course irrigation and at the time of day when the wastewater flow through the contact chamber is at a maximum.

The name of all chlorination facility operators and their grade of certification shall be reported in the first monitoring report submitted during each year.

ANALYSIS OF SAMPLES

All analyses shall be performed in accordance with the current edition of Standard Methods for the Examination of Water and Wastewater, in a laboratory certified to perform such analyses by the California State Department of Health Services or a laboratory approved by the Executive Officer.

REPORTING

Monthly monitoring reports including the preceding information shall be submitted to the Regional Board by the 15th day of the following month. The first report is due April 15, 1984.

Ordered by: Roy C. Hampson
ROY C. HAMPSON
EXECUTIVE OFFICER

Dated: March 13, 1984

CALI NIA REGIONAL WATER QUALITY CON L BOARD
LAHONTAN REGION

MONITORING AND REPORTING PROGRAM NO. 84-36

(REVISED MARCH 5,1986)

FOR

NAVAL WEAPONS CENTER
CHINA LAKE
Kern County

I. MONITORING

A. FLOW MONITORING

The following shall be recorded:

1. The daily volume of wastewater flow to the chlorination facility for each day of the monthly monitoring period.

B. PLANT EFFLUENT MONITORING

Grab samples shall be collected of the effluent from the chlorine contact chamber. These samples shall be analyzed to determine the magnitude of the following parameters:

PARAMETER	UNITS	SAMPLING FREQUENCY
Total Coliform	MPN/100 ml	Daily a/
Chlorine Residual	mg/l	Daily a/

C. OPERATION AND MAINTENANCE

A brief summary of any operational problems and maintenance activities shall be submitted to the Regional Board with each monitoring report.

This summary shall discuss:

1. Any modifications or additions to the wastewater conveyance system or chlorination facilities.

2. Any major maintenance conducted on the wastewater conveyance system or chlorination facilities.

3. Any major problems occurring in the wastewater conveyance system, chlorination facility, or irrigation system.

a/ The above samples shall be collected during days when wastewater is being used for golf course irrigation and at the time of day when the wastewater flow through the contact chamber is at a maximum. The sampling frequency for total coliform may be reduced to three times per week from November 1 through April 30 of each year providing compliance with waste discharge specification I.B. 1. is maintained during that period.

4. The calibration of any wastewater flow measuring devices.

5. The name of all chlorination facility operators and their grade of certification shall be reported in the first monitoring report submitted during each year.

D. ANALYSIS OF SAMPLES

All analyses shall be performed in accordance with the current edition of Standard Methods for the Examination of Water and Wastewater and in a laboratory certified to perform such analyses by the California State Department of Health Services or a laboratory approved by the Executive Officer.

II. REPORTING

Monthly monitoring reports including the preceding information shall be submitted to the Regional Board by the 15th day of the following month. The first report is due March 15, 1986.

Ordered by: Loyd R. Hampson Dated March 5, 1986

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LAHONTAN REGION

TRANSMITTAL OF

COMMENTS AND RECOMMENDATIONS OF
OTHER GOVERNMENTAL AGENCIES

The California Department of Health Services has requested the inclusion of the following additional requirements and recommendations which are not directly related to water quality:

1. The discharge shall be confined to the area designated and approved for disposal and reuse. Irrigation shall be controlled to minimize wastewater ponding and runoff.

2. All reclaimed water valves, outlets and/or sprinkler heads shall be appropriately tagged to warn the public that the water is not safe for drinking or direct contact.

3. All reclaimed water valves, outlets and sprinkler heads are to be of a type that can only be operated by authorized personnel.

4. Adequate means of notification shall be provided to inform the public that reclaimed water is being used. Such notification shall include the posting of conspicuous warning signs with proper wording of sufficient size to be clearly read. Notices should also be printed on score cards.

5. Irrigation shall be practiced during periods when the grounds will have maximum opportunity to dry before use by the public.

6. Wind-blown spray from the irrigation area shall be prevented from reaching areas accessible to the public.

7. Drinking water fountains shall be protected from direct or wind-blown reclaimed water spray.

MAILING LIST FOR CHINA LAKE NAVAL WEAPONS CENTER
Kern County
1/27

Mr. William C. Bonner
Head, Engineering Division
Public Works Department
Naval Weapons Center, China Lake
China Lake, CA 93555

Mr. E.E. Edwards
Director of Public Works
139 Balsam Street
Ridgecrest, CA 93555

Jack J. Coe/State Dept. of Water Resources

Ted Andrews/State Dept. of Health Services

George Nokes/State Dept. of Fish & Game

Bonnie Wolstoncroft/SWRCB/GCC

South Lake Tahoe

Kern County Health Department
1700 Flower Street
Bakersfield, CA 93305

APPENDIX H - WATER REUSE MATRIX

Recycled Water Uses Allowed* In California

This summary is prepared for WateReuse Association, from the December 2, 2000, Title-22 adopted Water Recycling Criteria, and supersedes all earlier versions

Use of Recycled Water	Treatment Level: Disinfected Tertiary Recycled Water	Disinfected Secondary-2.2 Recycled Water	Disinfected Secondary-23 Recycled Water	Undisinfected Secondary Recycled Water
Irrigation of:				
Food crops where recycled water contacts the edible portion of the crop, including all root crops	Allowed	Not allowed	Not allowed	Not allowed
Parks and playgrounds	Allowed	Not allowed	Not allowed	Not allowed
School yards	Allowed	Not allowed	Not allowed	Not allowed
Residential landscaping	Allowed	Not allowed	Not allowed	Not allowed
Unrestricted-access golf courses	Allowed	Not allowed	Not allowed	Not allowed
Any other irrigation uses not prohibited by other provisions of the California Code of Regulations	Allowed	Not allowed	Not allowed	Not allowed
Food crops, surface-irrigated, above-ground edible portion, and not contacted by recycled water	Allowed	Allowed	Not allowed	Not allowed
Cemeteries	Allowed	Allowed	Allowed	Not allowed
Freeway landscaping	Allowed	Allowed	Allowed	Not allowed
Restricted-access golf courses	Allowed	Allowed	Allowed	Not allowed
Ornamental nursery stock and sod farms with unrestricted public access	Allowed	Allowed	Allowed	Not allowed
Pasture for milk animals for human consumption	Allowed	Allowed	Allowed	Not allowed
Nonedible vegetation with access control to prevent use as a park, playground or school yard	Allowed	Allowed	Allowed	Not allowed
Orchards with no contact between edible portion and recycled water	Allowed	Allowed	Allowed	Allowed
Vineyards with no contact between edible portion and recycled water	Allowed	Allowed	Allowed	Allowed
Non food-bearing trees, including Christmas trees not irrigated less than 14 days before harvest	Allowed	Allowed	Allowed	Allowed
Fodder and fiber crops and pasture for animals not producing milk for human consumption	Allowed	Allowed	Allowed	Allowed
Seed crops not eaten by humans	Allowed	Allowed	Allowed	Allowed
Food crops undergoing commercial pathogen-destroying processing before consumption by humans	Allowed	Allowed	Allowed	Allowed
Ornamental nursery stock, sod farms not irrigated less than 14 day before harvest	Allowed	Allowed	Allowed	Allowed
Supply for impoundment:				
Nonrestricted recreational impoundments, with supplemental monitoring for pathogenic organisms	Allowed**	Not allowed	Not allowed	Not allowed
Restricted recreational impoundments and publicly accessible fish hatcheries	Allowed	Allowed	Not allowed	Not allowed
Landscape impoundments without decorative fountains	Allowed	Allowed	Allowed	Not allowed
Supply for cooling or air conditioning:				
Industrial or commercial cooling or air conditioning involving cooling tower, evaporative condenser, or spraying that creates a mist	Allowed***	Not allowed	Not allowed	Not allowed
Industrial or commercial cooling or air conditioning not involving cooling tower, evaporative condenser, or spraying that creates a mist	Allowed	Allowed	Allowed	Not allowed
Other uses:				
Groundwater Recharge	Allowed under special case-by-case permits by RWQCBs****			
Flushing toilets and urinals	Allowed	Not allowed	Not allowed	Not allowed
Priming drain traps	Allowed	Not allowed	Not allowed	Not allowed
Industrial process water that may contact workers	Allowed	Not allowed	Not allowed	Not allowed
Structural fire fighting	Allowed	Not allowed	Not allowed	Not allowed
Decorative fountains	Allowed	Not allowed	Not allowed	Not allowed
Commercial laundries	Allowed	Not allowed	Not allowed	Not allowed
Consolidation of backfill material around potable water pipelines	Allowed	Not allowed	Not allowed	Not allowed
Artificial snow making for commercial outdoor uses	Allowed	Not allowed	Not allowed	Not allowed
Commercial car washes, not heating the water, excluding the general public from washing process	Allowed	Not allowed	Not allowed	Not allowed
Industrial process water that will not come into contact with workers	Allowed	Allowed	Allowed	Not allowed
Industrial boiler feed	Allowed	Allowed	Allowed	Not allowed
Nonstructural fire fighting	Allowed	Allowed	Allowed	Not allowed
Backfill consolidation around nonpotable piping	Allowed	Allowed	Allowed	Not allowed
Soil compaction	Allowed	Allowed	Allowed	Not allowed
Mixing concrete	Allowed	Allowed	Allowed	Not allowed
Dust control on roads and streets	Allowed	Allowed	Allowed	Not allowed
Cleaning roads, sidewalks and outdoor work areas	Allowed	Allowed	Allowed	Not allowed
Flushing sanitary sewers	Allowed	Allowed	Allowed	Allowed

* Refer to the full text of the December 2, 2000 version of Title-22: California Water Recycling Criteria. This chart is only an informal summary of the uses allowed in this version.

The complete and final 12/02/2000 version of the adopted criteria can be downloaded from : <http://www.dhs.ca.gov/ps/ddwem/publications/Regulations/recycleregs_index.htm>

** With "conventional tertiary treatment". Additional monitoring for two years or more is necessary with direct filtration.

*** Drift eliminators and/or biocides are required if public or employees can be exposed to mist.

**** Refer to Groundwater Recharge Guidelines, available from the California Department of Health Services.

Prepared by Bahman Sheikh and edited by EBMUD Office of Water Recycling, who acknowledge this is a summary and not the formal version of the regulations referenced above

APPENDIX I - MEMO FROM GARY YAMAMOTO, P.E., AND JAMES WADDELL, DEPARTMENT OF HEALTH SERVICES, TO CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARDS, JANUARY 8, 2003

State of California—Health and Human Services Agency
Department of Health Services

California Department of Health Services

ANA M. BONTÁ, R.N., Dr. P.H.
Director

GRAY DAVIS
Governor

January 8, 2003

TO: State of California
Regional Water Quality Control Boards

SUBJECT: Orchard and Vineyard Irrigation Using Recycled Water

This memo is being sent to provide you with clarification concerning the application of recycled water on orchard and vineyard crops based on the current position of the California Department of Health Services Food and Drug Branch (FDB). General guidance is also presented for developing permit conditions for existing and proposed projects involving orchard and vineyard crops identified under Section 60340 (d) of the Water Recycling Criteria.

Section 60304(d) of the Criteria allows for the use of undisinfected secondary recycled water for prescribed applications involving limited food and seed crops, subject to certain restrictions. Such applications are limited to 1) Orchards and Vineyards where the recycled water does not come into contact with the edible portion of the food crop, 2) seed crops not eaten by humans, and 3) food crops that must undergo commercial pathogen destroying processing before being consumed by humans. The FDB, with the concurrence of the Division of Drinking Water and Environmental Management (DDWEM) believes that undisinfected secondary effluent represents a potential public health threat when direct or indirect modes of public contact with the recycled water, or a food product having been directly exposed to the recycled water, is allowed to occur.

It is the position of the FDB that orchard and vineyard crops will quite likely come into contact with recycled water or soil irrigated with recycled water through typical harvesting practices (e.g. sweeping of nuts shaken from trees) and/or improper use-site control measures (e.g. harvesting of grounders). Furthermore, FDB has reported that recent studies have indicated there may be a potential for pathogens to gain access to the interior of fruits or seeds through uptake by the root system, breaks in the surface of the food product and stem scars. As a result, the FDB recommends that orchard and vineyard crops are irrigated with water, which (at a minimum) meets the requirements of a disinfected secondary-2.2 recycled water as defined in Section 60301.220. Furthermore, it is the position of FDB that the coliform standard be achieved using chlorine as the disinfectant due to limited data available on the effectiveness of other

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Division of Drinking Water and Environmental Management, Recycled Water Unit
1180 Eugenia Place, Suite 200, Carpinteria, California 93013
(805) 566-9767; (805) 745-8196 fax
Internet Address: www.dhs.ca.gov/ps/ddwem/

disinfectants on secondary effluent and a general lack of experience with their use. If a project proponent wishes to use an alternative disinfectant, they would need to demonstrate equivalency to microbial inactivation using chlorine to achieve a 7-day median 2.2 MPN.

The Criteria require the submittal of an engineering report for all proposed projects. In accordance with Section 60323 of the Criteria, the report must (in part) "clearly indicate the means for compliance with these regulations and any other features specified by the regulatory agency". The DDWEM has developed comprehensive guidelines for preparation of such reports to assist the industry in addressing the finite elements of the Criteria. If convincing documentation of how compliance with requirements of Section 60304 (d) will be assured at all times is not provided, FDB recommendation would be for project denial or that minimum treatment requirements be imposed which comply with the disinfected secondary-2.2 recycled water requirement.

It is noted that the existing Water Recycling Criteria prescribe minimum treatment and use-site requirements. They do not preclude regulatory agencies from imposing more stringent treatment and/or use site controls if deemed necessary for public health protection. Additionally, by memorandum dated January 19, 1998 (copy attached), DDWEM field staff was advised that some proposed uses of recycled water might require the review and approval of other agencies having jurisdiction over the use. This memorandum directed staff to ensure that all appropriate agencies are notified of recycled water proposals to ensure them the opportunity to review and comment on the proposal. In the case of food crops, the FDB should certainly be advised/consulted prior to permit issuance.

It is important to recognize that this general guidance is specific to orchard and vineyard type crops, and in no way alters the intent of requirements outlined under Section 60340 (a) which applies to food crops where direct contact between the recycled water and the food crop may occur.

If you have any questions concerning this issue, please contact Dr. Chang-Rae Lee with the FDB at (916) 327-8041 or Jeff Stone with DDWEM at (805) 566-9767.

Sincerely,

Gary Yamamoto, P.E., Chief
Technical Programs Branch
Division of Drinking Water
and Environmental Management

James M. Waddell, Chief
Food and Drug Branch
Division of Food, Drug
and Radiation Safety

cc: State Water Resources Control Board-Rich Mills
Regional/District Engineers
CCDEH

APPENDIX J - BIOSOLIDS CRITERIA FOR LAND APPLICATION

Table J.1	Biosolids Pollutant Concentration Limits for Land Application Wastewater Treatment Plant No. 2 City of Ridgecrest		
Pollutant	**California General Order Ceiling Limits (mg/kg)[1]**	**503.13 Table 1 Ceiling Concentrations (mg/kg)[1]**	**503.13 Table 3 High Quality Pollutant Concentrations (mg/kg)[1]**
Arsenic	75	75	41
Cadmium	85	85	39
Copper	4,300	4,300	1,500
Lead	840	840	300
Mercury	57	57	17
Molybdenum	75	75	NA[2]
Nickel	420	420	420
Selenium	100	100	100
Zinc	7,500	7,500	2,800

Notes:
1. Dry weight basis.
2. Temporarily suspended by EPA pending further consideration. Value was 18 mg/kg.

Table J.2	Annual and Cumulative Land Application Rates Wastewater Treatment Plant No. 2 City of Ridgecrest		
Pollutant	**California General Order Cumulative Pollutant Loading Rate (lbs/acre)**	**503.13 Table 2 Cumulative Pollutant Loading Rate (kg/hectare)**	**503.13 Table 4 Annual Pollutant Loading Rate (kg/hectare)**
Arsenic	36	41	2.0
Cadmium	34	39	1.9
Copper	1,336	1,500	75
Lead	267	300	15
Mercury	15	17	0.85
Molybdenum	16	--	--
Nickel	374	420	21
Selenium	89	100	5.0
Zinc	2,494	2,800	140

Table J.3	Class A Pathogen Reduction Alternatives Wastewater Treatment Plant No. 2 City of Ridgecrest	
	Alternative	**Description**
A1:	Time and Temperature	Fecal coliform shall be less than 1,000 MPN/gram, or Salmonella sp. shall be less than 3 MPN/4 grams of total solids at the time of disposal. Maintain certain temperature and time period based on the percent solids and prescribed equations (see 503 Regulations for details).
A2:	Biosolids Treated in a High pH-High Temperature Process	Maintain biosolids at certain elevated temperature and pH for prescribed period of time (see 503 Regulations for details).
A3:	Biosolids Treated in Other Processes	The density of enteric viruses in the biosolids after pathogen treatment must be less than 1 PFU per 4 grams of total solids. The density of viable helminth ova in the swage sludge after pathogen treatment must be less than 1 per 4 grams of total solids. Report operating parameters to indicate consistent pathogen reduction treatment.
A4:	Biosolids in Unknown Processes	The density of enteric viruses in the biosolids after pathogen treatment must be less than 1 PFU per 4 grams of total solids. The density of viable helminth ova in the sewage sludge after pathogen treatment must be less than 1 per 4 grams of total solids.
A5:	Processes to Further Reduce Pathogens (PFRP)	
	Composting	Using either the within-vessel composting method or the aerated static pile composting method, the temperature of the sewage sludge is maintained at 55 degrees Celsius or higher for three days. Using the windrow composting method, the temperature of the sewage sludge is maintained at 55 degrees or higher for 15 days or longer. During the period when the compost is maintained at 55 degrees or higher, there shall be a minimum of five turnings of the windrow.

Table J.3	Class A Pathogen Reduction Alternatives Wastewater Treatment Plant No. 2 City of Ridgecrest
Alternative	**Description**
Heat Drying	Sewage sludge is dried by direct or indirect contact with hot gases to reduce the moisture content of the sewage sludge to 10 percent or lower. Either the temperature of the sewage sludge particles exceeds 80 degrees Celsius or the wet bulk temperature of the gas in contact with the sewage sludge as the sewage sludge leaves the dryer exceed 80 degrees Celsius.
Heat Treatment	Liquid sewage sludge is heated to a temperature of 180 degrees Celsius or higher for 30 minutes.
Thermophilic Aerobic Digestion	Liquid sewage sludge is agitated with air or oxygen to maintain aerobic conditions and the mean cell residence time of the sewage sludge is 10 days at 55 to 60 degrees Celsius.
Beta Ray Irradiation	Sewage sludge is irradiated with beta rays from an accelerator at dosages of at least 1.0 megarad at room temperature (ca. 20 degrees Celsius).
Gamma Ray Irradiation	Sewage sludge is irradiated with gamma rays from certain isotopes, such as Cobalt 60 and Cesium 137, at room temperature (ca. 20 degrees Celsius).
Pasteurization	The temperature of the sewage sludge is maintained at 70 degrees Celsius or higher for 30 minutes or longer.
Use of Processes Equivalent to obtain PFRP	Demonstrate operating parameters and/or pathogen levels to be PFRP equivalent subject to permitting authority approval.

Table J.4	Class B Pathogen Reduction Alternatives Wastewater Treatment Plant No. 2 City of Ridgecrest	
	Alternative	**Description**
B1:	Monitoring of Fecal Coliform	The geometric mean of seven samples of treated biosolids, collected at time of use or disposal shall meet a fecal coliform density of less than 2 million colony forming units or most probable number per gram of sewage sludge solids (dry weight basis).
B2:	Processes to Significantly Reduce Pathogens (PSRP)	Sewage sludge is treated by one of the five PSRP methods listed below.
	Aerobic Digestion	Sewage sludge is agitated with air or oxygen to maintain aerobic conditions for a specific mean cell residence time at a specific temperature. Values for the mean cell residence time and temperature shall be between 40 days at 20 degrees Celsius and 60 days at 15 degrees Celsius.
	Air Drying	Sewage sludge is dried on sand beds or on paved or unpaved basins. The sewage sludge dries for a minimum of three months. During two of the three months, the ambient average daily temperature is above zero degrees Celsius.
	Anaerobic Digestion	Sewage sludge is treated in the absence of air for a specific mean cell residence time at a specific temperature. Values for the mean cell residence time and temperature shall be between 15 days at 35 to 55 degrees Celsius and 60 days at 20 degrees Celsius.
	Composting	Using either the within-vessel, static aerated pile, or windrow composting methods, the temperature of the sewage sludge is raised to 40 degrees Celsius or higher and remains at 40 degrees Celsius or higher for five days. For four hours during the five days, the temperature in the compost pile exceeds 55 degrees Celsius.
	Lime Stabilization	Sufficient lime is added to the sewage sludge to raise the pH of the sewage sludge to 12 after two hours of contact.
B3:	Use of Processes Equivalent to PSRP	Demonstrate operating parameters and/or pathogen levels to be PSRP equivalent subject to permitting authority approval.

Table J.5	40 CFR 503 Vector Attraction Reduction Requirements Wastewater Treatment Plant No. 2 City of Ridgecrest
Option	**Process**
(1)	The mass of volatile solids in the sewage sludge shall be reduced by a minimum of 38 percent during sewage sludge treatment.
(2)	When the 38 percent volatile solids reduction requirement cannot be met for an anaerobically digested sewage sludge, vector attraction reduction can be demonstrated by digesting a portion of the previously digested sewage sludge anaerobically in the laboratory in a bench-scale unit for 40 additional days at a temperature between 30 and 37 degrees Celsius. When, at the end of the 40 days, the volatile solids in the sewage sludge at the beginning of that period is reduced by less than 17 percent, vector attraction reduction is achieved.
(3)	When the 38 percent volatile solids reduction requirement in cannot be met for an anaerobically digested sewage sludge, vector attraction reduction can be demonstrated by digesting a portion of the previously digested sewage sludge that has a percent solids of two percent or less aerobically in the laboratory in a bench-scale unit for 30 additional days at 20 degrees Celsius. When, at the end of the 30 days, the volatile solid sin the sewage sludge at the beginning of that period is reduced by less than 15 percent, vector attraction reduction is achieved.
(4)	The specific oxygen uptake rate (SOUR) for sewage sludge treated in an aerobic process shall be equal to or less than 1.5 milligrams of oxygen per hour per gram of total solids (dry weight basis) at a temperature of 20 degrees Celsius.
(5)	Sewage sludge shall be treated in an aerobic process for 14 days or longer. During that time, the temperature of the sewage sludge shall be higher than 40 degrees Celsius and the average temperature of the sewage sludge shall be higher than 45 degrees Celsius.
(6)	The pH of sewage sludge shall be raised to 12 or higher by alkali addition and, without the addition of more alkali, shall remain at 12 or higher for two hours and then at 11.5 or higher for an additional 22 hours at 25 degrees Celsius.
(7)	The percent solids of sewage sludge that does not contain unstabilized solids shall be equal to or greater than 75 percent based on the moisture content and total solids prior to mixing with other materials.
(8)	The percent solids of sewage sludge that contains unstabilized solids generated in a primary wastewater treatment process shall be equal to or greater than 90 percent based on the moisture content and total solids prior to mixing with other materials.
(9)	Sewage sludge shall be injected below the surface of the land. No significant amount of the sewage sludge shall be present on the land surface within one hour after the sewage sludge is injected. When the sewage sludge that is injected below the surface of the land is Class A with respect to pathogens, the sewage sludge shall be injected below the land surface within eight hours after being discharged from the pathogen reduction process.

Table J.5	40 CFR 503 Vector Attraction Reduction Requirements Wastewater Treatment Plant No. 2 City of Ridgecrest
Option	**Process**
(10)	Sewage sludge applied to the land surface or placed on a surface disposal site shall be incorporated into the soil within six hours after application to or placement on the land. When sewage sludge that is incorporated into the soil is Class A with respect to pathogens, the sewage sludge shall be applied to or placed on the land within eight hours after being discharged from the pathogen treatment process.
(11)	Sewage sludge placed on a surface disposal site shall be covered with soil or other material at the end of each operating day.
(12)	The pH of domestic septage shall be raised to 12 or higher by alkali addition and, without the addition of more alkali, shall remain at 12 or higher for 30 minutes at 25 degrees Celsius.

APPENDIX K - EFFLUENT DISPOSAL CAPACITY

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engineers

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June 11, 2007

City of Ridgecrest
100 West California Avenue
Ridgecrest, California 93555

Attention: Mr. Dennis Speer, Public Works Director

Subject: Wastewater Treatment Plant - Effluent Disposal Evaluation

Dear Mr. Speer:

As part of the Wastewater Facilities Planning Report a plan for effluent disposal capacity must be provided. Carollo Engineers (Carollo) completed an Effluent Disposal Evaluation Technical Memorandum No. 1 (enclosed) in order to demonstration adequate disposal capacity. The primary function of this effort is a water balance for the disposal methods selected and we prepared water balances for 2.4 million gallons per day (mgd) and for the design flow of 3.0 mgd.

In general, we recommend that the treated effluent be irrigated on the existing alfalfa crops and discharged to the existing and the proposed percolation/evaporation ponds. This disposal practice would require un-disinfected secondary treated effluent. The attached reports present two scenerios for both the 2.4 mgd and 3.0 mgd flows. Our water balance determined that if the City converted all the available City-owned land around the site to 64.8 acres of evaporation and percolation ponds, the City would have a disposal capacity of 2.4 mgd. Furthermore, the effluent disposal capacity to 3.0 mgd would require an additional 20 acres of evaporation and percolation ponds. The most economical method is to use the City-owned land east of the site and east of San Bernardino Road.

The construction of the ponds would be primarily for evaporation and percolation and only four feet deep ponds are recommended (two feet water depth with two feet of freeboard).

Consideration was made for the Bowman Road channel parkway. However, due to the additional increase for disinfection treatment facilities, dedicated pumping facilities and transfer pipeline facilities, this option becomes more expensive.

Please note, we used the pond evaporation and crop evapotranspiration values for southern San Joaquin Valley, as they are readily available. We will continue looking for these values for the Ridgecrest areas.

Lastly, we recommend that the City retain a Geotechnical Engineer to perform field borings for providing an actual percolation value for the City-owned lands.

Please provide your comments to this report as soon as possible as it will be incorporated into an Appendix to the Facilities Planning Report.

5100 CALIFORNIA AVENUE, SUITE 203 • BAKERSFIELD, CALIFORNIA 93309 • (661) 321-3433 • FAX (661) 321-3437

Should you have any question regarding this memorandum, please feel free to call us.

Sincerely,

CAROLLO ENGINEERS, P.C.

Amando Garza, P.E.
Associate

AGG:asw

Encl: Tech Memo No. 1 - Effluent Disposal Evaluation

Cc: J. Pollock, City of Ridgecrest
J. Bracken, City of Ridgecrest
J. Helt, City of Ridgecrest

City of Ridgecrest

Technical Memorandum No. 1

EFFLUENT DISPOSAL EVALUATION

DRAFT

June 2007

carollo engineers

7580 NORTH INGRAM AVENUE • SUITE 112 • FRESNO, CALIFORNIA 93711 • (559) 436-6616 • FAX (559) 436-1191

CITY OF RIDGECREST

TECHNICAL MEMORANDUM
NO. 1

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1.0 BACKGROUND

This Technical Memorandum (TM) summarizes the options available for effluent reuse and disposal for the City's WWTP No. 2 at the design capacity flows of 2.4 mgd and 3.0 mgd. The options include both evaporation/percolation ponds and crop irrigation.

The proposed plant site currently has 33.3 acres of alfalfa and 7.2 acres of evaporation and percolation ponds. Figure 1 shows these facilities. The total storage capacity of the ponds is approximately 14 acre-feet (with 2 feet of freeboard). The proposed WWTP facilities will include nitrification and de-nitrification capabilities which would result in effluent nitrogen less than 10 mg/L. This would address the Regional Water Quality Control Board's (RWQCB) concern for potential degradation of the groundwater due to percolation. The treatment effluent with nitrogen at less than 10 mg/L allows the irrigation of any crop to the maximum agronomic water rates without exceeding the agronomic nitrogen loadings.

Due to the bad quality of the underlying groundwater, the Indian Wells Valley Water District does not drill wells on the east side of the City for domestic drinking water.

The percolation values used in the water balances is the average of two percolation values used in previous studies by others.

Two scenarios were calculated for the future design flows of 2.4 mgd and 3.0 mgd. All water balances include the following information:

- Percolation Rate of 1-inch per day.
- 100 year Rainfall data for Inyo-Kern (Table 1).
- Lake evaporation rates based on San Joaquin Valley Class A pan evaporation rates and DWR data (Table 1).
- Irrigation demand for 33.3 acres of alfalfa planted farmland (Table 2).

A determination was made that the least cost option for effluent disposal was to develop the available City owned land into evaporation and percolation ponds.

Consideration was made for discharge of tertiary treated water to the proposed Bowman Road parkway. However, the area has little disposal capacity with a large cost for the additional treatment facility components.

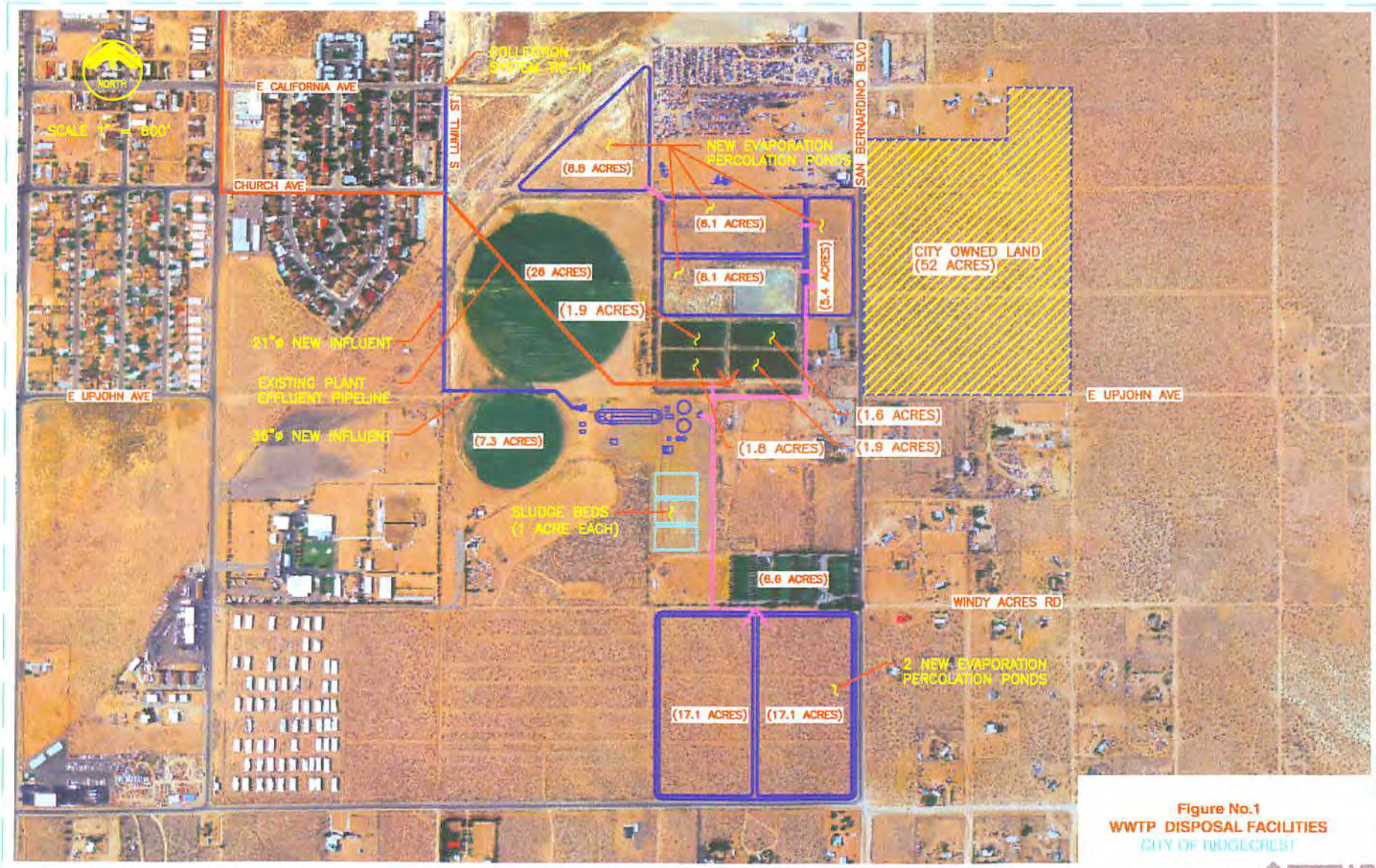

Figure No.1
WWTP DISPOSAL FACILITIES
CITY OF RIDGECREST

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TABLE 1 ESTIMATION OF EVAPORATION RATE FROM SURFACE OF PONDS
CITY OF RIDGECREAST WASTEWATER TREATMENT PLANT

	100 YR PRECIP in/month (A)	LAKE EVAP inches (B)	Net Gain/Loss inches (C)	AVERAGE RAINFALL inches (D)	Pan Evap inches (E)
September	0.66	5.81	-5.94	0.3	6.6
October	0.22	3.82	-4.12	0.1	4.34
November	0.88	2.38	-1.82	0.4	2.70
December	1.32	1.64	-0.54	0.6	1.86
January	1.10	1.64	-0.76	0.5	1.86
February	0.88	2.46	-1.92	0.4	2.80
March	0.66	4.09	-3.99	0.3	4.65
April	0.22	5.28	-5.78	0.1	6.00
May	0.22	7.09	-7.84	0.1	8.06
June	0.00	7.92	-9.00	0	9.00
July	0.44	8.73	-9.48	0.2	9.92
August	0.22	5.88	-6.46	0.1	6.68
Total	6.83	56.73	-57.64	3.10	64.47

(A) Based on 100 year rain event at Rain gauge station at Inyo Kern Arm and China Lake Armitage's monthly rainfall distribution.
(B) = (E)*0.8*1.10. Evap = pan evaporation rates*Cp*K. Ep = pan evaporation rates, based on San Joaquin Valley Class A pan evaporation rates.
Source= California Department of Water Resources, "Vegetative Water use in California", April 1975, Bulletin 113-3, Table 1, pg 9. Cp = pan coefficient to correct for excess evaporation from a pan as compared to a large body of water. K = weather correction reflecting that in wetter years, evaporation is less. K = 1.10 for dry conditions.
(D) has been derived from www.worldclimate.com

TABLE 2 IRRIGATION SCHEDULE FOR PROPOSED PLANT 33.3 AC FARMALAND
CITY OF RIDGECREAST WASTEWATER TREATMENT PLANT

Month	Crop Acreage (ac) alfalfa A	Irrigation Demand[1] (acre-in) alfalfa B	Water Needed for Crop Demand[2] (ac-ft) alfalfa C	Wastewater Application (Reduced for Nitrogen Loading) (ac-ft) alfalfa D	Supplemental Water Needed for Crop Demand[3] (ac-ft) alfalfa E	Nitrogen Loading due to Wastewater Application[4] (lbs) alfalfa F
September	33.3	8.09	22	22	0	610
October	33.3	4.23	12	12	0	319
November	33.3	2.37	7	7	0	178
December	33.3	1.29	4	4	0	97
January	33.3	1.25	3	3	0	94
February	33.3	2.24	6	6	0	169
March	33.3	3.70	10	10	0	279
April	33.3	7.08	20	20	0	534
May	33.3	7.83	22	22	0	590
June	33.3	9.39	26	26	0	708
July	33.3	12.11	34	34	0	913
August	33.3	8.39	23	23	0	632
		Total	189	189	0	5,124
		App. Rate ft/year	5.7	5.7	0.0	

Annual Nitrogen Loading (lbs/acre) = 154

Notes:
Total acreage = 33.3
(1) Irrigation demand from 1998 Lettter Report from David R. Woodruf - Cerified Crop Advisor
(2) C = A x B/12
(3) E = C - D
(4) F = D x (nitrogen concentration) x 0.3258 x 8.34

Crops	Area Acres	Nitrogen Uptake Lbs/Acre	Allowable Nitrogen Application Loading Lbs
Alfalfa	33.3	480	15,984
Total	33.3		15,984

Wastewater Nitrogen Concentration (mg/L) 10
Supp. Water Nitrogen Concentration (mg/L) 0
Total N Applied from effluent used for irrigation
Nitrogen applied (lbs) = (acre-feet)(ww N conc)(0.3258)(8.34)

1.1 SCENARIOS FOR FUTURE FLOWS OF 2.4 MGD AND 3.0 MGD

Scenario 1 for the future design flow of 2.4 mgd (Table 3) shows that the City could provide a disposal capacity of 2.4 mgd with the addition of 64.8 acres of evaporation and percolation ponds. It is assumed that the ponds will percolate at the rate of 1-inch per day and have a 2-foot water depth (4-foot total depth with two feet of freeboard). The effluent would first be used for irrigating the 33.3 acres of alfalfa and then sent to the ponds for evaporation and percolation disposal. Figure 1 shows the proposed plant site with the use of the City owned farmland as Evaporation and Percolation ponds.

Scenario 2 for the future design flow of 3.0 mgd (Table 4) shows that the City would need an additional 20 acres of evaporation and percolation ponds. With the addition of these ponds the City's total evaporation and percolation ponds becomes 92 acres with the existing 33.3 acres alfalfa land being maintained.

The primary disposal practice in both these scenerios is evaporation and percolation and a anti-degradation evaluation will need to be conducted. This study is beyond the scope of this evaluation.

1.2 SUMMARY

The City should continue to plant fodder crops with large nitrogen uptake requirements in order for the WWTP to dispose of as much effluent as possible on their farmland. The proposed treatment facilities will incorporation de-nitrification capabilities so as to eliminate any concern of percolating high nitrogen to the underlying groundwater.

The least costs and most effective disposal method is to develop the available existing City owned land into evaporation and percolation ponds. Consideration was made for producing tertiary treated water at a large treatment plant costs and was quickly eliminated.

<u>WW Flow of 2.4 mgd</u>

- **Scenario 1:** add 64.8 acres of percolation ponds and retain the existing 33.3 acres of irrigation land and the existing 7.2 acres of evaporation and percolation ponds.
- Scenario 1 could be accomplished by the construction of 64.8 acres of evaporation and percolation ponds on the available City owned land west of San Bernardino Road.

<u>Design Flow of 3 mgd</u>

- **Scenario 2:** add 84.8 acres of percolation ponds and retain the existing 33.3 acres of irrigation land and the existing 7.2 acres of evaporation and percolation ponds.

TABLE 3 WATER BALANCE FOR PROPOSED PLANT AT 2.4 MGD WW FLOW WITH THE ADDITION OF 64.8 ACRES OF PERCOLATION PONDS
CITY OF RIDGECREAST WASTEWATER TREATMENT PLANT

MONTH	WW FLOW	WW FLOW	EFFLUENT PONDS				TOTAL WW AVAILABLE	IRRIGATION DEMAND (NO REDUCTION FOR NITROGEN LOADING REQD.)	CUMUL EFFLUENT REMAINING IN PONDS
			PRECIP GAINS	EVAP LOSS	PERC LOSS	NET WATER AVAILABLE IN PONDS			
	(mg) (A)	(ac-ft) (B)	(ac-ft) (D)	(ac-ft) (E)	(ac-ft) (F)	(ac-ft) (G)	(ac-ft) (H)	(ac-ft) (I)	(ac-ft) (J)
September	70.9	217.6	3.97	34.85	180.0	6.7	6.7	22.5	0.0
October	73.3	225.0	1.32	22.92	186.0	17.4	17.4	11.7	5.7
November	66.6	204.5	5.29	14.26	180.0	15.5	15.5	6.6	14.6
December	71.0	218.0	7.93	9.82	186.0	30.1	30.1	3.6	41.1
January	74.1	227.4	6.61	9.82	186.0	38.2	38.2	3.5	75.9
February	63.2	194.1	5.29	14.78	168.0	16.6	16.6	6.2	86.2
March	68.7	210.8	3.97	24.55	186.0	4.2	4.2	10.3	80.2
April	70.8	217.2	1.32	31.68	180.0	6.9	6.9	19.7	67.5
May	76.8	235.6	1.32	42.56	186.0	8.4	8.4	21.7	54.1
June	77.9	239.2	0.00	47.52	180.0	11.7	11.7	26.1	39.8
July	81.5	250.0	2.64	52.38	186.0	14.3	14.3	33.6	20.4
August	81.6	250.5	1.32	35.27	186.0	30.5	30.5	23.3	27.7
Total	947.38	2,689.92	40.98	340.40	2,190.00	200.50	200.50	188.58	max 86.25

(A) Monthly Wastewater flows are projected from September 2005 to August 2006 flows, and using an Average annual flow of 2.4 mgd.
(B) = (A)*3.069
(D) Total acres of pond surface area (7.2 ac existing ponds and 64.8 ac new ponds)= 72
(E) Based on 2 feet of freeboard in ponds, total acres of pond surface area(7.2 ac existing ponds and 64.8 ac new ponds) 72
(F) Total acres of pond surface area(7.2 ac existing ponds and 64.8 ac new ponds) = 72
Based on percolation rate = 1 in/day
(G) = (B)+(D) -(E) - (F)
(H) = (G)
(I) Irrigation schedule from Table 2. Total acres of irrigation Lands = 33
(J) Cumulative effluent remaining after irrigation schedule met.
J2 = J1 + H2 - I2

Notes:
Total Storage Volume available (Assuming 2 ft water depth) = 144 acre-feet
Application Rate (from Irrigation Schedule Table 1B = 5.7 feet/year
Irrigation demand taken from ceritfied crop advisor.

TABLE 4 WATER BALANCE FOR PROPOSED PLANT AT 3 MGD WW FLOW WITH THE ADDITION OF 84.8 ACRES OF PERCOLATION PONDS
CITY OF RIDGECREAST WASTEWATER TREATMENT PLANT

			EFFLUENT PONDS						
MONTH	WW FLOW	WW FLOW	PRECIP GAINS	EVAP LOSS	PERC LOSS	NET WATER AVAILABLE IN PONDS	TOTAL WW AVAILABLE	IRRIGATION DEMAND (NO REDUCTION FOR NITROGEN LOADING REQD.)	CUMUL EFFLUENT REMAINING IN PONDS
	(mg) (A)	(ac-ft) (B)	(ac-ft) (D)	(ac-ft) (E)	(ac-ft) (F)	(ac-ft) (G)	(ac-ft) (H)	(ac-ft) (I)	(ac-ft) (J)
September	88.6	272.0	5.07	44.53	230.0	2.5	2.5	22.5	0.0
October	91.7	281.3	1.69	29.28	237.7	16.0	16.0	11.7	4.3
November	83.3	255.6	6.76	18.22	230.0	14.1	14.1	6.6	11.9
December	88.8	272.5	10.13	12.55	237.7	32.4	32.4	3.6	40.7
January	92.6	284.2	8.45	12.55	237.7	42.5	42.5	3.5	79.7
February	79.1	242.6	6.76	18.89	214.7	15.8	15.8	6.2	89.3
March	85.9	263.5	5.07	31.37	237.7	0.0	0.0	10.3	79.0
April	88.5	271.6	1.69	40.48	230.0	2.8	2.8	19.7	62.1
May	96.0	294.5	1.69	54.38	237.7	4.2	4.2	21.7	44.6
June	97.4	299.0	0.00	60.72	230.0	8.3	8.3	26.1	26.8
July	101.8	312.5	3.38	66.93	237.7	11.3	11.3	33.6	4.5
August	102.0	313.1	1.69	45.07	237.7	32.0	32.0	23.3	13.3
Total	1,184.23	3,362.40	52.36	434.96	2,798.33	181.92	181.92	188.58	max 89.27

(A) Monthly Wastewater flows are projected from September 2005 to August 2006 flows, and using an Average annual flow of 3 mgd.
(B) = (A)*3.069
(D) Total acres of pond surface area (7.2 ac existing ponds and 84.8 ac new ponds) = 92
(E) Based on 2 feet of freeboard in ponds, total acres of pond surface area (7.2 ac existing ponds and 84.8 ac new ponds)= 92
(F) Total acres of pond surface area (7.2 ac existing ponds and 84.8 ac new ponds) = 92
Based on percolation rate = 1 in/day
(G) = (B)+(D) -(E) - (F)
(H) = (G)
(I) Irrigation schedule from Table 2. Total acres of irrigation Lands = 33
(J) Cumulative effluent remaining after irrigation schedule met.
J2 = J1 + H2 - I2

Notes:
Total Storage Volume available (Assuming 2 ft water depth) = 184 acre-feet
Application Rate (from Irrigation Schedule Table 1B = 5.7 feet/year
Irrigation demand taken from ceritfied crop advisor.

The Scenario 2 would require that the City construct 64.8 acres evaporation and percolation with the available City owned land west of San Bernardino and 20 acres of percolation and evaporation ponds east of San Bernardino Road.

The percolation values will need to be further explored by actual geotechnical soil investigation for the area.

APPENDIX L - ALTERNATIVE COSTS

Alternative 1 - Oxidation Ditch

Item	Description		Unit Price	ENR Adjustment[1]	Contingency (25%)
1	Mobilization		$80,000	$88,000	$110,000
2	Influent Pipeline		$1,140,480	$1,255,000	$1,569,000
3	Headworks		$1,250,000	$1,371,000	$1,714,000
		Site Work	$12,000		
		Concrete	$442,000		
		Metals	$13,000		
		Wood & Plastics	$39,000		
		Finishes	$19,000		
		Equipment	$491,000		
		Mechanical	$232,000		
4	Oxidation Ditch (1 @ 3.0 mgd each)		$1,538,500	$1,951,000	$2,439,000
		Site Work	$143,000		
		Concrete	$1,060,500		
		Metals	$139,000		
		Finishes	$37,000		
		Equipment	$413,000		
		Mechanical	$9,500		
5	RAS/WAS PS				
		Ras/Was Pump Station	$961,350	$1,054,000	$1,318,000
6	Secondary Clarifiers (2 @ 85 ft)		$1,510,000	$1,657,000	$2,072,000
		Site Work	$37,400		
		Concrete	$667,250		
		Wood & Plastics	$42,500		
		Finishes	$0		
		Specialties	$0		
		Equipment	$701,250		
		Mechanical	$55,250		
7	Centirfuge Building		$1,202,200	$1,323,000	$1,654,000
		Site Work	$7,500		
		Concrete	$39,000		
		Masonry	$40,000		
		Metals	$48,000		
		Wood & Plastics	$18,000		
		Moisture Protection	$3,700		
		Doors & Windows	$6,000		
		Equipment	$119,000		
		Specialty Equipment	$860,000		
		Plumbing & Mechanical	$61,000		
8	MCC Building		$601,658	$662,000	$828,000
		Site Work	$1,330		
		Concrete	$21,000		
		Masonry	$106,000		
		Metals	$26,380		
		Thermal and Moisture Protection	$13,510		
		Doors & Windows	$6,190		
		Equipment	$347,690		
9	Sludge Holding Tanks		$653,660	$720,000	$900,000
10	Eff. Disposal Facilities(68 acres)		$3,128,000	$3,441,000	$4,302,000
11	Administration Laboratory Building		$403,333	$444,000	$555,000
12	Effluent Pump Station		$384,300	$427,000	$534,000
13	Sludge Beds (3 acres)		$457,380	$515,000	$644,000
14	Start up		$85,000	$94,000	$118,000
15	Demobilization		$70,000	$77,000	$97,000
16	Emergency Generator		$493,000	$543,000	$679,000
SUBTOTAL TOTAL				**$15,622,000**	**$19,533,000**
17	Yard Piping	29%		$4,113,000	$5,142,000
18	Paving, Grading, etc	16%		$2,194,000	$2,743,000
19	Electrical & Instrumentation	39%		$5,482,000	$6,853,000
ESTIMATED TOTAL				**$27,411,000**	**$34,271,000**

Notes:
1) Costs escalated to midpoint of construction(July 2010)

RIDGECREST WASTEWATER TREATMENT PLANT
ALTERNATIVE NO. 1 - OXIDATION DITCH

ESTIMATED ANNUAL O&M COSTS

POWER COSTS

Equipment	Horsepower (each)	Number	Annual Usage (Hours)	Costs ($)
Bar Screens	1.5	2	1752	$ 500
Conveyors	7.5	1	1752	$ 1,200
Influent Pumps	30	4	2190	$ 24,500
Mixers for Anoxic Basins	5	4	8147	$ 15,200
Oxidation Ditch Turbine Mixers	200	2	8760	$ 326,700
RAS Pumps	4	7	6257	$ 16,300
Secondary Clarifier Mechanism	0.75	5	8760	$ 3,100
Hypochlorite Feed Pumps	0.5	4	4380	$ 800
Effluent Pumps	135	3	5843	$ 220,700
WAS Pumps	1	4	4380	$ 1,600
Centrifuge Feed Pump	10	1	1314	$ 1,200
Centrifuges	25	2	876	$ 4,100
Subtotal				$ 615,900

LABOR COSTS

Personnel	Wage Rate ($)	Number	Annual Hours (Hours)	Costs ($)
Supervisors - CPO	45.50	1	2080	$ 94,640
Operator III - Foreman	32.50	1	2080	$ 67,600
Operator I	24.00	2	2080	$ 99,840
OIT	20.00	4	2080	$ 166,400
Subtotal				$ 428,480

MATERIALS & SUPPLIES

Equipment	Equipment Cost ($)	Percentage Rate (%)	Number	Costs ($)
Bar Screens & Conveyors	$ 200,000	5%	2	$ 20,000
Influent Pumps	$ 40,000	5%	4	$ 8,000
Mixers for Anoxic Basins	$ 20,000	5%	4	$ 4,000
Oxidation Ditch Turbine Mixers	$ 40,000	5%	2	$ 4,000
RAS Pumps	$ 15,000	5%	7	$ 5,250
Secondary Clarifier Mechanism	$ 270,000	5%	5	$ 67,500
Effluent Pumps	$ 45,000	5%	3	$ 6,750
WAS Pumps	$ 10,000	5%	4	$ 2,000
Centrifuge Feed Pump	$ 10,000	5%	1	$ 500
Centrifuges	$ 500,000	5%	2	$ 50,000
Subtotal				$ 168,000

Chemicals	Unit Cost ($/gallon)	Quantity (Gallons)	Costs ($)
Polymer	0.89	90,843 lbs	$ 80,851
Subtotal			$ 80,851

Biosolids Treatment & Disposal	Unit Cost $/ton)	Quantity (tons/yr)	Costs ($)
McCarthy Farms	34.50	5,302	$ 182,904

SCADA/Instrumentation Support	Unit Cost ($/Hr)	Time (Hrs)	
Contract Support	75	96	$ 7,200

Total Annul O&M Cost	$ 1,483,334
Present Worth Value of 30 years of Operation	$ 25,649,908
Capital Cost	$ 38,300,000
Alternative Present Worth Value	$ 63,949,908

FACTORS

Power	$ 0.125	kwh
Interest Rate	$ 4.00	%
Capital Recovery Factor	0.0578	

Alternative 2 - Membrane Bioreactor (MBR)

Item	Description		Unit Price	ENR Adjustment[1]	Contingency (25%)
1	Mobilization		$80,000	$88,000	$110,000
2	Influent Pipeline		$1,140,480	$1,255,000	$1,569,000
3	Headworks		$1,250,000	$1,371,000	$1,714,000
		Site Work	$12,000		
		Concrete	$442,000		
		Metals	$13,000		
		Wood & Plastics	$39,000		
		Finishes	$19,000		
		Equipment	$491,000		
		Mechanical	$232,000		
		Mechanical - Ductwork	$0		
4	Influent Splitter Box		$100,000	$109,700	$138,000
		Site Work	$19,000		
		Concrete	$55,000		
		Metals	$1,600		
		Wood & Plastics	$3,700		
		Equipment	$3,000		
		Mechanical	$9,000		
5	Membrane Biological Reactor (MBR)		$6,320,000	$6,952,000	$8,690,000
		Membrane Facilities	$3,000,000		
		Aeration Basins	$2,616,000		
		Fine Screen Bar Screen	$704,000		
6	Centirfuge Building		$1,202,200	$1,323,000	$1,654,000
		Site Work	$7,500		
		Concrete	$39,000		
		Masonry	$40,000		
		Metals	$48,000		
		Wood & Plastics	$18,000		
		Moisture Protection	$3,700		
		Doors & Windows	$6,000		
		Equipment	$119,000		
		Specialty Equipment	$860,000		
		Plumbing & Mechanical	$61,000		
7	MCC Building		$601,658	$662,000	$828,000
		Site Work	$1,330		
		Concrete	$21,000		
		Masonry	$106,000		
		Metals	$26,380		
		Thermal and Moisture Protection	$13,510		
		Doors & Windows	$6,190		
		Equipment	$347,690		
8	Sludge Holding Tanks		$653,660	$720,000	$900,000
9	Eff. Disposal Facilities (68 acres)		$3,128,000	$3,441,000	$4,302,000
10	Administration Laboratory Building		$403,333	$444,000	$555,000
11	Effluent Pump Station		$384,300	$427,000	$534,000
12	Sludge Beds (3 acres)		$457,380	$515,000	$644,000
13	Start up		$85,000	$94,000	$118,000
14	Demobilization		$70,000	$77,000	$97,000
15	Emergency Generator		$493,000	$543,000	$679,000
SUBTOTAL TOTAL				**$18,021,700**	**$22,532,000**
16	Yard Piping	30%		$4,870,000	$6,088,000
17	Paving, Grading, etc	16%		$2,559,000	$3,199,000
18	Electrical & Instrumentation	39%		$6,356,000	$7,945,000
ESTIMATED TOTAL				**$31,806,700**	**$39,764,000**

Notes:
1) Costs escalated to midpoint of construction(July 2010)

RIDGECREST WASTEWATER TREATMENT PLANT
ALTERNATIVE NO. 2 - MBR

ESTIMATED ANNUAL O&M COSTS

POWER COSTS

Equipment	Horsepower (each)	Number	Annual Usage (Hours)	Costs ($)
Bar Screens	1.5	2	1752	$ 500
Conveyors	7.5	1	1752	$ 1,200
Blowers for Girt Chamber	15	2	4380	$ 12,300
Primary Sedimentation Basin Mechanism	0.75	3	8760	$ 1,800
Primary Sludge Pumps	7.5	3	1752	$ 3,700
Intermediate Pumps	25	4	6570	$ 61,300
Fine Screens	5	2	4380	$ 4,100
Blowers for Aeration Basins	175	4	6570	$ 428,900
Mixers for Anoxic Chambers	5	4	8760	$ 16,300
Air Scour Blowers for MBR Basin	150	2	4380	$ 122,500
Permate Pump	100	4	4380	$ 163,400
Recirculation Pump for MBR System	30	4	4380	$ 49,000
Citric Acid Feed Pumps	0.5	2	4380	$ 400
Hypochlorite Feed Pumps	0.5	4	4380	$ 800
Effluent Pumps	135	3	5843	$ 220,700
Sludge Wasting Pumps	10	2	8760	$ 16,300
Gravity Thickeners	10	2	8760	$ 16,300
Dissolved Air Flotation Thickener	10	2	8760	$ 16,300
Digester Mixing Pumps	20	1	8760	$ 16,300
Digester Heating Recirculation Pumps	10	1	8760	$ 8,200
Digester Sludge Transfer Pump	10	1	8851	$ 8,300
Centrifuge Feed Pump	10	1	1314	$ 1,200
Centrifuges	25	2	876	$ 4,100
Subtotal				$ 1,173,900

LABOR COSTS

Personnel	Wage Rate ($)	Number	Annual Hours (Hours)	Costs ($)
Supervisors - CPO	45.50	1	2080	$ 94,640
Operator III - Foreman	32.50	1	2080	$ 67,600
Operator I	24.00	2	2080	$ 99,840
OIT	20.00	4	2080	$ 166,400
Subtotal				$ 428,480

MATERIALS & SUPPLIES

Equipment	Equipment Cost ($)	Percentage Rate (%)	Number	Costs ($)
Bar Screens & Conveyors	$ 200,000	5%	2	$ 20,000
Blowers for Girt Chamber	$ 90,000	5%	2	$ 9,000
Primary Sedimentation Basin Mechanism	$ 270,000	5%	3	$ 40,500
Primary Sludge Pumps	$ 20,000	5%	3	$ 3,000
Intermediate Pumps	$ 40,000	5%	4	$ 8,000
Fine Screens	$ 200,000	5%	2	$ 20,000
Blowers for Aeration Basins	$ 25,000	5%	3	$ 3,750
Mixers for Anoxic Chambers	$ 20,000	5%	4	$ 4,000
Air Scour Blowers for MBR Basin	$ 25,000	5%	2	$ 2,500
Permate Pump	$ 270,000	5%	4	$ 54,000
Recirculation Pump for MBR System	$ 20,000	5%	4	$ 4,000
Citric Acid Feed Pumps	$ 5,000	5%	2	$ 500
Hypochlorite Feed Pumps	$ 5,000	5%	4	$ 1,000
Effluent Pumps	$ 45,000	5%	3	$ 6,750
Sludge Wasting Pumps	$ 10,000	5%	2	$ 1,000
Gravity Thickeners	$ 332,000	3%	2	$ 19,920
Dissolved Air Flotation Thickener	$ 1,413,000	3%	2	$ 84,780
Digester Mixing Pumps	$ 20,000	5%	1	$ 1,000
Digester Heating Recirculation Pumps	$ 12,000	5%	1	$ 600
Digester Sludge Transfer Pump	$ 12,000	5%	1	$ 600
Centrifuge Feed Pump	$ 10,000	5%	1	$ 500
Centrifuges	$ 500,000	5%	2	$ 50,000
Subtotal				$ 335,400

Chemicals	Unit Cost ($/gallon)	Quantity (Gallons)	Costs ($)
Hypochlorite	0.96	126,213 gal	$ 121,165
Polymer	0.89	75,703 lbs	$ 67,376
Subtotal			$ 188,540

Biosolids Treatment & Disposal	Unit Cost $/ton)	Quantity (tons/yr)	Costs ($)
McCarthy Farms	34.50	4,418	$ 152,420

SCADA/Instrumentation Support	Unit Cost ($/Hr)	Time (Hrs)	
Contract Support	75	120	$ 9,000

Total Annul O&M Cost	$ 2,287,740
Present Worth Value of 30 years of Operation	$ 39,559,740
Capital Cost	$ 36,293,000
Alternative Present Worth Value	$ 75,852,740

FACTORS

Power	0.125	kwh
Interest Rate	$ 4.00	%
Capital Recovery Factor	0.0578	