

**VILLAGE
OF
LOS LUNAS**

**WASTEWATER
TREATMENT AND
SLUDGE
MANAGEMENT**

FINAL

**PRELIMINARY
ENGINEERING
REPORT**

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VILLAGE OF LOS LUNAS, NEW MEXICO
WASTEWATER TREATMENT AND SLUDGE MANAGEMENT PER

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LIST OF ACRONYMS AND ABBREVIATIONS

AFD	adjustable frequency drive
AFY	acre feet per year
ATAD	auto-thermal thermophilic aerobic digestion
AVG	average
BNR	biological nutrient removal
BOD	biochemical oxygen demand
BPR	biological phosphorus removal
°C	Celsius degree
CFR	Code of Federal Regulations
cfs	cubic feet per second
cfu	colony forming units
COD	chemical oxygen demand
DASZ	data analysis subzones
dB	decibel
DMR	discharge monitoring report
DO	dissolved oxygen
DP	Discharge Plan
EID	environmental information document
EPA	Environmental Protection Agency
°F	Fahrenheit degree
gpcd	gallons per capita per day
gpd	gallons per day
gpd/sf	gallons per day per square foot
gpm	gallons per minute
GWDP	Ground Water Discharge Plan
HP	horse-power
I/I	infiltration and inflow
LS	lift station
M&E	Metcalf and Eddy
MAX	maximum
MBR	membrane bioreactor
MG	million gallons
MGD	million gallons per day
mg/l	milligrams per liter
MH	manhole
MIN	minimum
MOP	manual of practice
NM	New Mexico

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

NMED	New Mexico Environment Department
NOEC	no observed effect concentration
NPDES	National Pollutant Discharge Elimination System
OSHA	Occupational Safety and Health Administration
O&M	operation and maintenance
PER	preliminary engineering report
PF	peak factor
P&I	principal and interest
RAS	return activated sludge
sq.ft.	square foot
SNdN	simultaneous nitrification and denitrification
SSES	sewer system evaluation survey
s.u.	standard units
TDH	total dynamic head
TKN	total Kjeldahl nitrogen
TMDL	total maximum daily load
TN	total nitrogen
TP	total phosphorus
TRC	total residual chlorine
TSS	total suspended solids
ug/l	micrograms per liter
US	United States
USEPA	United States Environmental Protection Agency
UV	ultraviolet light
VFA	volatile fatty acids
VSS	volatile suspended solids
WAS	waste activated sludge
WEF	water environment federation
WET	whole effluent toxicity
WQCC	Water Quality Control Commission
WTP	water treatment plant
WWTP	wastewater treatment plant

EXECUTIVE SUMMARY

The Village of Los Lunas is located in Valencia County, which lies within the Middle Rio Grande Basin, approximately 20 miles south of the City of Albuquerque. The 2010 Census indicates that the Village is the second-fastest-growing community in the State of New Mexico, which greatly impacts the Village's wastewater infrastructure.

The planning period for this Preliminary Engineering Report (PER) is 30 years (2011 to 2041). Over the duration of this period, the population served by the Village sewer system is anticipated to reach 56,258, which is equivalent to an average annual growth rate of about 4.4%.

The Village has implemented all of the sanitary sewer collection system improvements recommended to allow for the ultimate build-out of the community. The Village's existing wastewater treatment consists of an activated sludge plant, constructed in 1981 and a state-of-the-art MBR facility, constructed in 2007. Both treatment plants are operated in parallel, but with a common outfall to the Rio Grande. The Village's existing sludge treatment and disposal consists of a gravity belt thickener (GBT), covered aerobic digesters, and 200 acres for final sludge application at a sludge disposal site.

If both, the activated sludge and MBR plants are operated at their maximum hydraulic capacity; they should serve the Village through 2016. However, obvious signs of aging in the activated sludge plant and the increased difficulty of obtaining replacement parts for equipment may prove challenging to maintain maximum hydraulic capacity. Based on historical data and the Village's growth projections, the flow to the WWTP at the end of the 30-year planning period (2041) would be 4.7 MGD and far exceed the current capacity.

The sludge treatment and disposal facilities, constructed in 1996, are considered the most deteriorated component of the wastewater treatment and sludge management system by the Village's WWTP Operations Staff and the Engineer. The sludge management system is at maximum capacity and in need of improvement and expansion, as it was designed to treat solids produced by a WWTP capacity of 1.2 MGD. The sludge disposal site is also near capacity due to

the nitrogen loading rate, which limits the allowable amount of solids deposited without exceeding the state-permit limits.

Several alternatives for the wastewater treatment and sludge management system were considered to enable the Village to comply with state and federal regulations and to accommodate population growth within the planning area. The Village constructed a state-of-the-art MBR plant and chose this as their preferred technology for future capacity expansions; therefore, the evaluation included phasing options for liquid treatment as opposed to consideration of other technologies for the liquid treatment process. Regarding sludge management, evaluation of alternatives included options which would improve efficiency and increase disposal capacity.

The alternatives were initially screened based on the following criteria: 1) regulatory compliance; 2) expandability; 3) site efficiency and constructability; 4) operations and maintenance; 5) public acceptance; 6) cost.

The Proposed liquid treatment improvements were: 1) expansion of MBR capacity, 2) expansion of entrance works, 3) replacement of existing effluent discharge line, and 4) replacement of administration and laboratory building.

The Engineer recommends a phased approach for implementing the expansion of the liquid treatment process with MBR facilities. Figure ES-1 shows a timeline for expansion of the liquid treatment components.

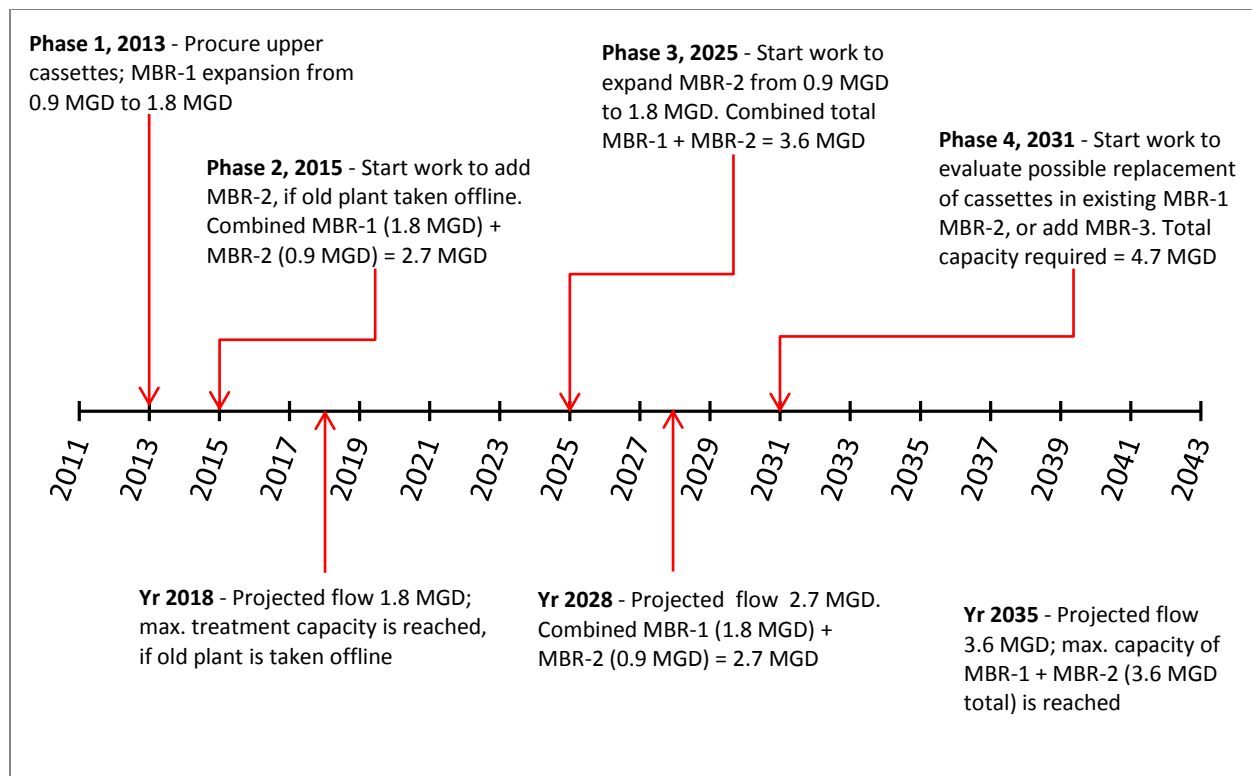


FIGURE ES-1

TIMELINE FOR IMPLEMENTATION OF CAPACITY EXPANSION FOR THE LIQUID TREATMENT PROCESS

A number of treatment and handling options were considered for sludge management, to support various disposal alternatives.

Three alternatives for sludge disposal were evaluated: Option A – 100% Surface Disposal, Option B – 100% Landfill Disposal, and Option C – Combined Surface Disposal and Landfill Disposal. Of these options, Option C– Combined Surface Disposal and Landfill Disposal is the recommended alternative based on the evaluation criteria. Some of the benefits Option C provides are the use of existing facilities and equipment, operational flexibility, and ease of phasing. Figure ES-2 shows a timeline for expansion of the sludge management recommendations.

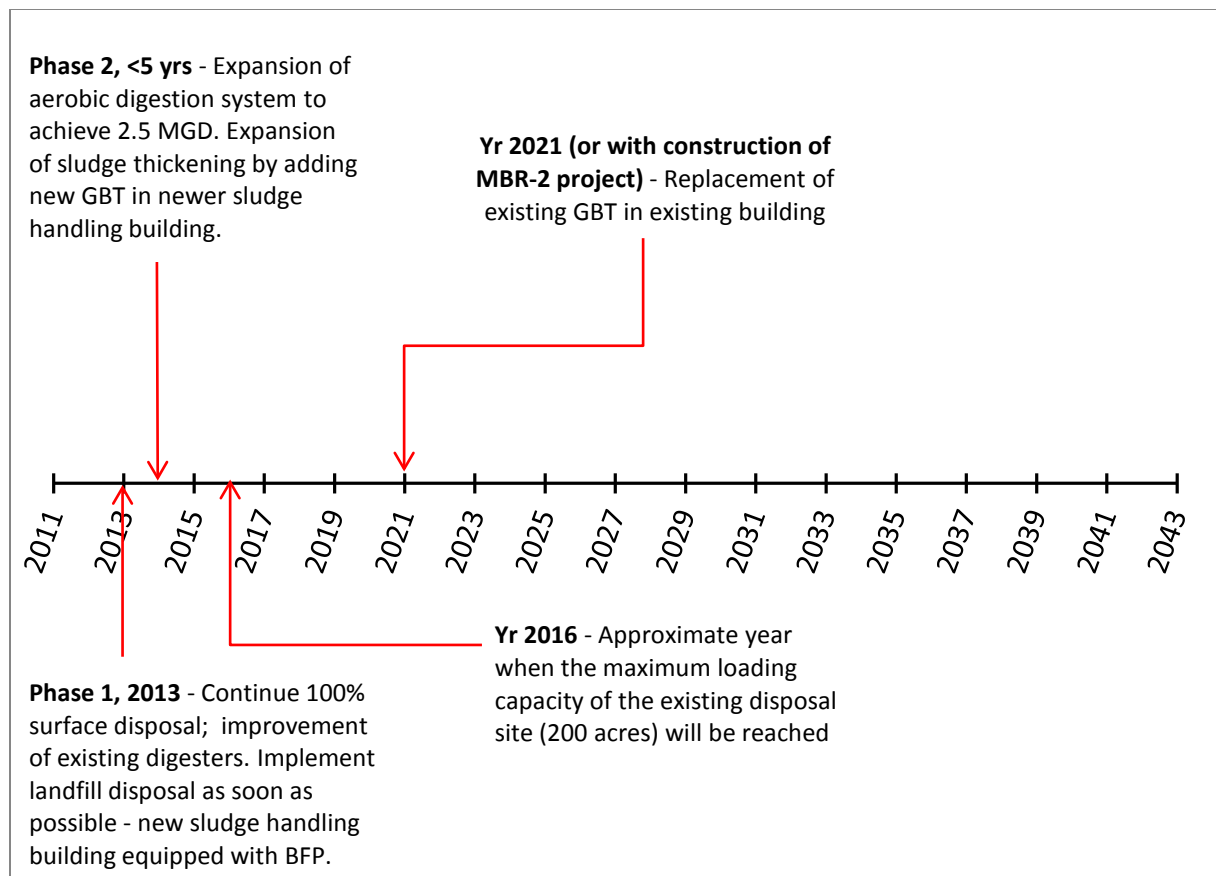


FIGURE ES-2
TIMELINE FOR IMPLEMENTATION OF SLUDGE DISPOSAL
OPTION C – COMBINED SURFACE DISPOSAL AND LANDFILL DISPOSAL

In order to accommodate current needs and future growth and development, it is clear that the Village will need to invest in the wastewater treatment and sludge management infrastructure. Conceptual cost estimates of the recommended alternatives were prepared and are presented in Table ES-1.

TABLE ES-1
SUMMARY OF PROJECT COSTS AND PRESENT WORTH

Project	Total Project Cost	Present Worth
Expansion of Existing MBR Plant (MBR-1)	\$2,243,600	\$4,579,400
Sludge, Option C - Combined Surface and Landfill Disposal	\$11,639,000	\$17,798,300
New Effluent Discharge Line	\$528,500	\$602,900
New Administration and Laboratory Bldg.	\$1,980,600	\$2,278,100
New MBR Plant (MBR-2) and Improvements of Existing Entrance Works	\$16,911,000	\$21,582,500

The Engineer recommends that the Village actively pursue funding for the improvements to the wastewater treatment and sludge management system in the near future. Based on the urgency to implement each individual project (i.e., need for additional capacity, compliance with regulations, etc.) a priority ranking has been established. The two highest priorities are:

1. Capacity expansion of the existing MBR plant (MBR-1) by adding the upper cassettes.
2. Improvement of existing aerobic digesters and a new sludge handling building equipped with a belt filter press for implementation of a combined sludge disposal method by surface land application and disposal at the landfill.

The other three projects recommended for implementation in the near future are:

1. Replacement of the effluent discharge line.
2. New administration and laboratory building.
3. New aerobic digestion system with 65 acres of additional land for sludge disposal.

1.0 INTRODUCTION

1.1 General

The Village of Los Lunas, New Mexico is located in the Middle Rio Grande Valley in Valencia County, approximately 20 miles south of the City of Albuquerque.

Based on the 2010 Census, the Village of Los Lunas is now the second-fastest-growing community in the State, just behind the City of Rio Rancho. Population growth between the 2000 Census and the 2010 Census was 47.8%. This extraordinary growth, and the corresponding increase in wastewater flows, has driven the need for expansion of the Village's wastewater infrastructure.

Numerous improvements have been made in recent years to the sewer collection system and at the wastewater treatment plant (WWTP). However, to accommodate all this growth, the Village desires to determine wastewater infrastructure needs to provide services to potential new residents and businesses. This entails evaluation of the condition of the existing facilities for treatment of both components of wastewater, liquid, and solids. This Preliminary Engineering Report (PER) provides a detailed evaluation of the condition and capacity of the different unit operations and processes that integrate the treatment of both components. The Report also addresses future capacity needs based on population projections, evaluates technologies and processes for future facilities based on current and potential future regulations, and makes recommendations to the Village for implementation of improvements.

1.2 Project Background

The Village's original activated sludge treatment plant was constructed in the early 1980s and has a capacity of 0.7 MGD. The plant was expanded in the early 1990s to 1.2 MGD based on the effluent quality discharge standards that were current at the time of planning and design. However, in the mid-1990s more stringent effluent limits were added to the discharge permit, which reduced the treatment capacity of the facility. In order to comply with the new limits, the

hydraulic capacity was de-rated to approximately 0.8 MGD. The reduction allowed for an increase in detention time within certain process units in order to convert ammonia to nitrate and comply with effluent limits established in the permit. More recently, to accommodate the ongoing growth in the Village, it was determined that a treatment capacity expansion from the 0.8 MGD available was needed.

In 2007, Los Lunas took a major step by starting the construction of a state-of-the-art membrane bioreactor (MBR) plant with initial capacity for up to 0.9 MGD. This facility was put into service in 2010 and is still one of the few municipal MBR plants currently in operation in the State of New Mexico. At present, both facilities, the old activated sludge plant and the new MBR plant, are operated in parallel as separate plants and together provide treatment to a wastewater flow of about 1.1 to 1.3 MGD. The disinfected effluent from both plants is blended prior to discharge to the Rio Grande.

With regard to solids management, the existing sludge treatment process and equipment, as well as the land disposal site, were constructed in 1997. The entire system is considered by the Operations Staff as the component of the overall treatment process most in need of major and immediate improvements.

Sludge treatment at the Village's WWTP begins with the mixed liquor (waste activated sludge, WAS) removed from the activated sludge and the MBR plants. The current treatment process consists of thickening with a gravity belt thickener (GBT) to remove water and increase solids concentration. The thickened sludge is pumped into covered aerobic digesters for stabilization of biosolids. Both the activated sludge and the MBR facilities use the same sludge processing equipment. After digestion, the sludge is transported off-site to the approximately 220-acre sludge disposal site located on Dalies Road west of the Village for surface application.

The aeration system for the digesters is nearing the end of its design life, and portions of the system are failing due to the corrosive conditions that exist between the liquid surface and the covers over the digesters. The aeration system for two of the digester's four cells was modified in 2007 to replace the air piping and related components that were corroding at that time.

Emergency repairs and improvements to the aeration system in the other two cells were completed in March 2011.

The sludge treatment system and its components were designed to provide treatment to the solids produced by the operation of a plant with capacity for up to 1.2 MGD. As such, these facilities and equipment are at or over their design capacity and in need of improvement and capacity expansion in the immediate future.

1.3 Report Objectives

This Report provides a comprehensive plan for the management of the Village's wastewater flows and sludge treatment, starting at present and extending through the planning period.

The objectives of this Report are as follows:

- Describe the planning area. Include an accompanying Environmental Information Document (EID).
- Develop population growth estimates and predict wastewater flows for the 30-year planning period through 2041, inclusive.
- Describe the current regulations governing wastewater discharge to the Rio Grande and sludge (biosolids) disposal from the Village of Los Lunas WWTP.
- Describe potential changes in effluent and sludge disposal permits.
- Assess the existing facilities for wastewater and sludge handling with respect to operational condition, capacity, and capability to accommodate future wastewater treatment demands and compliance with regulations.
- Develop a list of wastewater and sludge treatment alternatives.
- Provide a detailed description of feasible alternatives and a comparative evaluation.
- Provide an opinion of project construction cost and annual O&M cost estimates for the feasible alternatives.
- Recommend a wastewater and sludge treatment alternative for implementation.
- Develop a detailed layout and site use plan for current and future facilities for the Village of Los Lunas WWTP.

1.4 Report Organization

The contents and formatting of this Report are consistent with the accepted PER format that was developed by Rural Utility Services (RUS) of the United States Department of Agriculture (USDA) and used by the New Mexico Environment Department (NMED). It can thus be utilized to solicit loans or grants from the RUS, the New Mexico Finance Authority, and the NMED. The Report is organized into the following sections:

Section 1 – Introduction: discusses the project background, objectives of the Report, and Report organization.

Section 2 – Project Planning Area: describes the project planning area, including location, environmental resources present, growth areas, population trends, and wastewater flow and characteristics.

Section 3 – Existing Facilities: provides a description of the existing wastewater and sludge treatment facilities, including location, history, applicable permits and regulations, and operational and financial conditions.

Section 4 – Need for Project: describes the need for the project in terms of health and sanitation, regulatory requirements, and current system operation and maintenance (O&M). It also addresses the capacity requirements according to the expected population growth and wastewater flows.

Section 5 – Alternatives Considered: details the alternatives considered for treatment of the Village's wastewater and sludge management. It also includes a no-action alternative for baseline comparison.

Section 6 – Selection of An Alternative: recommends the alternative for the liquid portion of the wastewater treatment plant, including preliminary sizing. A detailed description of sludge treatment and management alternatives is also presented. The comparison among the alternatives includes technical evaluations as well as a comparison of cost and other non-monetary aspects.

Section 7 – Proposed Project: provides additional recommendations on how to implement the proposed improvements for wastewater treatment and sludge management. It includes a site master plan, with the layout of the recommended alternative(s).

Section 8 – Conclusions and Recommendations: provides a plan of action to expedite the completion of the recommended improvements.

2.0 PROJECT PLANNING AREA

The Village of Los Lunas, which lies within the Middle Rio Grande Basin, faces significant growth challenges with respect to wastewater treatment. As the second-fastest-growing community in the State of New Mexico,⁽¹⁾ the Village's growth results in a need for increased capacity and improved treatment for wastewater. This Section of the PER provides a brief history of the Village, general geologic and environmental setting, recorded climatologic conditions, and expected population growth through the planning period. Population projections are used to determine wastewater treatment requirements and future plant capacity needs.

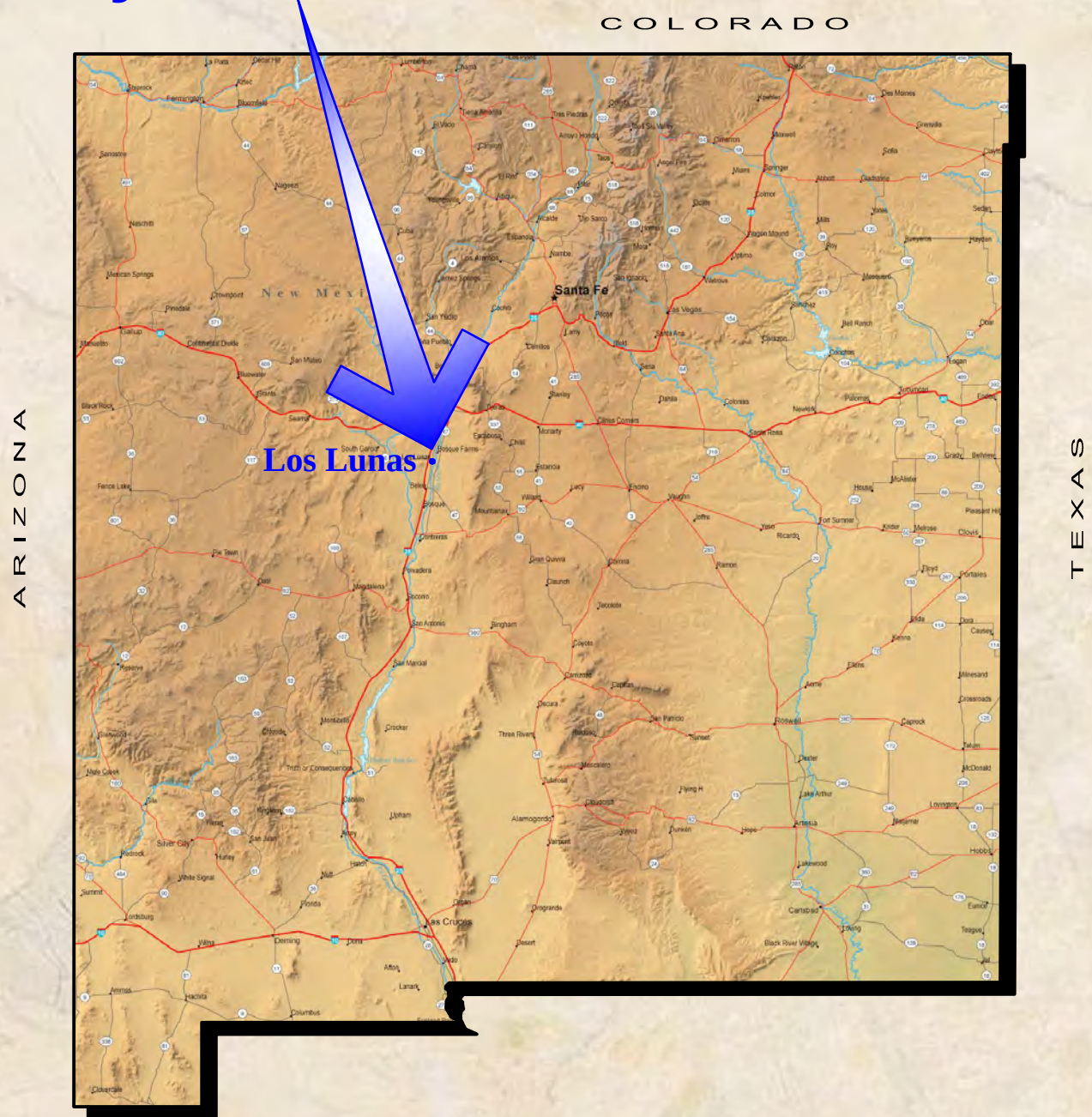
2.1 Project Location and Climate

The Village of Los Lunas is located in Valencia County in central New Mexico at an approximate elevation of 4,856 ft (1,480 m) above mean sea level (amsl). The Village's location is shown in Figure 2-1.

Table 2-1 presents a summary of some climatologic conditions for the Village obtained from the Western Regional Climate Center for Station No. 295150 located in Los Lunas, NM ⁽²⁾. The information presented is a synopsis of records collected from 7/1/1923 to 3/31/2013.

As shown in Table 2-1, the average annual maximum and minimum ambient temperatures in the Village are 73.0 °F (22.8°C) and 37.8 °F (3.2°C), respectively. The maximum and minimum monthly temperatures are 100.1 °F (37.8°C) in July of 2003 and 8.97 °F (-12.8°C) in January of 1964, respectively.

Project Location



Los Lunas Wastewater Treatment and Sludge Management - PER

MOLZENCORBIN

Figure 2-1
Project Location Map

TABLE 2-1
AVERAGE CLIMATOLOGIC CONDITIONS FOR LOS LUNAS, NM

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temp. (°F)	51.4	57.8	65.5	73.7	82.0	91.2	93.2	90.7	84.5	74.1	61.1	51.2	73.0
Average Min. Temp.(°F)	17.8	22.3	28.5	35.7	44.6	53.3	60.5	58.9	50.1	37.6	25.9	18.8	37.8
Average Total Precipitation (in)	0.36	0.41	0.50	0.46	0.46	0.61	1.25	1.70	1.17	1.04	0.46	0.52	8.93
Average Total Snowfall (in)	1.2	0.7	0.2	0.2	0	0	0	0	0	0.2	0.4	1.5	4.3

Source: <http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?nm5150>. Webpage retrieved May 24, 2013.

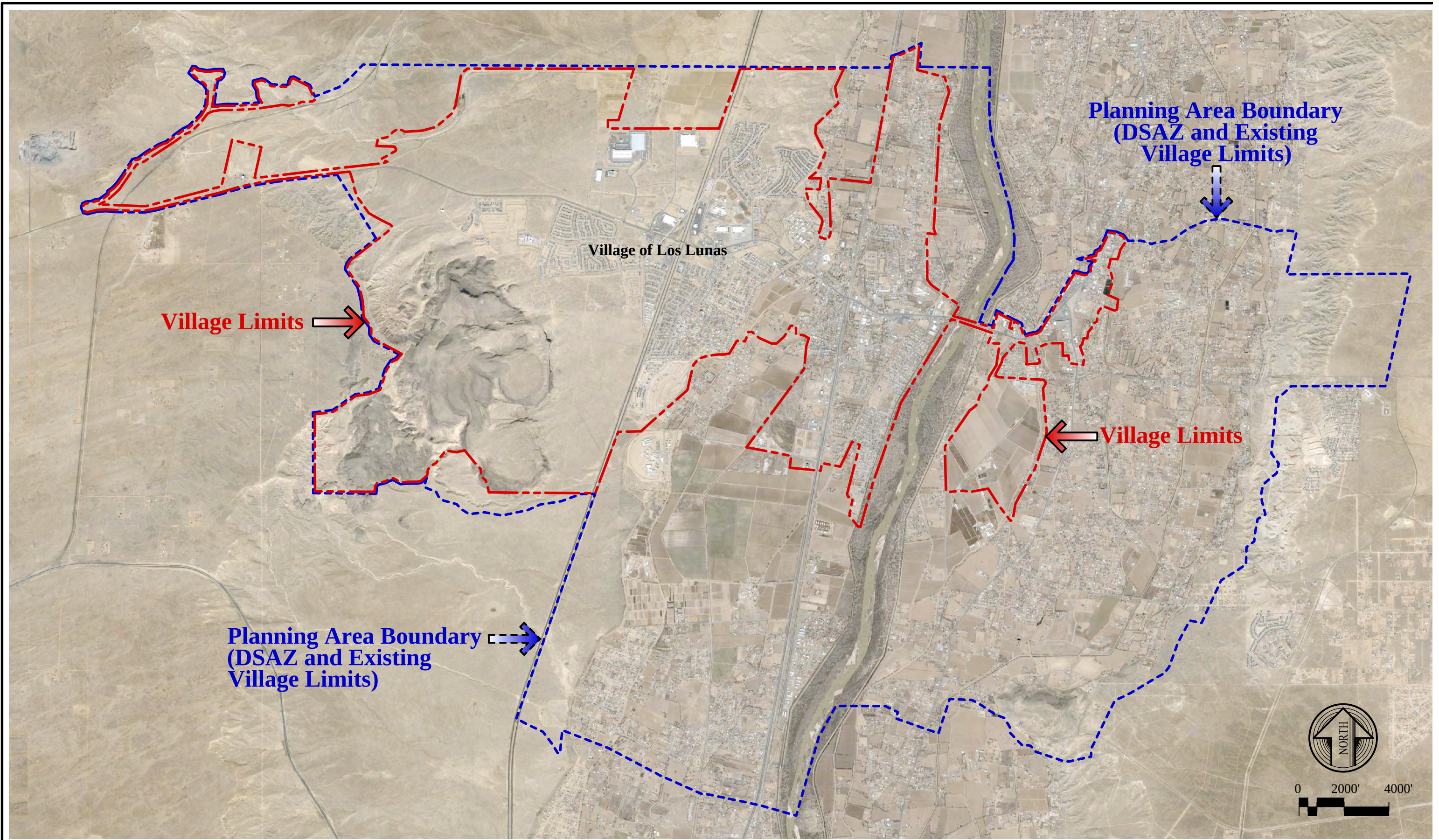
2.1.1 Planning Period

A typical planning period for PERs is 20 years. However, in order to better master-plan the existing WWTP site, this report will utilize a planning period of 30 years. The study period will cover years 2011 to 2041, inclusive.

2.1.2 Planning Area

The Village continues to expand its boundaries to allow for growth and development in the community. North of the Village, on the east side of the Rio Grande, Los Lunas borders the Village of Peralta. On the west side of the river, the Pueblo of Isleta adjoins the northern border. Otherwise, the Village has significant potential to expand in all other directions.

The project planning area for this Report was established by the Owner identifying the Village limits and the data analysis subzones (DASZ) from the Mid Region Council of Governments (MRCOG) ⁽³⁾. Figure 2-2 shows the existing Village limits as well as the overall planning area boundary.



Los Lunas Wastewater Treatment and Sludge Management - PER

2.2 Environmental Resources Present

This PER includes the evaluation of the existing wastewater treatment facilities and sludge treatment and disposal processes. Sludge, or biosolids, is disposed of at another site outside of the wastewater treatment plant boundaries. Therefore, a separate description of the environmental resources present at each site is provided.

An Environmental Information Document (EID) has been prepared as part of this PER and will be submitted under separate cover.

2.2.1 Wastewater Treatment Plant Site

The Village owns approximately 19.9 acres of land at the site of the existing wastewater treatment facilities. A manufactured housing development is located on the north side of the site. The boundaries on the west and south sides are common with farm lands. An irrigation ditch and native *bosque* vegetation are located immediately adjacent to the plant fence on the east side. The effluent line crosses underneath the irrigation ditch and continues east to the outfall structure, where treated and disinfected effluent is discharged into the Rio Grande.

2.2.2 Sludge Disposal Site

The Village of Los Lunas disposes of digested sludge by surface land application on a reclamation site that covers a total of approximately 220 acres. The sludge disposal site is located in Valencia County (Township T6N, Range R1E, Section 18), approximately nine miles southwest of the Village. This site has been in use since 1997, when the existing sludge handling facilities were constructed at the WWTP and sludge disposal began.

2.3 Population Growth Projections

In the past decade, the growth of the Village of Los Lunas has been extraordinary. According to the 2010 Census, the Village's population increased by 4,801 people, from 10,034 in 2000 to

14,835 in 2010, which represents an increase of 47.8%. This growth rate was the second-fastest in the State, just behind the City of Rio Rancho, which had a population growth rate of 69.1% in 10 years ⁽¹⁾. Similarly, Valencia County grew by 15.7%, which placed it as the fifth-fastest-growing county in New Mexico.

2.3.1 Population Projection Methodology

MRCOG of New Mexico is a governmental agency which represents the counties of Bernalillo, Valencia, Tarrant, and Sandoval. The Owner requested that this Report utilize the MRCOG population projections to determine future growth. The MRCOG recently completed the 2035 Regional Forecast ⁽³⁾, which provides growth projections for the four counties previously listed. The MRCOG also has population forecasts for years 2015 and 2025.

Utilizing the Data Analysis Subzones (DASZ) identified by the Village for the project planning area, the MRCOG data are summarized in Table 2-2. This information shows that by 2035, if the Village expands to include all of the identified DASZ, the population will be about 49,246. By calculating the average annual growth rate from the 2025 and the 2035 data for each DASZ and applying that rate forward, the planning year (2041) population is anticipated to reach approximately 56,258.

TABLE 2-2
MRCOG GROWTH FORECASTS

DASZ #	Population				Average Annual Growth Rate	
	2015	2025	2035	2041	2015 to 2025	2025 to 2035
4141	3,333	3,235	5,089	6,679	-0.30%	4.63%
4142	126	176	233	276	3.40%	2.85%
4143	373	382	393	400	0.24%	0.28%
4144	926	1,078	1,056	1,043	1.53%	-0.21%
4145	1,269	1,292	1,254	1,232	0.18%	-0.30%
4146	394	381	369	362	-0.33%	-0.32%
4152	6	26	26	26	15.79%	0.00%
4153	0	0	0	0	0.00%	0.00%
4154	5,041	12,134	14,957	16,957	9.18%	2.11%
4161	3,993	3,995	3,964	3,946	0.01%	-0.08%
4162	1,428	2,713	4,333	5,738	6.63%	4.79%
4163	393	440	455	464	1.14%	0.34%
4164	2,157	2,124	2,473	2,709	-0.15%	1.53%
4165	1,293	1,916	2,595	3,113	4.01%	3.08%
4166	2,813	2,826	3,823	4,583	0.05%	3.07%
4167	251	279	318	344	1.06%	1.32%
4521	2,565	2,518	2,477	2,453	-0.18%	-0.16%
4522	284	273	263	257	-0.39%	-0.37%
4523	3,059	2,984	3,374	3,632	-0.25%	1.24%
4524	1,124	1,443	1,794	2,044	2.53%	2.20%
TOTAL	30,828	40,215	49,246	56,258	2.69%	2.05%

It will take time for the Village to annex in all of the DASZ listed in Table 2-2. Therefore, it does not make sense to utilize the total population listed for years 2015 and 2025 in the project planning. Assuming that linear growth in the Village will occur, through population increase and expansion of the Village limits, between the 2010 population (14,835) and the 2041 population (56,258), the average annual growth rate is 4.39%. Table 2-3 provides the population projections for the Village if this average annual growth rate is applied to the 2010 Census population through the duration of the planning period.

TABLE 2-3
VILLAGE OF LOS LUNAS POPULATION PROJECTIONS

Year	Population	Year	Population
2010	14,835	2026	29,517
2011	15,487	2027	30,814
2012	16,167	2028	32,168
2013	16,878	2029	33,581
2014	17,619	2030	35,057
2015	18,393	2031	36,597
2016	19,201	2032	38,205
2017	20,045	2033	39,883
2018	20,926	2034	41,636
2019	21,845	2035	43,465
2020	22,805	2036	45,375
2021	23,807	2037	47,368
2022	24,853	2038	49,450
2023	25,945	2039	51,622
2024	27,085	2040	53,890
2025	28,275	2041	56,258

2.4 Wastewater Flow Projections

2.4.1 Historical Wastewater Flow Data

Historical wastewater flow records for the Village’s WWTP show that the average influent does not exhibit significant monthly variations, as shown in Figure 2-3. The increase in flow first seen after November 2011 is due to the connection of the Central New Mexico Correctional Facility (CNMCF) to the municipal sanitary sewer collection system.

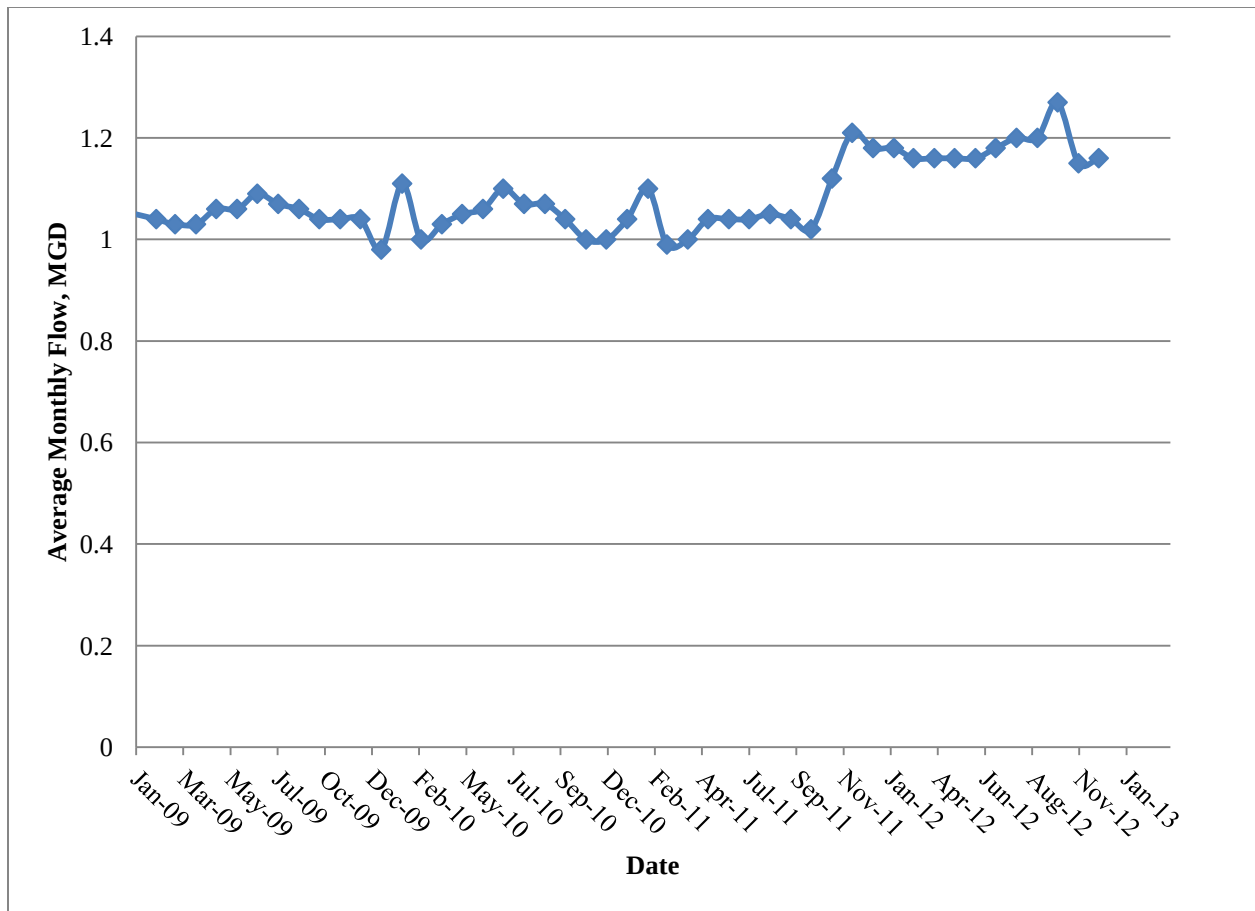


FIGURE 2-3
AVERAGE MONTH WASTEWATER FLOWS 2009-2012

Table 2-4 presents the average monthly flows from January 2009 to December 2012. The annual average for 2009 is 1.05 MGD, for 2010 1.04 MGD, for 2011 1.06 MGD, and for 2012 is 1.18 MGD.

TABLE 2-4
VILLAGE OF LOS LUNAS HISTORICAL WASTEWATER FLOW (*)

Month	Flow, Month Average, MGD				
	Avg. Month, 2009	Avg. Month, 2010	Avg. Month, 2011	Avg. Month, 2012	Avg. Month, 2013
January	1.05	0.98	1.04	1.18	Data not available (As of Jan. 2013)
February	1.04	1.11	1.10	1.18	
March	1.03	1.00	0.99	1.16	
April	1.03	1.03	1.00	1.16	
May	1.06	1.05	1.04	1.16	
June	1.06	1.06	1.04	1.16	
July	1.09	1.10	1.04	1.18	
August	1.07	1.07	1.05	1.20	
September	1.06	1.07	1.04	1.20	
October	1.04	1.04	1.02	1.27	
November	1.04	1.00	1.12	1.15	
December	1.04	1.00	1.21	1.16	
Average	1.05	1.04	1.06	1.18	

(*) Source: Discharge Monitoring Reports (DMRs) submitted to the EPA.

2.4.2 Residential and Commercial Flows

As stated in Section 2.3 of this Report, the 2010 Census data shows the Village with a population of 14,835. The 2010 Census housing data lists 5,916 total housing units in the Village. This results in approximately 2.51 persons per household. However, not all of the houses in the Village are connected to the sewer collection system. The total number of residential sewer connections and commercial sewer connections in the Village for 2010 were 4,926 and 319, respectively.

According to the Owner, none of the commercial sewer connections are significant water users and therefore do not discharge substantial amounts of sewage. If the total number of connections (residential and commercial) is multiplied by 2.51 persons per household, the resulting equivalent population served by the collection system and discharging into the WWTP is

approximately 13,153. If the average day flow from 2010 is divided by the equivalent population connected to the sewer system, the resulting wastewater flow contribution is about 80 gallons per capita per day (gpcd).

Future residential flows are expected to be generated by the connection of customers not currently served by a central WWTP (annexation), future customers from platted subdivisions, future customers from unplatted subdivisions, and future commercial establishments, all within the project planning area delineated in Figure 2-2.

2.4.3 Industrial and Institutional Wastewater Flow

There are no major industries located in the Village, and at this point in time there are no plans under active consideration. CNMCF is located in Los Lunas. In November 2011, the CNMCF was connected to the municipal sewer system; thus, its discharge has been received at the Los Lunas WWTP since then and is reflected in the increase in flows, as shown in Figure 2-3.

2.4.4 Infiltration and Inflow

Hourly flow data was obtained from the Owner for the significant precipitation events over the past five years. Upon evaluation of the data, there were no discernible flow increases at the WWTP corresponding to rainfall. The collection system is mostly new, and many of the older areas have been rehabilitated. In addition, the per capita flow contribution of 80 gpcd previously estimated falls within the typical range for communities with minimal infiltration and inflow (I/I). It is therefore concluded that only minimal I/I exists within the Village's collection system. It is assumed that the 80 gpcd flow contribution accounts for average I/I in the sewer system.

2.4.5 Total Wastewater Flow Projections

Table 2-5 presents the wastewater flow projections to the Village's WWTP from residential, commercial, and institutional users through the project planning period. It was assumed that 100% of the population will be connected to the sewer collection system in these projections.

TABLE 2-5
WASTEWATER FLOW PROJECTIONS (*)

Year	Population	Projected Residential and Commercial Flows, MGD	Projected CNMCF Flow, MGD	Total Projected Flow, MGD
2010	14,835	1.19	0.00	1.19
2011	15,487	1.24	0.17	1.41
2012	16,167	1.29	0.17	1.46
2013	16,878	1.35	0.17	1.52
2014	17,619	1.41	0.17	1.58
2015	18,393	1.47	0.17	1.64
2016	19,201	1.54	0.17	1.71
2017	20,045	1.60	0.17	1.77
2018	20,926	1.67	0.17	1.84
2019	21,845	1.75	0.17	1.92
2020	22,805	1.82	0.17	1.99
2021	23,807	1.90	0.17	2.07
2022	24,853	1.99	0.17	2.16
2023	25,945	2.08	0.17	2.25
2024	27,085	2.17	0.17	2.34
2025	28,275	2.26	0.17	2.43
2026	29,517	2.36	0.17	2.53
2027	30,814	2.47	0.17	2.64
2028	32,168	2.57	0.17	2.74
2029	33,581	2.69	0.17	2.86
2030	35,057	2.80	0.17	2.97
2031	36,597	2.93	0.17	3.10
2032	38,205	3.06	0.17	3.23
2033	39,883	3.19	0.17	3.36
2034	41,636	3.33	0.17	3.50
2035	43,465	3.48	0.17	3.65
2036	45,375	3.63	0.17	3.80
2037	47,368	3.79	0.17	3.96
2038	49,450	3.96	0.17	4.13
2039	51,622	4.13	0.17	4.30
2040	53,890	4.31	0.17	4.48
2041	56,258	4.50	0.17	4.67

(*) Based on 80 gpcd

Flow from the CNMCF assumed at 0.17 MGD was added starting in 2011.

Figure 2-4 shows a summary of flow projections through the planning period. At the end of the 30-year planning period, the total projected flow to the WWTP is 4.67 MGD, which for practical purposes was rounded to 4.7 MGD.

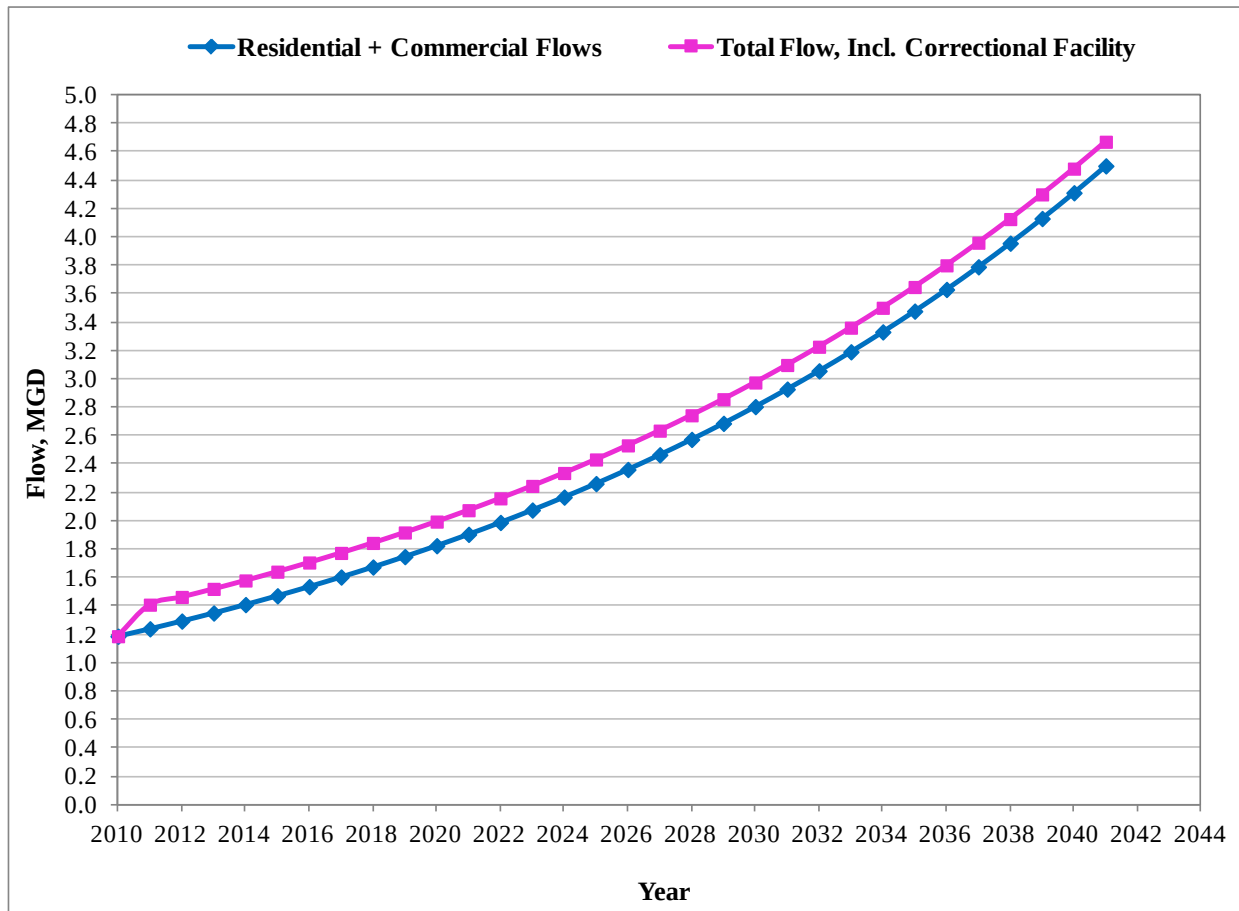


FIGURE 2-4
WASTEWATER FLOW PROJECTIONS 2010-2041

2.5 References

- 1) Census Bureau, “U.S. Census Bureau Delivers New Mexico’s 2010 Census Population Totals”. Webpage retrieved March 18, 2011. <http://2010.census.gov/news/releases/operations/cb11-cn87.html>
- 2) Western Regional Climate Center, Climate Data for Los Lunas, NM. Webpage retrieved May 24, 2013. <http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?nm5150>.
- 3) Mid Region Council of Governments of New Mexico. Webpage retrieved May 30, 2012. <http://www.mrcog-nm.gov/>.

3.0 EXISTING FACILITIES

As previously presented in Section 2.0 of this Report, at the end of the 30-year planning period, the projected flow to the wastewater treatment plant (WWTP) is 4.7 million gallons per day (MGD).

This Section of the Preliminary Engineering Report describes the existing sewer system, wastewater treatment, and sludge treatment disposal facilities operated by the Village.

3.1 Location Map

Figure 3-1 shows the layout for the Village's main interceptors in the sewer collection system.

Figure 3-2 shows the site and layout of the existing Village of Los Lunas WWTP. Figure 3-3 shows the location and layout of the sludge disposal site.

3.2 History of Wastewater Facilities in Los Lunas

3.2.1 Sewer Collection System

The Village's sanitary sewer collection system is comprised of many small lines (8-inch diameter typical) that feed into the main interceptor system. The interceptors range in size from 8-inch to 30-inch diameter. Since 2005, the Village has implemented all of the recommended improvements made by their Consulting Engineers for the collection system to allow for the ultimate build-out of the community as recommended in the Wastewater Facilities Plan Addendum PER (Molzen-Corbin & Associates, 2005).

The collection system improvements primarily consisted of intercepting all of the wastewater flows west of NM 314 for routing to the Morris Road lift station. The areas west of NM 314 are slated for the majority of growth in Los Lunas. The Morris Road lift station delivers these wastewater flows to the new Membrane Bioreactors (MBR) Wastewater Treatment Plant

(WWTP). The sewer east of NM 314 is routed to an 18-inch gravity interceptor, which flows into the existing activated sludge WWTP influent lift station. The portion of the collection system east of NM 314 is the oldest in the Village.

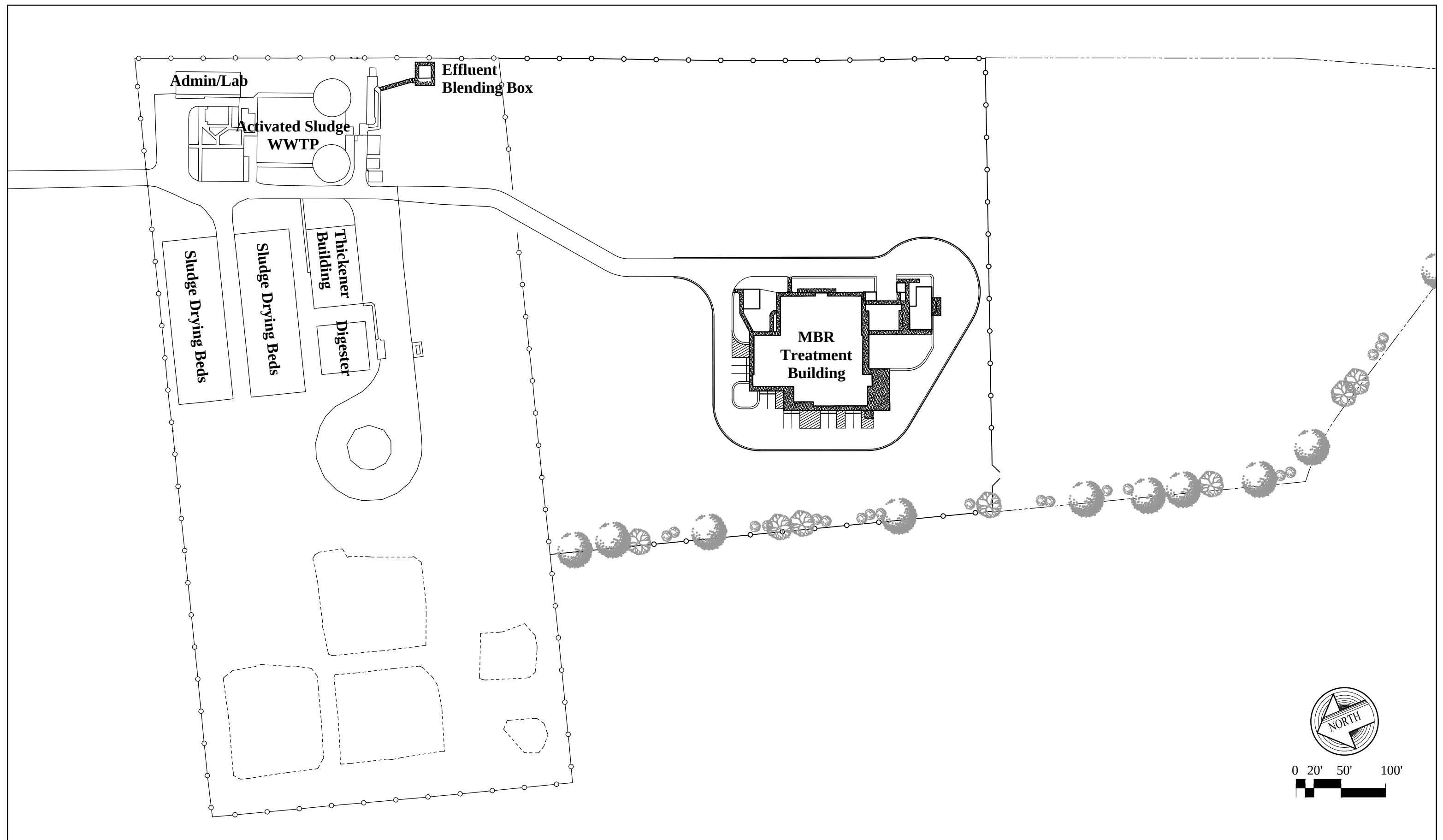
Recommendations made in the Wastewater Facilities Plan Addendum PER (Molzen-Corbin & Associates, 2005) to correct inflow problems included:

- Replace existing manhole covers with lids that fit flush with the top of the ring and do not have holes.
- Fit existing covers with an inner ring to raise the cover above ponding height and weld the vent holes shut.
- Use manhole inserts to prevent water from seeping into the collection system through the outer edges of the manhole ring.

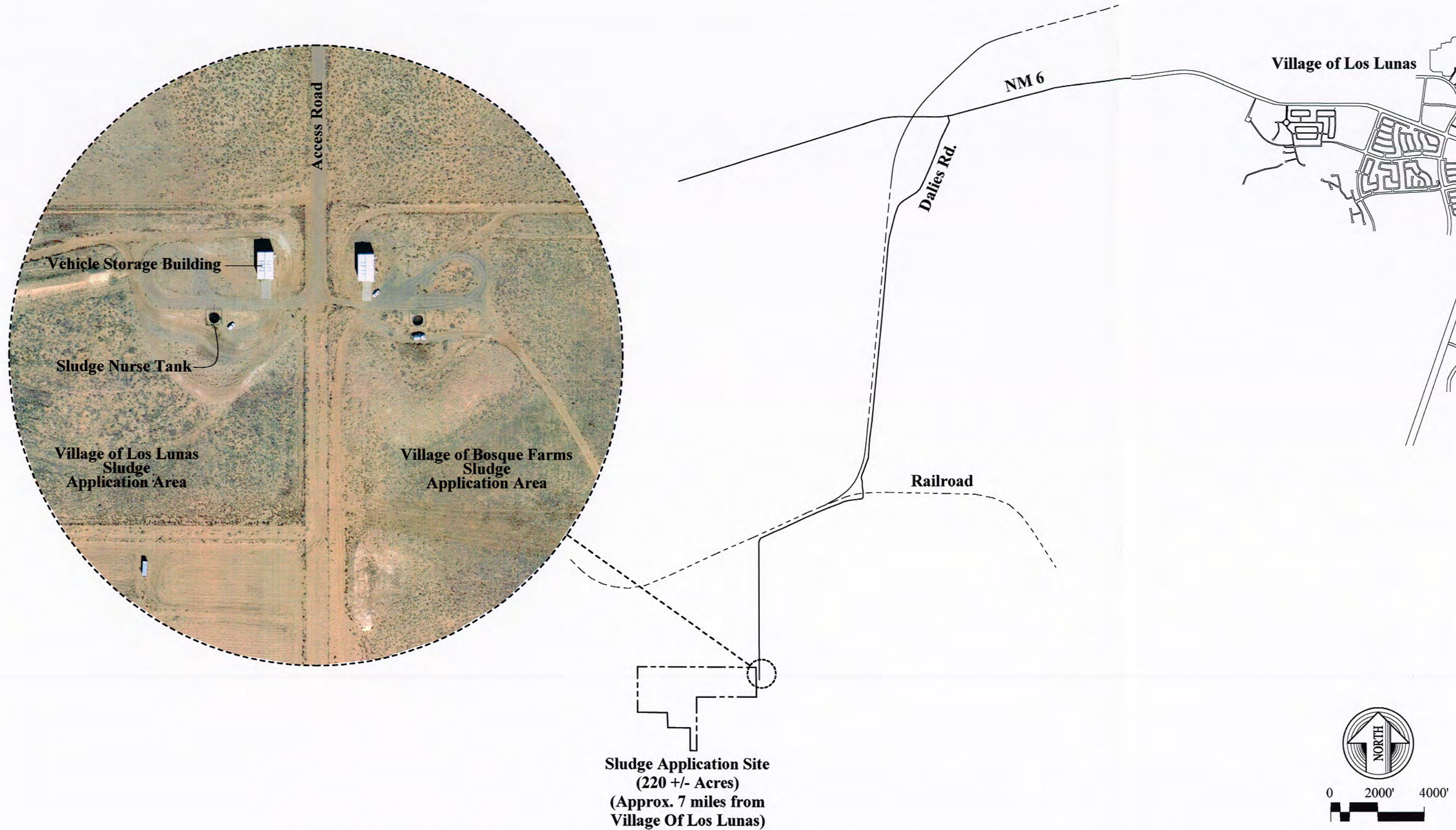
As stated in Section 2.4.4, there does not appear to be a significant amount of infiltration and inflow (I/I) within the Village's collection system. However, to ensure that I/I continue to have a minimal impact, the Village should use their sewer line televising equipment to survey the collection system to identify problematic areas and make spot repairs as necessary.

For additional detailed information regarding the Village's collection system, refer to the following reports:

- Wastewater Facilities Plan, Draft, Molzen-Corbin & Associates, 1996
- Wastewater Facilities Plan and Environmental Information Document, Final, Molzen-Corbin & Associates, 1998
- Wastewater Facilities Plan Update, Molzen-Corbin & Associates, 2000
- Wastewater Facilities Plan Addendum Preliminary Engineering Report, Final, Molzen-Corbin & Associates, 2005



Los Lunas Wastewater Treatment and Sludge Management - PER



3.2.2 Activated Sludge Wastewater Treatment Plant

The existing Activated Sludge wastewater treatment plant was constructed in 1981 as an extended aeration process with a design capacity of 0.7 MGD. In 1992, the plant was converted to a conventional activated sludge process, thereby increasing the capacity to approximately 1.2 MGD with discharge standards current for the time. Major treatment unit processes of this plant included: an influent lift station equipped with three Archimedes screw pumps, two bar screens, an aerated grit chamber, two aeration basins, two final clarifiers, two post-aeration basins, disinfection system, administration/laboratory building, and blowers/maintenance room.

Due to changes in the National Pollutant Discharge Elimination System (NPDES) permit issued in the mid-1990s, the design capacity of the plant was de-rated from approximately 1.2 MGD to 0.8 MGD. This drop in rated capacity was necessary because an increase in detention time was required within certain process units in order to convert ammonia to nitrate, which was required for compliance with the effluent discharge limits. The treatment capacity of the final clarifiers was also reduced to some extent because nitrified sludge settles at a slower rate than conventional sludge.

The original effluent disinfection method was chlorination, which was replaced in 1995 with an open channel ultraviolet (UV) light system. The most recent improvements to this facility were the replacement of the screw pumps at the influent lift station with submersible pumps in 2007 and electrical (controls) modifications to the effluent pumps in 2010. As of 2012, the activated sludge plant is still in service and fully operational.

3.2.3 Sludge Treatment and Disposal

Sludge treatment at the Village's WWTP begins with mixed liquor being wasted from the activated sludge process (WAS), which is then thickened by a gravity belt thickener (GBT) to remove water and increase solids concentration. The thickened sludge is pumped into the covered aerobic digesters for stabilization of biosolids.

There are four separate basins in the aerobic digester, referred to as Cells 1, 2, 3, and 4. The aeration system for the digesters is near the end of its design life, and portions of the system are failing due to the corrosive conditions that exist in the digesters. Also, the aeration system for Cells 1 and 2 was modified in 2007 to replace the air piping and related components that were corroding at that time. Similar emergency repairs and improvements to the aeration system in Cells 3 and 4 were completed in March 2011.

Digested sludge is disposed of by surface application at the Village's sludge disposal site, located approximately nine (9) miles southwest of the plant. The existing sludge disposal facilities were constructed in 1997 to comply with changes in regulations at that time for sludge disposal. The current facilities consist of approximately 220 acres, of which about 200 acres are used for sludge application, a temporary sludge holding tank and appurtenances, and a building for storage of the Terra Gator (vehicle used for sludge disposal/application).

3.2.4 Membrane Bioreactors (MBR) Plant

The new MBR wastewater treatment facility started construction in 2007 and began operations in early 2010. The Village is one of the few communities in New Mexico that currently has this state-of-the-art technology for treatment of domestic wastewater.

The MBR facility was designed to accommodate future growth and increases in wastewater flows by allowing for incremental increases in the hydraulic capacity in phases. The first phase of the MBR plant, which has been in operation since 2010, is capable of providing treatment to an average flow rate of 0.9 MGD. However, the plant capacity can be easily expanded to up to 1.8 MGD by adding the upper membrane cassettes to the MBR basins already in place.

Furthermore, the MBR plant was designed to allow for some changes in the NPDES permit, which may occur in the future. For instance, anaerobic basins were included in the hydraulic profile and layout of the treatment process. If phosphorus limits are included in future discharge permits, these basins could be added to the treatment process. A description of the different components of the MBR plant is presented in Section 3.4.8.2.

3.3 National Pollutant Discharge Elimination System (NPDES) Permit and Ground Water Discharge Plan (GWDP)

The Village's WWTP has two types of permits: an NPDES permit, which establishes the requirements for the discharge of liquid effluent into the Rio Grande, and a GWDP for disposal of biosolids by land application at the sludge disposal site.

3.3.1 Past Changes in NPDES Permit Requirements

As mentioned previously, the wastewater treatment plant constructed in 1981 was modified from an extended aeration process to an activated sludge system in 1992. The modifications allowed for an increase in capacity from 0.7 MGD to 1.3 MGD. However, due to subsequent changes in the NPDES permit, process adjustments had to be made to meet new limits in the permit in the 1990s. These changes were made mainly in response to the requirement to comply with ammonia toxicity limits; therefore, the plant had to be de-rated to approximately 0.8 MGD to increase the detention time needed for the process.

3.3.2 Potential Changes in Future NPDES Permits

The previous NPDES permit expired on June 30, 2012, as shown in the copy provided in Appendix A of this Report. That permit was based on a plant design flow of 0.9 MGD. The average flow to the treatment facility is now about 1.3 MGD since the CNMCF was connected to the Village's sewer system in November 2011. A draft of the new NPDES permit was issued in December, 2012 for public comment. The Fact Sheet for the new permit has been included in Appendix A.

With regard to potential modifications to the NPDES permit as a result of changes in water quality standards or impairment, the most recent total maximum daily load (TMDL) for the Middle Rio Grande Watershed approved by the US EPA (June 2010) identified two issues: total dissolved aluminum and *E. coli*. Selected pages of the TMDL are included in Appendix B of this Report, and the complete 170-page document can be downloaded from the NMED website (see reference at the end of Section 3.0 of this PER). However, the impairment for dissolved

aluminum was identified on the segment of the Rio Grande from San Marcial to Rio Puerco only. With regard to *E. coli*, several segments of the river were identified as impaired (see list in Appendix B).

Of the two parameters identified as causes of impairment, only *E. coli* may have an effect on the effluent quality requirements for the Village's WWTP. However, because *E. coli* standards can be easily met by appropriate effluent disinfection, there should not be a major concern to meet current or even future disinfection requirements. The WWTP is equipped with two separate ultraviolet (UV) light systems (one at the old plant and one at the MBR facility) capable of providing adequate disinfection to the plant effluent.

It should be noted that at this time, there are no nutrient impairments (phosphorus or nitrogen) identified for the Rio Grande in the vicinity of Los Lunas. The NMED Surface Water Quality Bureau was contacted in September, 2012 for comments regarding this report and potential future NPDES permit modifications. To date, no comments have been received.

3.3.3 Ground Water Discharge Plan (GWDP) for Sludge Disposal

The first permit application for disposal of sludge was submitted to the NMED Ground Water Quality Bureau in 1996. The permit number DP-1053 was issued on May 9, 1996 for surface disposal (land application) of up to 35,000 gpd (on a single day, but also maximum for a week) of treated sludge. The new GWDP permit allows for up to 45,000 gpd of treated sludge to be discharged. Copies of the previous and current permits are provided in Appendix C.

The Village is authorized to dispose of sludge by surface spray application or subsurface injection on the approximately 220-acre disposal site. The GWDP establishes that the sludge needs to be evenly distributed over each parcel on a rotational basis. The Village is required to submit semi-annual monitoring reports to the NMED. The sludge transported to the disposal site must be analyzed quarterly for total Kjeldahl nitrogen (TKN) and nitrate (NO₃-N) concentrations. The amount of total nitrogen applied with the sludge is limited to 200 pounds per acre per year.

3.4 Condition of Existing Facilities

The condition of the existing facilities was evaluated from two different perspectives:

- 1) the capability to comply with current regulations for liquid effluent and sludge disposal; and,
- 2) the actual mechanical condition of the equipment, and the hydraulic capacity of the different unit operations, equipment, and processes.

3.4.1 Existing NPDES Permit

The Village currently operates its existing WWTP under the NPDES permit NM0020303 issued by the U.S. Environmental Protection Agency (USEPA) on May 31, 2007. This permit became effective July 1, 2007 and expired on June 30, 2012. A copy of the expired NPDES permit and the Fact Sheet from the Draft NPDES permit are included in Appendix A. Discharge limits from the expired permit are presented in Table 3-1. Both the activated sludge and the MBR plants use UV light for disinfection. However, when chlorine is used in any process throughout the plant, the effluent limitation for chlorine is 19 micrograms per liter (ug/L). This limit must be met when sodium hypochlorite (NaOCl) is used for chemical cleaning of the membranes. The NPDES permit also contains general information and requirements for sewage sludge treatment and disposal (see copy of the permit in Appendix A of this PER).

TABLE 3-1
VILLAGE OF LOS LUNAS WWTP NPDES PERMIT LIMITS

Effluent Characteristics	Discharge Limitations		
	30-day average (lbs/day)	Concentration (mg/L) (Unless noted)	
		30-day Average	7-day Average
Flow	Report	N/A	N/A
Biochemical Oxygen Demand (5-day)	225	30	45
Total Suspended Solids	225	30	45
<i>E. coli</i> Bacteria (cfu/100 ml)	N/A	126	410 (daily max.)
pH	6.6 minimum, 9.0 maximum		
Whole Effluent Toxicity	48-Hr Acute NOEC Freshwater		
Species	<i>Daphnia pulex</i> , <i>Pimephales promelas</i>		
Critical Dilution	14%		
No detectable chlorine in effluent.			
No discharge of oils, scum, grease, and other floating materials that would cause the formation of a visible sheen or visible deposits on the bottom or shoreline.			

3.4.1.1 Compliance with NPDES Permit

Table 3-2 presents a summary of the monthly discharge monitoring reports (DMRs) submitted to the EPA for the period January 2010 to December 2012. During startup of the MBR plant in January 2010, due to equipment failure, the activated sludge plant was hydraulically overloaded. This resulted in process upset and release of TSS from the secondary clarifiers, exceeding the discharge limit of 30 mg/L TSS and 225 lbs TSS/day. There is also one exceedance of *E. coli* (September 2011) due to equipment failure. The occurrences were reported to regulatory agencies and the problem was resolved within days.

**TABLE 3-2
HISTORIC EFFLUENT QUALITY 2010-2012**

From	To	Parameter and Limits in Current NPDES Permit								
		Flow, month avg, MGD	Flow, daily max, MGD	BOD, mg/L	BOD, lbs/day	TSS, mg/l	TSS, lbs/day	pH, min	pH, max	E.coli, #/100 ml
		Report		30	225	30	225	6.6	9.0	126
1/1/09	1/31/09	1.05	1.26	8.07	69.05	17.50	149.70	7.25	7.58	5
2/1/09	2/28/09	1.04	1.10	19.00	161.63	25.00	212.67	7.25	7.52	54
3/1/09	3/31/09	1.03	1.11	5.50	46.79	7.50	63.80	7.46	7.68	10
4/1/09	4/30/09	1.03	1.09	4.50	37.90	8.00	67.39	7.53	7.88	2
5/1/09	5/31/09	1.06	1.21	5.50	47.96	10.00	87.28	7.47	7.76	27
6/1/09	6/30/09	1.06	1.17	4.00	35.03	6.00	52.54	7.57	7.62	8
7/1/09	7/31/09	1.09	1.18	3.90	34.88	12.80	114.54	7.50	7.77	36
8/1/09	8/31/09	1.07	1.14	5.80	50.85	19.00	166.59	7.52	7.74	19
9/1/09	9/30/09	1.06	1.16	3.00	26.40	4.00	30.86	7.52	7.63	20
10/1/09	10/31/09	1.04	1.13	2.95	25.21	7.05	60.33	7.43	7.78	16
11/1/09	11/30/09	1.04	1.13	2.75	22.90	2.25	18.77	7.37	7.56	9
12/1/09	12/31/09	1.04	1.12	2.87	24.37	2.45	20.84	7.38	7.58	10
1/1/10	1/31/10	0.98	1.26	6.39	43.47	70.03	540.69	7.34	7.60	118
2/1/10	2/28/10	1.11	1.23	8.03	70.63	8.80	77.38	7.45	7.61	19
3/1/10	3/31/10	1.00	1.20	4.05	32.58	5.20	41.61	7.47	7.57	49
4/1/10	4/30/10	1.03	1.14	2.56	21.43	3.55	29.80	7.54	7.68	12
5/1/10	5/31/10	1.05	1.22	2.51	21.46	2.90	24.78	7.42	7.59	12
6/1/10	6/30/10	1.06	1.13	2.33	19.97	2.80	23.57	7.49	7.59	15
7/1/10	7/31/10	1.10	1.27	1.95	17.53	1.05	9.40	7.43	8.01	7.0
8/1/10	8/31/10	1.07	1.17	1.87	17.04	1.35	12.16	7.38	7.56	11
9/1/10	9/30/10	1.07	1.31	1.50	13.57	2.63	23.28	7.47	7.75	23
10/1/10	10/31/10	1.04	1.19	2.09	18.78	1.65	14.90	7.40	7.52	15
11/1/10	11/30/10	1.00	1.16	1.81	14.48	1.30	10.47	7.38	7.55	42
12/1/10	12/31/10	1.00	1.09	2.03	16.49	1.66	13.57	7.30	7.48	3
1/1/11	1/31/11	1.04	1.54	3.03	25.77	2.78	23.86	7.24	7.44	3
2/1/11	2/28/11	1.10	1.58	2.56	21.65	1.95	16.33	7.36	7.42	5
3/1/11	3/31/11	0.99	1.06	2.13	18.01	1.70	14.36	7.18	7.52	22
4/1/11	4/30/11	1.00	1.22	2.62	21.48	2.94	24.00	7.19	7.51	97

From	To	Parameter and Limits in Current NPDES Permit								
		Flow, month avg, MGD	Flow, daily max, MGD	BOD, mg/L	BOD, lbs/day	TSS, mg/l	TSS, lbs/day	pH, min	pH, max	E.coli, #/100 ml
		Report		30	225	30	225	6.6	9.0	126
5/1/11	5/31/11	1.04	1.15	2.61	22.7	4.75	41.3	7.32	7.5	30
6/1/11	6/30/11	1.04	1.77	2.89	24.9	1.60	14.55	7.34	7.46	67
7/1/11	7/31/11	1.04	1.18	2.16	18.53	1.65	14.14	7.35	7.49	40
8/1/11	8/31/11	1.05	1.34	1.79	15.78	1.42	12.41	7.39	7.6	29
9/1/11	9/30/11	1.04	1.21	3.20	28.14	1.00	7.55	7.16	7.52	170
10/1/11	10/31/11	1.02	1.11	2.40	20.25	1.70	14.27	7.2	7.46	49
11/1/11	11/30/11	1.12	1.24	3.50	32.19	5.58	50.33	7.12	7.31	109
12/1/11	12/31/11	1.21	1.36	3.61	36.93	2.20	21.92	7.05	7.34	95
1/1/12	1/31/12	1.18	1.30	6.10	60.05	5.40	53.05	7.08	7.77	8
2/1/12	2/29/12	1.18	1.36	5.18	47.67	5.34	49.23	7.17	7.52	9
3/1/12	3/31/12	1.16	1.24	5.75	55.78	4.56	44.51	7.04	7.27	24
4/1/12	4/30/12	1.16	1.22	2.80	27.69	2.90	28.91	7.36	7.54	31
5/1/12	5/31/12	1.16	1.24	2.69	26.23	3.54	34.53	7.36	7.46	15
6/1/12	6/30/12	1.16	1.43	4.28	42.31	2.35	23.3	7.43	7.58	37
7/1/12	7/31/12	1.18	1.27	3.69	35.79	1.45	20.18	7.16	7.43	65
8/1/12	8/31/12	1.20	1.58	2.89	27.68	2.75	26.26	7.19	7.23	52
9/1/12	9/30/12	1.20	1.54	1.80	17.95	1.98	19.60	7.4	7.51	68
10/1/12	10/31/12	1.27	2.20	3.22	30.25	3.53	32.73	7.33	7.5	57
11/1/12	11/30/12	1.15	1.31	3.92	35.59	4.89	44.41	7.33	7.49	37
12/1/12	12/31/12	1.16	1.29	5.22	54.35	3.14	30.32	7.23	7.46	34

Figure 3-4 shows effluent concentrations for BOD and TSS from January 2009 to December 2012. In 2009, only the activated sludge plant was in service and the MBR facilities were under construction. During that period, effluent BOD and TSS were below the standard of 30 mg/L established in the NPDES permit. As mentioned previously, during startup of the MBR plant, all sewage had to be re-directed to the activated sludge plant, causing process upsets which resulted in the temporary breakthrough of TSS, exceeding the limit in the permit. Once the MBR reached steady state conditions, the quality of the effluent has substantially improved, as can be seen in Figure 3-4. Typically, the blended effluent has a concentration below 5 mg/L of BOD and TSS and often below detection limits.

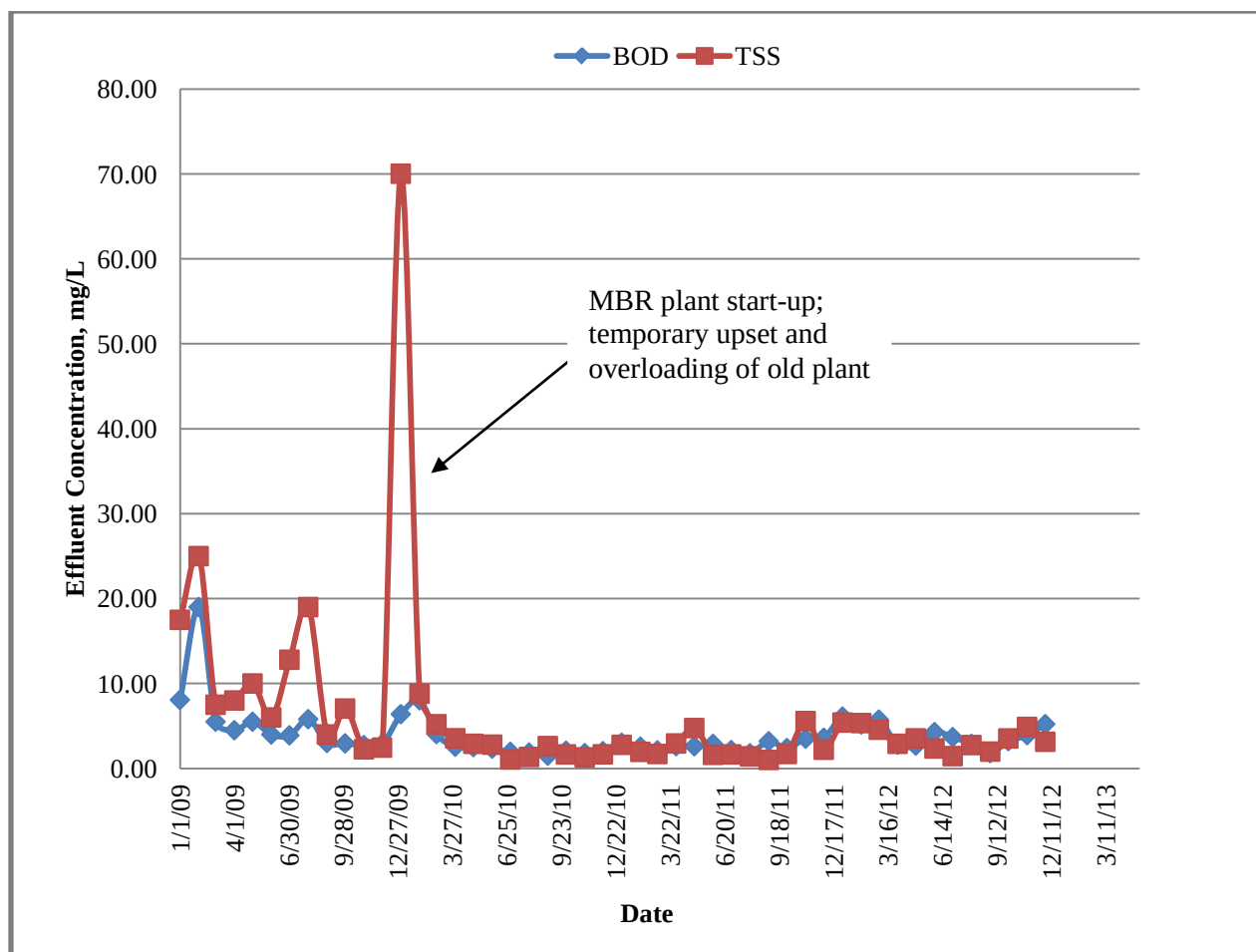


**FIGURE 3-4
WWTP EFFLUENT BOD AND TSS CONCENTRATIONS**

As previously shown in Table 3-1, the facility is required to conduct the whole effluent toxicity (WET) test twice semi-annually on two species. DMRs for the WET test were provided for the periods of 1/01/2009–6/30/2009, 7/1/2009–12/31/2009, 1/01/2010–6/30/2010, 7/1/2010-12/31/2010, 1/01/2011–6/30/2011, 7/1/2011–12/31/2011, and 1/01/2012–6/30/2012, and 7/1/2012-12/31/2012. The results of all the tests have been reported as “Pass”.

3.4.2 Water Quality Standards

As mentioned earlier, the Village’s WWTP discharges treated effluent into the Rio Grande. Per NMED, Water Quality Standards define water quality goals by designating uses for rivers,

streams, lakes and other surface waters, setting criteria to protect those uses and establishing anti-degradation provisions to preserve water quality. The new US EPA approved water quality standards became effective on November 20, 2012. The water quality standards for the Rio Grande segment, where the Village's treatment plant discharges effluent, are presented in Table 3-3.

TABLE 3-3
RIO GRANDE SYSTEM STREAM STANDARDS SUMMARY

Section 20.6.4.105	RIO GRANDE BASIN – The main stem of the Rio Grande from the headwaters of Elephant Butte reservoir upstream to Alameda Bridge (Corrales Bridge), excluding waters on Isleta Pueblo.
Designated Uses	Irrigation, marginal warmwater aquatic life, livestock watering, public water supply, wildlife habitat and primary contact
Criteria	1) Use-specific numeric criteria are applicable to the designated uses. Some examples are presented below. Refer to source document cited below for more detailed information. a) Irrigation: (1) dissolved selenium 0.13 mg/L (2) 0.25 mg/L dissolved selenium in presence of >500 mg/L SO₄. b) Marginal Warmwater Aquatic Life: dissolved oxygen 5 mg/L or more, pH within the range of 6.6 to 9.0 and maximum temperature 32.2°C (90°F). c) Water supply: Water quality adequate for these uses is ensured by the general criteria and numeric criteria for bacterial quality, pH and temperature. d) Primary Contact: the monthly geometric mean of E. coli bacteria of 126 cfu/100 mL and single sample of 410 cfu/100 mL and pH within the range of 6.6 to 9.0 apply to this use. 2) At mean monthly flows above 100 cfs, the monthly average concentration for TDS 1,500 mg/L or less, sulfate 500 mg/L or less, and chloride 250 mg/L or less.

Source: <ftp://ftp.nmenv.state.nm.us/www/swqb/Standards/2012/20.6.4NMAC-IntegratedStandards-CWASStatus2012-11-20.pdf>. Webpage retrieved May 28, 2013.

3.4.3 Sludge Treatment and Disposal Regulations

3.4.3.1 Federal Regulations for Sludge Treatment and Disposal

The federal sludge regulation, Title 40 Code of Federal Regulations (CFR) Part 503, classifies sludge as Class A or Class B with respect to pathogens and vector attraction reduction. This regulation also sets site restrictions for sludge disposal.

The CFR Part 503, “Standards for the Use and Disposal of Sewage Sludge” (the Part 503 Rule), requires that wastewater solids be processed before they are land applied. This processing is referred to as “stabilization” and helps minimize odor generation, destroys pathogens, and reduces vector attraction potential ⁽⁷⁾. Aerobic digestion is one of the methods/technologies used for solids stabilization.

The Part 503 Rule defines two types of biosolids with respect to pathogen reduction, Class A and Class B, depending on the degree of treatment the solids have received. Both types are safe for land application, but additional requirements are imposed on Class B solids. Such requirements include: restricting public access to the application site, limiting livestock grazing, and controlling crop harvesting schedules. Class A biosolids (sludge treated so that there are no detectable pathogens) are not subject to these restrictions. In addition to stabilization, the Part 503 Rule sets maximum concentrations of metals, which cannot be exceeded in biosolids that will be land applied ⁽⁷⁾.

As previously mentioned in Section 2.2.2 and shown in Figure 3-3, the Village of Los Lunas owns a surface disposal site for final disposal of digested sludge. This site has been dedicated and permitted to receive Class B sludge since the mid-1990s.

3.4.3.2 State Regulations for Sludge Treatment and Disposal

Because the Village land-applies its wastewater sludge to a site less than 800 feet above a ground water source, regulations set by the NMED Ground Water Quality Bureau must be met. The main focus for these regulations is to prevent the ground water source from nitrate contamination. In addition, all ground water resources in the state with total dissolved solids (TDS) contents less than 10,000 mg/L are protected against nitrate contamination by NMED regulations.

The Village’s sludge disposal site is located above a water source, approximately 400 feet below ground, and with a TDS concentration of 150-350 mg/L. In order to comply with State regulations, the Village presented a Ground Water Discharge Plan to the NMED and received approval in May 1996 (DP-1053; see copy in Appendix C).

3.4.3.3 Compliance with the GWDP

The quality of the digested sludge currently produced by the Village's treatment plant conforms to current federal regulation 40 CFR Part 503 for Class B sludge. The Village achieves the pathogen reduction criteria through aerobic digestion and the mean cell residence time/temperature criteria (between 40 days at 20°C and 60 days at 15°C). Vector attraction reduction is most typically met by the Village through reduction of the volatile solids content by at least 38% during treatment.

The total nitrogen loading rate for the disposal site limits application to 200 pounds of nitrogen per acre per year (lb/ac/yr). According to the plant's Operations Staff, there is some concern about accumulation of nitrogen in a few of the parcels available for sludge disposal. One of these parcels has not been used for disposal of sludge since 2009. This has resulted in an increase in the frequency of rotation among the remaining parcels. The 2010 land application data showed the total nitrogen loading rate to be 117 lb/ac/yr.

As stated in 3.4.3.2, the main focus of the GWDP and the nitrogen application rate is to protect ground water. Historically the Village-monitored nitrogen migration in the ground is done by taking soil samples. Two samples are taken from each land application section (11 sections total) once a year. One sample was considered a "surface" sample and one sample was considered a "subsurface" sample. The depth of the soil samples has changed over time, but for the past four years the depth of the surface and subsurface samples has been at 24-inches and 48-inches, respectively. When the soil samples were taken from each section, another sample (surface and subsurface) was taken outside of the Village's land application site to serve as a "control" sample as a means to monitor the background conditions. With the new GWDP, soil sampling is no longer required.

Figure 3-5 shows a comparison of the surface and subsurface samples taken from the land application sections (averaged for all 11 sections) versus the control samples. From the Figure, it is interpreted that there is no apparent nitrogen migration from 24-inches to 48-inches below the

ground surface. This implies that the 200 lb/ac/yr total nitrogen application rate is sustainable by the site.

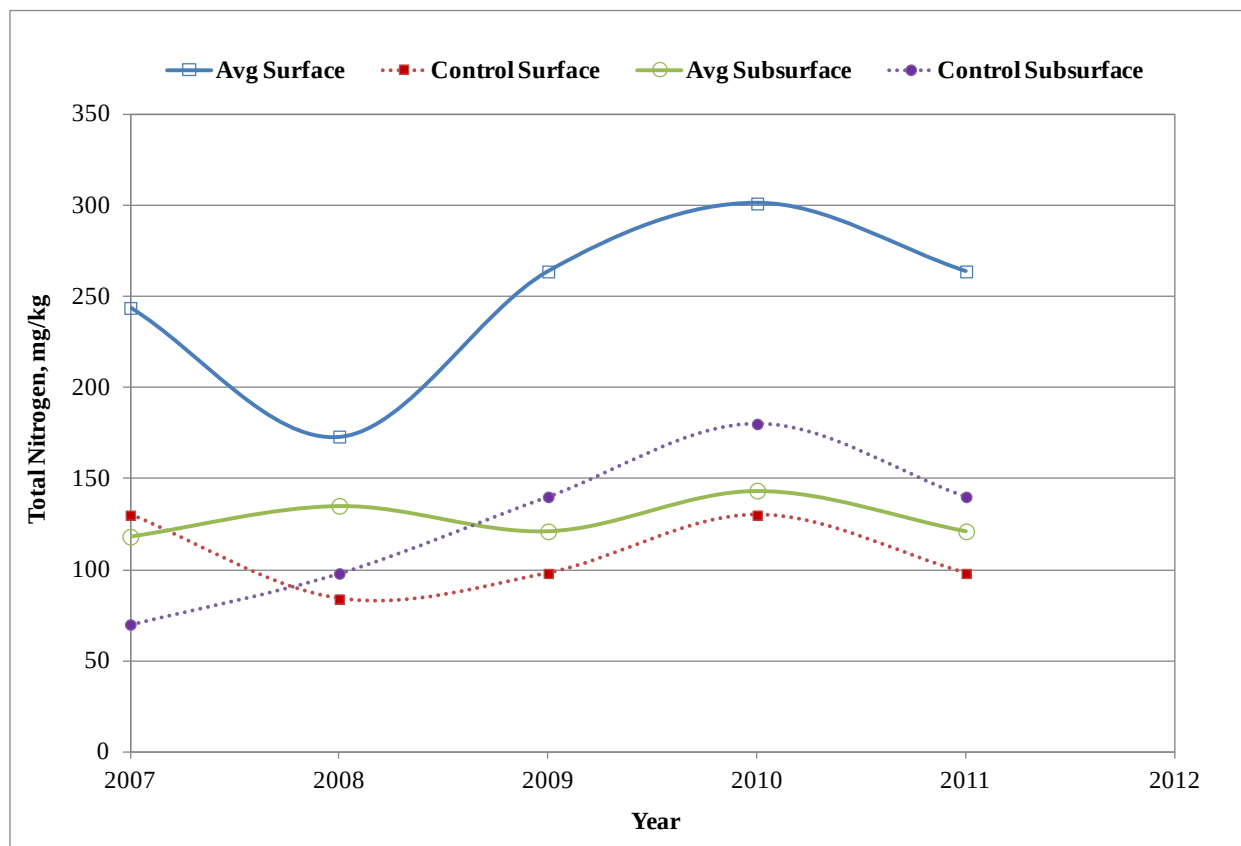


FIGURE 3-5
SLUDGE DISPOSAL SITE SOIL SAMPLING RESULTS

3.4.4 Sewer Collection System Capacity vs. Current Flows

A detailed evaluation of the capacity and current flows in the sewer collection system was done as part of the Wastewater Facilities Plan Addendum PER (Molzen-Corbin & Associates, 2005). The recommendations for improvement made in that report have been to ensure adequate conveyance capacities through the main interceptors for ultimate build-out of the Village. The Los Lunas sanitary sewer collection system, therefore, has adequate capacity for current as well as future projected flows. Additional sewer lines will need to be installed as the Village boundaries are extended and as existing vacant lands are developed.

3.4.5 Wastewater Treatment Capacity vs. Current Flows

Current wastewater treatment capacity was previously presented in Sections 3.2.2 and 3.2.4. The activated sludge plant has a capacity for up to 0.8 MGD and the MBR plant for up to 0.9 MGD (Phase 1). The total installed treatment capacity is 1.7 MGD. Currently, under normal operation conditions, approximately 0.5 MGD is diverted to the old activated sludge plant and about 0.7 MGD to the MBR plant. Per the plant Operations Staff, the activated sludge plant produces a better quality effluent if the flow is maintained close to 0.5 MGD rather than at design capacity of 0.8 MGD.

Flow data was obtained from the DMRs submitted to the EPA from January 2009 to December 2012. Figure 3-6 shows the average month flow and daily maximum in each month. The annual average in 2009 was 1.05 MGD, 1.04 MGD in 2010, 1.06 MGD in 2011, and 1.18 MGD in 2012. The historical daily maximum flow is 2.20 MGD recorded in October 2012.

Based on the average monthly flow rate for the past six months (1.2 MGD) and the current maximum installed combined capacity (1.7 MGD), the Village's facilities have a remaining average day capacity of 0.5 MGD, if both plants are operated at their maximum hydraulic capacity. However, as previously mentioned, the plant Operations Staff's preference is to operate the old plant at a maximum hydraulic rate of 0.5 MGD. Under this condition, the combined capacity of the two facilities is 1.4 MGD. Therefore, the reliable treatment capacity still available is only 0.2 MGD average day flow.

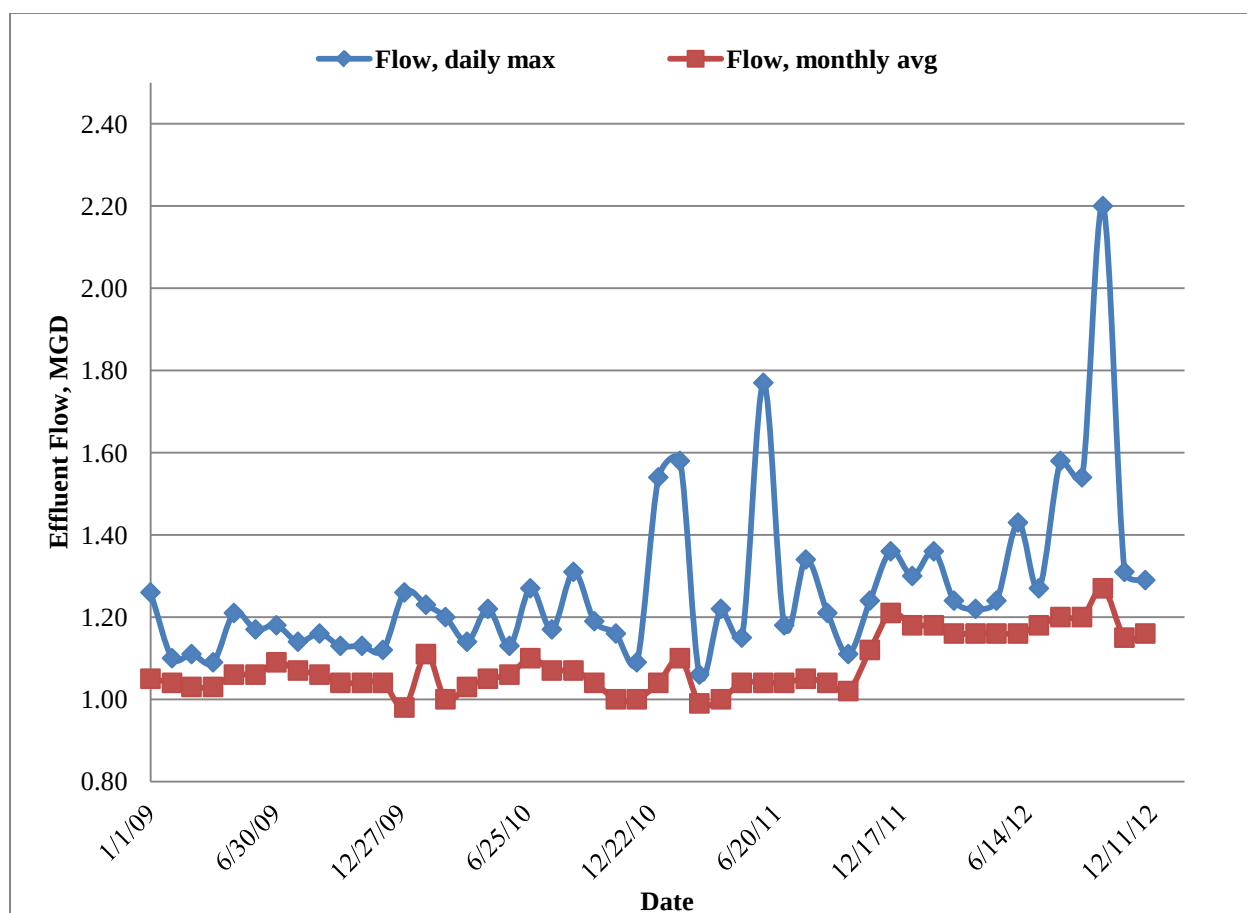


FIGURE 3-6
AVERAGE MONTH AND DAILY MAXIMUM FLOW

Figure 3-7 shows a summary of historic and current wastewater flows to the plant as well as the hydraulic capacity of the treatment facilities. The average daily flow for January 2009 through December 2012 is 1.27 MGD. The combined current capacity of the MBR plant (0.9 MGD) and the activated sludge plant (0.8 MGD) is 1.7 MGD which, based on the flow projections, will get the Village through approximately 2015. However, if the old plant continues to be operated at 0.5 MGD, the total plant capacity is only 1.4 MGD, which is the flow projected to be received by year 2014.

Once the second layer of cassettes is added to the MBR plant, the total combined treatment capacity of both plants will be increased to 2.6 MGD. Under this scenario, the Village will have sufficient treatment capacity until 2026, if all facilities are operated at their maximum design

capacity. However, the activated sludge plant is already more than 30 years old, and its continued use for the long term is questionable due to the difficulties in obtaining spare parts for some of the original equipment. The MBR plant alone, with both layers of cassettes (1.8 MGD), has enough capacity for the flows projected through 2017.

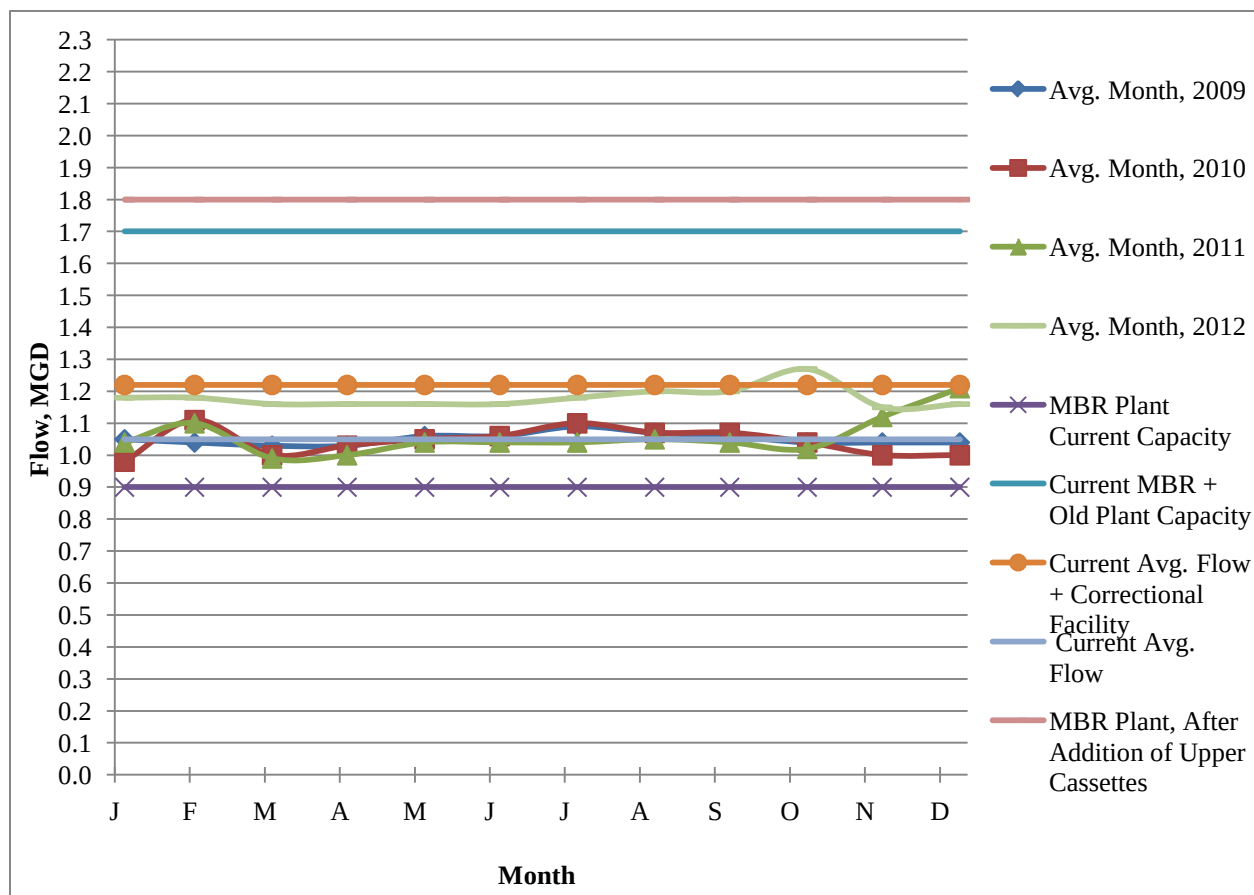


FIGURE 3-7
WASTEWATER FLOWS AND EXISTING PLANT CAPACITY

3.4.6 Sludge Treatment Capacity vs. Current Sludge Production

The sludge treatment process and disposal method were designed and constructed in the mid-1990s. As such, this 16-year-old process shows some signs of deterioration and is in need of improvements. The digesters were designed according to the regulations in place at that time (Title 40 Code of Federal Regulations Part 503) to meet vector attraction reduction and pathogen

reduction for land disposal of sludge. The target for vector attraction was to achieve a minimum 38% volatile solids (VS) reduction. For pathogen reduction, the temperature-retention time conditions of 15°C for mean cell residence time (MCRT) of 60 days or 20°C for 40 days MCRT were used as the design parameters. Because during winter conditions the temperature is about 15°C, this was used as the governing condition for design and sizing of the digesters. The capacity of the digesters to achieve pathogen reduction through aerobic digestion at 15°C and 60 days MCRT has been calculated at 1.2 MGD average day flow to the WWTP. This estimate is in agreement with the original capacity of approximately 1.23 MGD for the activated sludge plant, which was in service at the time when the sludge treatment facilities were built.

Table 3-4 shows a summary of the projected sludge and solids production expected for years 2011-2013. A significant increase in flow occurred at the end of 2011 due to the connection of the CNMCF to the Village's sewer system. According to these projections, the aerobic digesters will likely reach their design capacity in terms of their ability to achieve pathogen reduction based on time-temperature requirements in the near future, if temperatures are at or below 15°C. The disposal site is permitted for sufficient hydraulic loading capacity (45,000 gpd) for the future.

TABLE 3-4
SOLIDS PRODUCTION AND SLUDGE DISPOSAL
REQUIREMENTS PROJECTED FOR 2011-2013

Total Plant Flow	Solids Production, MBR Plant + Activated Sludge Plant				Digested Sludge Disposal Requirements			
	Old Plant	MBR Plant	Total Solids to Digester					
MGD	dry lbs/wk	dry lbs/wk	dry lbs/wk	dry lbs/day	lbs/day	lbs/month	gal/day	gal/wk
1.10	7,393	6,743	14,136	2,019	1,662	49,858	4,984	34,885
1.20	7,393	7,867	15,260	2,180	1,795	53,862	5,384	37,686
1.30	7,393	8,991	16,384	2,341	1,929	57,865	5,784	40,488
1.40	7,393	10,115	17,508	2,501	2,062	61,869	6,184	43,289

3.4.7 Sewer Collection System Evaluation

The overall condition of the Village's sewer collection system is good. The majority of the existing infrastructure is new, and the Village has done an exceptional job of maintaining and updating the older portions of the collection system. Los Lunas has aggressively addressed all of the improvements recommended by Molzen Corbin in the previous reports identified in Section 3.2.1 of this PER.

The Village should continue with their operation and maintenance programs for the gravity sewer lines, manholes, lift stations, and forcemains. Lift station pump replacements or pump additions should be made by monitoring the start/stop cycles and runtimes.

One potentially problematic section of forcemain, which has a direct impact on the wastewater treatment facilities, is the pipe from the Morris Road lift station to the entrance works of the new MBR system. This 18-inch diameter forcemain has sufficient conveyance capacity for the flows contributed west of NM 314 road through the ultimate build-out of the Village. This pipe is also quite long (over 3,000-feet), but to the current low flow conditions, wastewater can reside in the forcemain and turn anaerobic prior to reaching the WWTP site. This problem should begin to resolve itself as flows to the Morris Road lift station increase, which will decrease the duration that sewage remains in the forcemain.

3.4.8 Liquid Treatment Components Evaluation

Appendices D, E, and F show detailed descriptions of all equipment and components of the wastewater treatment facilities, including the old plant, the MBR plant, and the sludge treatment facilities. Selected pictures of the existing facilities are presented in Appendix G.

3.4.8.1 Activated Sludge Plant

A detailed evaluation of the activated sludge wastewater treatment facility was previously presented in the Preliminary Engineering Reports prepared by Molzen Corbin & Associates in

1996 and 2000 (“Wastewater Facilities Plan” and “Wastewater Facilities Plan Update”, respectively). A brief description of the plant components is included in the following paragraphs. For more detailed information regarding evaluation criteria and condition of existing components at the activated sludge plant, refer to Appendix D of this Report.

- **Entrance Works:** The individual components of the entrance works are the influent lift station, mechanical bar screen, flow metering (Parshall flume), and aerated grit chamber.

- **Influent Lift Station:** This unit provides a means of lifting (pumping) wastewater from the wet well where the raw sewage is received into the treatment process by means of three pumps. The screw pumps were replaced in 2007 with three submersible centrifugal pumps.

The influent lift station submersible pumps are designed for 1,170 gpm at 43.3-ft TDH if a single pump is in operation or 1,870 gpm at 50.9-ft TDH for two pumps in operation. The pumps have 20 HP motors and adjustable frequency drives (AFDs) that allow the speed of the pump, and therefore the discharge rate, to be adjusted in response to the changes in the influent flow rate.

The speed of the pumps is controlled based on the water level in the wet well and the discharge flow. There are two ultrasonic level transmitters to monitor the level in the wet well. The redundant level indicators provide an accuracy check for the units and provide a backup should one unit fail. Three slide gates that were once the screw pump isolation gates have been abandoned, but left in place.

The influent pumps can discharge in three ways:

- 1) All the discharge can be pumped to the old plant;
- 2) Influent can be pumped to both the old plant and the MBR plant; and,
- 3) All the influent is pumped to the MBR plant.

- **Parshall Flume (Flow Meter):** This unit is essential to process control as it measures influent flow and records average and diurnal variations in flow. This information assists staff in

determining variations in air supply, adjustments to sludge return rates, and potential fluctuations based on the time of day.

Influent flow measurement consists of a Parshall flume with 9-inch-wide throat. The capacity of the flume is 2.29 MGD average day flow and 5.73 MGD peak day flow based on a free flow through the flume with 2-feet of head and 6-inch freeboard.

- **Mechanical Bar Screen:** This equipment removes large objects from the influent flow stream such as rags, paper, plastics, metals, sticks, and other materials. Removal of these objects early in the treatment process is important to protect downstream equipment from damage and also to reduce maintenance and operational problems.

There are two front-cleaned mechanical bar screens; the west screen is the primary unit and the east screen the emergency/backup unit. The mechanical bar screens are 2-feet/6-inches wide, inclined at 30 degrees to vertical; the west bar screen has 3/8-inch openings between bars and the east 3/4-inch openings. The estimated capacity of the mechanical bar screens is 2.18 MGD at average day flow and 5.45 MGD peak flow.

- **Aerated Grit Chamber:** This unit removes heavier, inorganic materials such as sand, grinds, gravel, and other non-putrescible components from the influent wastewater. The removal of these materials is important to protect downstream treatment units and equipment from wear or damage caused by their abrasive action. Aerated grit chambers may also help to reduce septic or anaerobic conditions in the wastewater by introducing some air into the stream and stripping out noxious gases. It is, however, important not to over-aerate or have high detention times in the grit chamber, as these actions may burn out some of the organic components needed for the optimal performance of the biological processes.

The existing grit chamber is a concrete tank with an approximate volume of 8,976 gallons. The rated capacity of the grit chamber at 5-min detention time is 2.59 MGD at peak flow and 1.04 MGD average day flow (assuming a peaking factor = $2.5Q_{avg}$). Two torque flow grit pumps,

each 220 gpm at 32-ft head and 780 rpm, are also provided. Air to the aeration diffusers in the grit chamber is supplied by the plant aeration system blowers.

The existing grit processing equipment consists of a 10-inch cyclone and a 12-inch classifier. The cyclone subjects the material collected from the bottom of the aerated grit chamber to a centrifugal force to affect liquid/solid separation. The classifier dewateres the concentrated solids for disposal as municipal solid waste. The hydrogritter unit (combination cyclone/classifier equipment) has capacity for up to 220 gpm at a pressure drop of 5 psi.

- **Biological Treatment:** The individual components of the activated sludge process are the aeration basins, secondary clarifiers, and post-aeration basins.
 - **Aeration Basins:** The basins provide a suitable environment for the activated sludge process, allowing the wastewater, oxygen, and microorganisms to be mixed together to facilitate biological conversion of organic compounds (i.e., BOD). The aeration mechanism utilized in this unit is a diffused air system where air is introduced at the bottom of the tank, inducing mixing as the air bubbles rise to the surface. This process also supplies dissolved oxygen to the liquid to promote a high rate of biological activity.

The process consists of two aeration basins which have a capacity of 374,500 gallons each (including the clarifier feed basin), at a side water depth (SWD) of 22-feet. Because the originally designed extended aeration process was converted to activated sludge to meet new permit requirements, the overall plant capacity was de-rated to about 0.80 MGD.

Air is supplied by the centrifugal blowers located in the blowers/maintenance room. An 18-inch header splits the air flow into two 12-inch feed lines, one for each train. The aeration system consists of two air bridges per basin. Each air bridge is equipped with nine 24-inch shear tubes with 2-inch air drops.

- **Secondary Clarifiers:** These units provide a quiescent environment for the separation of clarified effluent and active biological solids (activated sludge). Effluent and solids are separated

by gravity, allowing clarified effluent to escape over the edge of the basin via V-notch weirs. Scum and floatable debris are removed by means of a rotating skimmer.

The activated sludge plant has two secondary clarifiers, each 40-foot diameter and SWD of 14-feet. The surface area is approximately 1,250 square feet (sq.ft.) and 115,685 gallons of volume per unit. The secondary clarifiers are the limiting process units, as the capacity is 0.8 MGD at average day flow (at 400 gpd/sq.ft.) and 2.0 MGD at peak day flow (at 800 gpd/sq.ft. and assuming peaking factor = $2.5Q_{avg}$). The clarifiers' spray pump (located inside the washwater pumps room) has capacity for 100 gpm at 80-feet TDH.

- **Post-Aeration Basins:** These basins were originally designed as chlorine contact chambers. However, after the improvements made in 1995 and installation of the UV disinfection system, the use as chlorine contact basins was terminated. These units now provide additional aeration to freshen the effluent from the secondary clarifiers before UV disinfection and discharge to the river. Flow capacity in the post-aeration basins is “unlimited” as they are not a required biological treatment process to achieve discharge limits in the current NPDES permit.

- **Effluent Disinfection and Disposal:** The disinfection process is considered to be the primary mechanism for the inactivation and destruction of pathogenic organisms to prevent the spread of waterborne diseases to downstream users. Disinfection of treated wastewater is typically accomplished by chlorination/dechlorination or with ultraviolet (UV) light. With regard to disposal, the disinfected effluent is discharged into the Rio Grande.

- **UV Disinfection:** The disinfection method currently in service at the activated sludge plant is an open-channel UV system. This component was added in 1995 to replace the chlorination system.

There are two banks with submerged lamps in a single channel, for a total of 16 modules (8 per bank). The disinfection system is designed to provide 65% UV light transmissivity at 30 mg/L of total suspended solids. An automatic level controller at the end of the channel ensures that there

is a constant depth over the UV lamps at all times. The capacity of the existing system is 1.5 MGD with one unit on standby.

– **Effluent Pump Station and Effluent Disposal:** The effluent from the activated sludge plant was originally pumped to the river by the submersible pumps located in a wet well downstream of the UV disinfection system. During construction of the MBR plant, modifications were made to divert the effluent from the old plant to discharge into the new effluent blend and sampling box, where it mixes with the permeate from the MBR plant.

There are two submersible pumps installed at the activated sludge plant effluent wet well, one in service and one standby unit. Each pump has a 14-HP motor and a rated capacity of 2,000 gpm at 19.5-ft TDH (low well level) and 2,500 gpm at 16-ft TDH (high well level).

After putting the MBR plant into service in 2010, electrical (controls) modifications to the existing effluent pumps were required to match the reduced flows to the activated sludge plant, as it was receiving only approximately 50 percent of the total collection system flow. The existing effluent pumps at the old plant were designed to handle 100% of the total flow with a pumping capacity of 2,500 gpm (constant speed). With the old plant only receiving approximately half of the total flow, the pumps turn on for a short period of time at 2,500 gpm.

The existing pumps were modified to include new adjustable frequency drives (AFDs), a local control panel, a programmable logic controller (PLC), a pressure transducer, and a backup float. These electrical modifications allowed the pumps to discharge at a variable rate to match the receiving flow. The modifications also provide a steady flow condition to the effluent metering structure.

After blending, the combined effluent flows from the blending box through a 24-inch line that connects to the original 16-inch diameter outfall line that discharges into the river. The 16-inch ductile iron pipe is about 30 years old and, due to the increase in flows, will need to be replaced in the near future. The capacity of the pipe is estimated at 3.4 MGD peak flow (approximately 1.7 MGD average day flow), which may be reached by the year 2016.

- **Washwater System:** The activated sludge plant has a washwater system that supplies effluent water to the clarifiers' spray bars and to the gravity belt thickener for belt washing and other cleaning operations.

There are two end-suction centrifugal pumps installed (one in service, one standby) in the washwater/spray pump building, each with capacity for 90 gpm at 230-ft. TDH.

- **Emergency Generator:** The activated sludge plant has an emergency generator capable of running one influent pump, one mechanical bar screen, and one effluent pump during emergencies and power outages.

The capacity of the original generator was 90 KW, driven by a 149-HP diesel engine. This unit was old (about 30 years) and it was difficult and costly to find replacement parts. The generator was recently replaced (4/30/12) with a used generator. This unit is a 1998 Caterpillar unit, which had 1,346 hours of use at start-up. The generator has 160KW (200 kva) capacity driven by a 180 HP motor. A 300-gallon diesel storage tank to operate during power outages is located in the generator/maintenance building.

Administration/Laboratory Building: The activated sludge plant has a building that is currently used as general administration office and laboratory. The building has several separate rooms: laboratory (including emergency eye wash and shower), lab office area, office space, training/break room, restrooms for men and women, janitor's closet, locker room, and shower room.

The administration building is undersized because the operations staff has increased since the time of construction of the original extended aeration plant. More office space is needed for the operators and management. The laboratory space is inadequate, and there is a need for more equipment, particularly analytical kits (Hach[®]), to measure nitrogen and other parameters at the plant instead of sending the samples to external laboratories. Audio-visual equipment is also needed for training at the plant.

3.4.8.2 MBR Plant

The newest addition to the WWTF is the MBR plant which started construction in 2007 and operations in 2010. The structures in the MBR system are: entrance works (flow metering, fine screens, and grit chamber), biological process basins (anoxic, pre-aeration, and MBR basins), pumping systems (anoxic basin transfer pumps, WAS pumps, permeate pumps, and chlorine feed pumps for membrane cleaning), support systems (plant drain station and washwater systems), and permeate disinfection. This state-of-the-art facility and its individual components are described in the following paragraphs. For more detailed information, including design criteria and description of unit operations and equipment at the MBR, refer to Appendix E of this Report. Selected pictures of these facilities are presented in Appendix G.

- **Entrance Works:** The individual components of the entrance works are: an electromagnetic influent flow meter, two fine screens (with space for a future third screen), a screenings conveyor, an aerated grit chamber, two blowers for the grit chamber, an airlift grit pump, and a grit classifier.

The entrance works facility has two floor levels. The rotary-drum fine screens, screenings washers/compactor, and grit conveyor are located on the uncovered top floor level. The grit blowers and the motor control centers are in the lower level, inside a room. The grit and screenings containers are also located in the lower level, outside of the blower room. The grit chamber is a hopper-bottom tank two levels deep. Although there is no roof over the top level, the grit tank and open channels are covered with aluminum decking to prevent debris such as sand, leaves, and cottonwood seeds from entering the screened flow stream. This type of debris can interfere with the MBR process by clogging the membrane plates' pores.

- **Influent Flow Meter:** The new plant influent flow meter is mounted in the vertical riser of the influent pipe before it enters the influent head box. Electromagnetic flow meters (EMFs) are designed to measure flow in completely filled pipelines.

The flow meter is an 18-inch diameter unit with capacity to measure 756 to 30,250 gpm. The following flow parameters are logged once per day: average daily flow, continuous flow total, daily flow total, daily maximum flow, daily minimum flow, and recent total flow.

– **Fine Screens:** The inlet valves, rotary drum screens, and conveyor work in conjunction to remove solid inorganic debris such as rags, sticks, hair, and other small solids that have potential to clog or damage pumps, valves, pipes and the MBR cassettes in particular.

Prior to the influent flowing into the fine screens, the raw sewage is discharged into a head box which provides a common “header” that allows the depth of influent behind the screens to be monitored. It also provides a common overflow if both fine screens’ inlet valves are closed or for some other reason the influent level upstream of the screens gets too high. The influent head box is about 22-feet long by 3-feet/3-inches wide and 5-feet deep. The top of the overflow weir is 36-feet off the box floor. The inlet valves operate automatically to direct the influent to the online fine screen. The fine screen separates the debris from the wastewater stream, and the washer/compactor washes organic material from the debris removed and dewateres it before discharging it to a container.

The fine screens consist of a rotating perforated drum with an internally-mounted transport screw which transports the separated solids out of the drum. The fine screens have a perforation size of 2 mm (0.08-inches). Water for continuous washing of the screen is supplied at 25 gpm and 80 psig pressure. Each of the two fine screens currently installed has a peak flow capacity of up to 6.6 MGD (at 325 mg/L TSS). The drive units have a 1.5 HP motor.

The MBR entrance works are also equipped with two screening press/compactors, one for each fine screen. Each compactor is powered by a 1.5 HP motor and has capacity for up to 0.33 cfm of screenings. The entrance works structure is designed to allow for the installation of a third fine screen and press/compactor in the future.

A 9-inch diameter 20-ft long spiral conveyor driven by a 1.5 HP motor conveys screenings discharged by the screenings washers/presses to the discharge chute for final disposal. This unit has capacity for up to 0.33 cubic feet per minute (cfm) or 25 lbs/min of screenings.

– **Grit Chamber:** The grit removal process consists of one aerated grit chamber, one grit pump, two blowers, and a grit classifier.

The grit chamber is 15-ft wide by 15-ft long and has a side water depth of 14.8-ft from the discharge weir to the top of the grout that forms the hopper. The depth at the center of the tank is 17.6-ft. The grit chamber is designed for an average day flow of 3.6 MGD and 7.2 MGD peak flow for a detention time of five minutes at peak flow rate.

The grit chamber is equipped with a 24-inch draft tube aerator and a 4-inch airlift grit pump. The aeration system is designed for a maximum air flow rate of 30 standard cubic feet per minute per 1,000 cubic feet of tank volume (scfm/1,000 cu.ft.) and average of 20 scfm/1,000 cu.ft. The estimated peak air requirements are 110 scfm. The grit pump has capacity for up to 100 gpm at 12 cubic feet per minute (cfm) air flow. The grit pump sends the materials deposited at the bottom of the chamber to the grit classifier through a 4-inch diameter pipe.

Two positive displacement blowers supply air to the grit chamber aerator and airlift pump. Each blower has capacity for an air flow rate of 120 scfm at a discharge pressure of 7.0 psig. The motor capacity is 10 HP.

The air lift pump discharges to the classifier, which washes out organic material and dewateres the grit. The remaining liquid and lighter solids are discharged out through a 6-inch diameter overflow pipe and returned to the grit chamber. The grit classifier is a 12-inch diameter screw conveyor equipped with a 0.33 HP drive motor.

- **Biological Process Basins:** The MBR system is made up of several components that interact with each other throughout the treatment process to achieve complete treatment of wastewater. The system consists of two biological treatment trains, with the following individual components

per train: one anoxic basin, one pre-aeration basin, and two MBR basins. Each component of the biological process is described in the following pages.

- **Anoxic Basins:** Discharge from the entrance works enters a splitter box through an 18-inch diameter pipe at the head of the MBR system. The flow is then divided between the two MBR trains by two weir gates. Each of these gates splits the flow into the two anoxic basins to begin treatment.

Each anoxic basin is 41-ft wide by 15-ft long. The highest water level is 12-ft and the lowest 8-ft. The volume of mixed liquor in the basins varies from 36,800 gallons (at minimum water level) to 55,200 gallons (at maximum water level). The anoxic basins are equipped with two mechanical mixers, which are used to mix screened raw wastewater with mixed liquor recycled from the MBR basins. The mixture of influent and mixed liquor is pumped from the anoxic basins to the pre-aeration basins by submersible transfer pumps with adjustable frequency drives (AFDs) to allow control of the discharge rate. Each of the two submersible mixers located in each anoxic basin is driven by a 2.5-HP motor and has capacity for 4,010 gpm. The anoxic basins are also equipped with two submersible pumps, which are known as transfer pumps. The transfer pumps have capacity for 3,397 gpm at 15.7-ft TDH. These pumps are driven by 25-HP motors.

- **Pre-Aeration (PA) Basins:** These basins provide an environment for additional nitrogen removal through simultaneous nitrification/denitrification. There is one PA basin per treatment train. Each basin is equipped with mechanical mixers and aerators. Mixed liquor from each PA basin is divided between two MBR basins through two up-opening slide gates. Each PA basin is 41-ft wide and 23-ft long and is equipped with eleven 24-inch shear tubes with 2-inch aerators, two submersible mixers, an effluent slide gate (flow under bottom), and a dissolved oxygen (DO) probe.

Air is supplied by two positive displacement blowers with adjustable frequency drives (AFDs). Each blower has a design capacity of 1,638 cfm at a pressure of 7 psi. The blowers are driven by 100-HP motors. The PA basins' submersible mixers are driven by 4-HP motors. Each mixer has a pumping capacity of 4,490 gpm.

– **MBR Basins:** Following the pre-aeration basins are the MBR basins. These basins provide an aerobic environment that supports bacteria to metabolize organic matter (BOD) and to achieve nitrification of ammonia to nitrate. Another function of the MBR basins is to separate the solids and treated water by retaining the solids in the basin while the treated water (called “permeate”) passes through the membranes and on to disinfection.

Permeable membranes submerged in the MBR basins are used to separate the biomass solids from the treated water. The MBR treatment system uses mixed liquor suspended solids (MLSS) concentrations of 8,000–15,000 mg/L, which is three to six times the typical concentration used in other biological treatment processes such as activated sludge.

The flow from each pre-aeration basin is split into two MBR basins, which results in a total of four MBR basins in the plant. Each MBR basin is 14-ft wide by 32-ft long and a maximum water level of 18.5-ft (minimum of 14-ft water depth to cover a double-deck set of cassettes). An upper and lower submerged membrane unit (SMU or cassettes) can be installed in each basin, but only the lower SMUs are currently installed. There are nine cassettes installed in each of the four MBR basins (lower level only). A cassette is composed of 200 flat plate cartridges with a pore size opening of 0.4 microns that prevents the passage of suspended solids while allowing the free passage of filtered water (permeate). Each membrane cartridge has a surface area of 8.6-sq.ft. and is designed for a flux (flow) of 14.7 gallons per day per square foot (gpd/sq.ft.) and peak flux of 29.4 gpd/sq.ft for a 24-hour peak event.

The total capacity of the four MBR basins with the lower cassettes installed is 0.90 MGD at average day flow. This capacity can be increased to 1.80 MGD when the upper level cassettes are installed in the four basins. The permeate nozzle at the top of each cartridge is connected to a manifold via a transparent tube. Multiple membrane unit manifolds are then connected to a common header in an MBR to collect permeate.

Three positive displacement blowers provide process air to the MBR basins. Each blower has a design capacity of 1,780 cfm at a pressure of 9 psi. The blowers’ motors are 125-HP units. Each MBR basin is equipped with nine air diffuser assemblies fitted with a diffuser manifold designed

to properly distribute air for membrane cleaning and aeration of the mixed liquor. Each diffuser assembly is equipped with a backwash flushing system to clean the diffusers.

- **WAS Pumps:** Sludge wasting is one of the most important tasks of the wastewater operator. To maintain the proper balance of active microorganisms (biomass), a portion of the biomass is removed or “wasted” from the system. The WAS pumps draw sludge to be wasted from the MBR basins and discharge it to the GBT at the old plant to thicken the sludge prior to stabilization in the aerobic digesters.

There are two rotary lobe WAS Pumps each with a 10-HP motor. These are positive displacement pumps, so the discharge rate is directly related to the speed of the pump. Adjustable frequency drives (AFDs) are used to adjust the speed of the pumps. The design output of WAS pumps is 275 gpm at 299 rpm. The maximum speed of each pump is determined by the size of the drive sheaves.

- **Permeate Pump Station:** The permeate pump station receives the disinfected permeate from the MBR and provides a sump for the permeate and chlorine injection pumps. The permeate pumps transfer disinfected permeate to the effluent blending and metering box. The effluent from both plants is mixed prior to discharge into the Rio Grande.

The permeate pump station is located outside of the MBR building. The wet well is 10-ft/10-in wide by 20-ft long and a total depth of 12.5-ft. At a high water level (HWL), the storage volume is 13,776 gallons. The wet well was designed for installation of up to six permeate pumps. Currently, there are three permeate submersible pumps installed; two of the pumps are in operation and one is a stand-by. The AFD pumps operate automatically to pump permeate to the effluent blend box. The pumps are driven by 15-HP motors. A single pump in operation has a design capacity of 1,520 gpm at 18-ft TDH. The three pumps currently installed have sufficient capacity to operate the MBR plant after the expansion from 0.9 MGD to 1.8 MGD by adding the upper cassettes. The firm capacity of the three pumps is 4.0 MGD peak flow. In the future, three more permeate pumps will be installed during the construction of the second MBR plant.

- **Chlorine Injection Pumps:** The chlorine injection (CI) pumps provide water for the MBR membranes “clean in place” system. This system utilizes a dilute (0.5%) sodium hypochlorite solution applied to the MBR cassettes only once every four to six months. When not providing water for membrane cleaning, the pumps discharge can be recirculated through the online UV unit to prevent the UV lamps from overheating during low flow periods.

There are two pumps located in the west end of the permeate pump station wet well. The two CI pumps are 6.5-HP submersible units, each with capacity of 153 gpm at 65-ft TDH. They pump water from the permeate pump station to the sodium hypochlorite storage area below the MBR cassette cleaning area. Vacuum is used to draw sodium hypochlorite from the containers and mix it with the water to produce a dilute solution used to clean the MBR membranes.

- **Support Systems:** The MBR plant has two other pumping systems that are not part of the biological treatment processes, but are essential for the operation of the facility. These two support systems are the plant drain pump station and the washwater system.

- **Plant Drain Pump Station:** The facility drain system collects drainage from the buildings and treatment process and pumps it back to the entrance works to be mixed with raw sewage. The drain lift station has two submersible pumps. Each pump has a 10-HP motor and a design capacity of 465 gpm at 42.5-ft TDH. A level transmitter is provided in the wet well to control the pumps. Float switches are also provided as backup control.

- **Washwater System:** The purpose of the washwater system is to provide high-pressure disinfected effluent for use throughout the plant.

The washwater system consists of two 20-HP end-suction centrifugal pumps that draw disinfected permeate from the UV disinfection discharge lines to provide about 170 gpm of washwater at a TDH of 196-ft. The washwater pumps start automatically when the washwater system pressure drops below the setpoint or the flow to the system exceeds the setpoint.

- **Effluent Disinfection:** The system installed at the MBR plant to provide disinfection to the permeate is a closed vessel UV system. The permeate flows by gravity from the MBR basins through the UV vessels to the permeate pump station. Each UV vessel is equipped with six medium-pressure, high-intensity lamps. If the flow through the UV units drops below the minimum flow, the lamps can overheat. To dissipate the heat, the lead chlorine injection pump will start, and a recirculation valve will open to allow permeate to recycle from the permeate pump station through the online UV unit. After disinfection, a portion of the permeate is drawn off by the washwater pumps and the remaining permeate flows to the permeate pump station.

3.4.8.2.1 Desirable Improvements of the MBR Plant

During the site visits and meetings with the plant Operations Staff, several desirable improvements of the MBR plant were identified:

- 1) The transfer pumps located inside the anoxic basins are very heavy (approx. 1,000 lbs each). A manual hoist with enough capacity to remove this equipment has been provided. However, due to the weight of the pumps and depth of the basins, removing them from the basins is very difficult and requires significant labor effort. A power-assisted lifting mechanism is desirable.
- 2) There is no potable water for drinking at the MBR facilities. The operations staff currently has bottled water at this plant, but it is desirable to have a potable water fountain and wash basin.
- 3) Improvement of the mechanism to remove the UV vessels from their location.

3.4.9 Evaluation of Sludge Treatment Components

The history of the sludge management process was previously presented in Section 3.2.3 of this PER. The individual components of the sludge management systems are: gravity belt thickener (GBT), aerobic digesters, and sludge disposal site. A summary of the unit processes and current condition will be presented in the following paragraphs. For more detailed information regarding evaluation criteria and condition of existing components and equipment for sludge management,

refer to Appendix F of this Report. Selected pictures of these facilities are presented in Appendix G.

- **Gravity Belt Thickener:** The GBT assists in reducing the volume of sludge to be digested in the aerobic digester by allowing the separated water to seep through the mesh belt, thus creating a thicker sludge. The filtrate from the GBT flows back to the activated sludge influent lift station.

As part of the MBR facility project which started construction in 2007 and operations in 2010, improvements were made to the existing sludge thickening system. These improvements included increasing the capacity of the GBT, adding the ability to feed WAS from the MBR plant to the existing GBT, and replacing the GBT PLC. The WAS pumps for the activated sludge plant are located in the thickener room and draw sludge from the return activated sludge (RAS) channel in the MBR building. The WAS pumps for the MBR process are located in a room inside the MBR building.

The existing gravity belt thickener is 2-meters wide, which had an original capacity to process up to 220 gpm at 1% solids concentration. This machine was reconditioned to increase the capacity to about 400 gpm. The polymer feed system has a maximum capacity of 45 gph at 50 psi. Assuming that the GBT is run only during regular plant operating hours (5 day/week, 8 hr/day), the flow of sludge that the GBT could process is 1.05 MG of WAS per week. This sludge would be produced by an influent plant flow of about 2.7 MGD, combined for the activated sludge and MBR plants.

- **Thickened Waste Activated Sludge (TWAS) Pump:** This unit conveys the thickened sludge from the GBT to the aerobic digester. The positive displacement progressive cavity pump has capacity for 100 gpm at 100 psi. The pump is driven through a mechanical variable speed drive within a range of 87.5- 350 rpm.
- **Aerobic Digesters:** These basins are used to stabilize the thickened sludge prior to final disposal. Per the current NPDES permit requirements established for sludge management (Element 1 – Land Application, Section I, Paragraph C.2 – Pathogen Control), “all sewage

sludge that is applied to agricultural land, forest, a public contact site, or a reclamation site shall be treated by either Class A or Class B pathogen requirements.” Aerobic digestion is one of the methods used to achieve Class B sludge.

The existing aerobic digester at the Los Lunas WWTP consists of one digester basin divided into four covered cells, each approximately 25-ft wide by 25-ft long and SWD of 22-ft, for an approximate total volume of 411,400 gallons. Thickened sludge processed by the gravity belt thickener is pumped into Cell 1 by the TWAS pump located under the GBT hopper.

Air for the aerobic digestion process is continuously supplied to Cells 1 and 2 by one of the centrifugal blowers located inside the blower room at the activated sludge plant. Air for Cells 3 and 4 is supplied by one centrifugal blower and/or one of the two positive displacement blowers located in the aerobic digester blower room. The centrifugal blower is driven by a 125-HP motor and provides 1,894 cfm at 3500 rpm. Each of the two positive displacement blowers (one is a standby unit) has a 60-HP motor.

Digested sludge is drawn from Cell 4 and pumped into a tanker truck by the digested sludge pump. This pump has two operating points; the first is 600 gpm at 20-ft head and the second 900 gpm at 14-ft of head. The hauler tanker has capacity for up to 5,000 gallons of digested sludge.

The aerobic digesters are the most deteriorated component of the overall wastewater treatment process at the Village’s WWTF. The condition of the concrete and equipment inside the basins is unknown because they are covered. Removal of the fiberglass covers is difficult due to the location of the air piping on top of them.

- **Digested Sludge Pump:** This pump draws digested sludge and pumps it into a tanker truck to transport it off-site for final disposal. The centrifugal pump has two operating points: 600 gpm at 20-ft head and 900 gpm at 14-ft head, 1150 rpm.
- **Sludge Drying Beds:** These beds were originally used for sludge disposal when the activated sludge WWTP was constructed and prior to construction of the improved sludge treatment

process. However, after the addition of the sludge handling facilities in the mid-1990s, they were essentially abandoned, with just sporadic use since then. However, per the Operations Staff, they are still functional if needed during an emergency condition.

The sludge drying beds consist of twelve rectangular units, with an 18-inch layer of sand at the top, an intermediate 12-inch layer of gravel, and a bottom layer of ½-inch gravel of variable depth. Underdrain piping is also provided to carry the drainage from the beds by gravity to the influent lift station. A skid steer loader is capable of getting into the bed's surface to remove dried sludge.

- **Sludge Land Application Site:** Once sludge has been treated and biologically stabilized at the plant in the aerobic digesters, it is hauled to the sludge application site for final disposal. For plant flows received prior to the connection of the CNMCF to the WWTP (1.0-1.1 MGD average day flow), the sludge was hauled approximately once every 10 days; however, the frequency of sludge hauling and disposal has now increased. As flow to the plant increases, a larger volume of sludge will need to be hauled to the disposal site.

The sludge land application site consists of a nursing tank, a spreader unit (Terra Gator), and the land for disposal. The nursing tank is an open tank with capacity for approximately 15,000 gallons. The hauler truck discharges the sludge into this tank by gravity. Then the Terra Gator unit, which is equipped with a 2,500-gallon storage tank, draws sludge from the nursing tank for land application.

The approximately 220-acre land application site (total surface area) is graded to route storm water generated by the site into six retention ponds and has a 50-ft buffer zone around the perimeter of the site. The site is divided into 11 sections, each approximately 20 acres. Rotation of the sections where the sludge is applied is frequent. The total surface available is used in less than one year, which means that some sections receive sludge twice per year.

As previously mentioned in Section 3.4.3.3 of this report, the annual allowance for total nitrogen is 200 pounds of nitrogen per acre. However, the operators reported that a couple of the sections

have already presented signs of nitrogen accumulation. Those sections are not in use for sludge disposal and are periodically monitored for nitrogen content.

3.4.9.1 Condition of Aerobic Digesters – Recent Findings

During the evaluation of individual components of the existing sludge management process and preliminary calculations to determine the remaining useful life of the system, it was discovered that the digesters were not performing well. During the site visits to the WWTP, it was noticed that the appearance of the sludge was very dark (black), with a strong ammonia odor in the off-gasses.

The plant Operations Staff reported that after the MBR facility was brought online in 2010, they had some operational issues and inconsistent performance of the digesters. In February 2011, the problem was aggravated by two events: First, a pipe that allowed for sludge to be fed at different locations in the aerobic digesters failed due to corrosion and freezing, which occurred during a severe winter storm and extremely cold conditions; and second, the aeration diffusers were plugged and providing insufficient aeration.

Per the Engineer's request, samples of the digester contents in each cell were taken and sent to a certified laboratory for analysis on two separate occasions. Table 3-5 shows ammonia concentrations in each of the four digesters cells. After evaluating the results, it was concluded that the source of the problem was a severe ammonia inhibition condition. Among the consequences of this inhibition problem and process upset, the digesters were inconsistently meeting the minimum 38% volatile solids reduction established in current regulations for Class B land application of biosolids. Another method to demonstrate compliance with these regulations is the specific oxygen uptake rate (SOUR) test, which was implemented by the Operations Staff. Results indicated that the sludge was not meeting Class B requirements. Therefore, the Village stopped hauling digested sludge to the land application site. The sludge was then discharged into the drying beds located at the WWTP for dewatering prior to final disposal.

TABLE 3-5
AMMONIA CONCENTRATION IN AEROBIC DIGESTERS CELLS

Sample Date	Units	Ammonia			
		Cell 1 (Feed Cell)	Cell 2	Cell 3	Cell 4 (Draw Cell)
6/20/11	mg/kg (wet weight)	1,200	1,600	1,500	1,700
7/7/11	mg/L (wet weight)	1,100	1,400	1,700	1,400

In order to bring the digesters back to proper operational condition and consistent performance, it was necessary to remove the toxic sludge from the digesters and re-start the feeding with lower solids content in the feed sludge. This change was expected to slightly decrease process air requirements and also aid in increasing the destruction of volatile solids. Indeed, after the diffusers were unplugged and cleaned, mixing and air supply to the digesters have improved. Repair of the feed line was also completed in July 2011. The sludge in the digester has since then met the requirements set forth in 40 CFR 503 for Class B biosolids. Regular hauling of digested sludge for final disposal at the land application site was re-started after verification that it was meeting Class B requirements. However, ammonia concentrations are still in the high range and the toxicity condition remains.

To implement a digesters recovery process, disposal of a significant volume of sludge, which would likely exceed the maximum hydraulic application rate set by the current discharge permit (up to 35,000 gallons per week), was required. After evaluating several alternatives, including dewatering of the digested sludge and disposal at a landfill, the Engineer and the Village concurred that the most technically and economically feasible option was to dispose of the sludge at the Village's surface disposal site.

The Village's Utilities Director, Operations Staff, and the Consulting Engineer met with the New Mexico Environment Department (NMED) Ground Water Quality Bureau (GWQB) Staff on June 29, 2011 to discuss the operational issues with the digesters. On July 26, 2011, the Village submitted a letter to GWQB requesting authorization from the NMED for a variance to temporarily exceed the current maximum hydraulic rate of 35,000 gallons of sludge per week. Assuming a scenario where the entire contents of the digester needed to be removed and

disposed of at the surface disposal site, approximately 411,000 gallons of digested sludge would be land-applied. At an estimated application rate of 20,000 gallons per day, it would take approximately four weeks to complete the process if sludge is hauled to the site from Monday to Friday. This would be equivalent to an application rate of approximately 100,000 gallons per week under the worst-case scenario.

A sample of the contents of the digester was taken on July 14, 2011 and analyzed for total nitrogen (TKN+NO₃) by a certified laboratory. The laboratory results indicated that the total nitrogen content was 100,000 mg/kg on a dry-weight basis. The sludge in the digester had an average total solids concentration of about 4.0%, which resulted in a total mass of approximately 62 metric tons of solids on a dry-weight basis. Therefore, in the event that the entire contents of the digesters have to be removed and land-applied, a total of 13,700 pounds of nitrogen would be applied. Of the total 220 acres of land that the Village owns at the disposal site, approximately 70 acres would be used for disposal of the sludge, thus resulting in a nitrogen loading of about 196 pounds per acre. These parcels will not receive any additional sludge during the remainder of the year to avoid exceeding the maximum recommended application rate of 200 pounds per acre per year. All the calculations and estimates previously discussed are based on the worst-case scenario. However, a more reasonable scenario contemplated that only 50% of the volume of the digester would have to be removed to re-start the digestion process.

On September 19, 2011, the NMED granted temporary permission to discharge digested sludge to four of the 20-acre cells at the Village's disposal facility (see Appendix H). Among the conditions to apply sludge at a higher hydraulic rate are:

- Total nitrogen cannot exceed 200 pounds per acre per year, including any other regular discharges, in accordance with the existing discharge permit DP-1053.
 - Special record-keeping requirements for this temporary permission are applicable.
- Information to be submitted to the NMED includes: facility map indicating the cells where sludge was applied, total volume of sludge applied to each cell, total dry weight of sludge applied to each cell, analysis of total solids in the sludge to be applied at least once per week, and submission of Surface Disposal Data Sheets (SDDS) for each cell used.

Molzen Corbin developed an Implementation Plan for the recovery of the digesters. In a simplified approach, the recovery plan includes the following steps:

- Remove all of the sludge in Cell 4 (draw cell) and dispose at the land application site.
- Transfer sludge from Cell 3 into Cell 4 and dilute the contents with water or plant effluent.
- Reduce the thickened sludge total solids in feed sludge to ~3% and feed this sludge into Cell 3, which is now going to be the Feed Cell.
- Constantly monitor temperature, dissolved oxygen (DO), and pH in the digesters cells.
- Implement aeration on/off operation based on pH monitoring results. This change in the aeration scheme will result in total nitrogen removal through a nitrification/denitrification process.
- Operate aerobic digesters under new operations plan:
 - Limit feed solids concentration to less than 4%.
 - Feed Cell 3: Draft tube and stinger diffusers alternated on/off based on pH (diffusers off 4 to 6 hours per day). Monitor temperature, DO, and pH daily, and ammonia weekly.
 - Cells 2 and 1: Constant aeration. Monitor temperature, DO, and pH daily. Periodically check ammonia in each of these cells (~2 per month for a couple of months; then reduce to monthly, depending on results).
 - Cell 4: Continue use as sludge draw/disposal cell. Draft tube and stinger diffusers on at all times, unless level requires shut-off of draft tubes.

The new operations plan is expected to aid in achieving total nitrogen removal, thus reducing the nitrogen content in the sludge applied on the disposal site. A reduction in nitrogen will provide some temporary relief by extending the useful life of this site until other methods for sludge disposal are implemented.

As previously mentioned, an emergency disposal method to remove sludge from the digesters had to be implemented because the quality of the sludge was not in compliance with 503 CFR regulations and thus could not be land-applied. Therefore, the drying beds had to be temporarily used for this purpose. To dispose of the dried solids at a landfill permitted to receive special

waste (biosolids), a permit from the NMED Solid Waste Bureau (SWB) needed to be obtained by the Village. The process consisted of submitting a Sludge Disposal Management Plan (DMP) to the SWB for approval prior to any removal of sludge from the site. A copy of a general DMP is provided in Appendix I of this Report.

As required by the temporary permission granted by the NMED on September 19, 2011 for emergency disposal of sludge, on January 20, 2012 the Village submitted a Letter Report summarizing the actions that were implemented as well as volume and mass of sludge that was disposed of. A copy of the Letter Report is provided in Appendix H of this PER.

3.5 Financial Status

The following sections summarize the financial information provided by the Village of Los Lunas for the sewer and wastewater treatment system. Detailed information and documentation are provided in Appendix J of this Report.

3.5.1 Number of Connections

The Village's sewer rate structure delineates between residential and commercial customers. Table 3-6 provides the total number of sewer connections for 2007-2012. The number of residential connections increased by 489 from 2007 to 2012. On the other hand, the number of commercial users showed a slight decrease by 14 connections within the same time period.

TABLE 3-6
VILLAGE OF LOS LUNAS SEWER CONNECTIONS 2007-2012

Year	Number of Sewer Connections		
	Residential	Commercial	Total
2007	4,558	338	4,896
2008	4,666	346	5,012
2009	4,755	349	5,104
2010	4,926	319	5,245
2011	4,952	322	5,274
2012	5,047	324	5,371
Average	4,817	389	5,206

3.5.2 Rate Schedules

Table 3-7 summarizes the sewer service rates for 2007-2012.

TABLE 3-7
RATE STRUCTURES 2007-2012

Year	Cost First 1,000 Gallons	Each 1,000 Gallons After
2007	\$17.88	\$2.64
2008	\$18.58	\$2.74
2009	\$19.29	\$2.84
2010	\$19.71	\$2.94
2011	\$19.71	\$2.94
2012	\$19.71	\$3.04
Average	\$19.15	\$2.86

The CNMCF is billed for both the minimum and the medium security facilities (3" meter used).

For outside Village limits, the rates are: \$28.496 per 2,000 gallons base and, for usage above the 2,000 gallons, the rate is \$3.102 per each additional 1,000 gallons.

3.5.3 Annual Operating and Maintenance Costs

Table 3-8 presents a summary of annual operating costs of the wastewater treatment system over a five-year period. Detailed information regarding individual expenses by item and year are provided in Appendix J of this Report.

TABLE 3-8
ANNUAL OPERATING EXPENSES

Period	Annual Budget	Remaining/ <Over> Budget
Jul 01, 2007 Thru Jun 30, 2008	\$ 1,059,543.00	\$ 276,627.07
Jul 01, 2008 Thru Jun 30, 2009	\$ 1,052,151.00	\$ 204,271.41
Jul 01, 2009 Thru Jun 30, 2010	\$ 1,103,173.00	\$ 200,472.59
Jul 01, 2010 Thru Jun 30, 2011	\$ 2,269,420.00	\$ 512,164.17
Jul 01, 2011 Thru Jun 30, 2012	\$ 2,380,625.00	\$ 793,767.11

3.5.4 Revenue Received for the Last Five Years

Financial data for the Sewer and Wastewater Treatment System was provided by the Village of Los Lunas. Table 3-9 presents the revenue collected from the sewer rates over a five-year period.

TABLE 3-9
ANNUAL REVENUE DATA

ITEM	Jul 01, 2007 Thru Jun 30, 2008		Jul 01, 2008 Thru Jun 30, 2009		Jul 01, 2009 Thru Jun 30, 2010		Jul 01, 2010 Thru Jun 30, 2011		Jul 01, 2011 Thru Jun 30, 2012	
	Year-to-Date Actual	Est. Annual Revenue	Year-to-Date Actual	Est. Annual Revenue	Year-to-Date Actual	Est. Annual Revenue	Year-to-Date Actual	Est. Annual Revenue	Year-to-Date Actual	Est. Annual Revenue
Sales	\$ 1,418,474	\$ 1,708,505	\$ 1,238,326	\$ 1,973,983	\$ 1,810,914	\$ 2,120,860	\$ 1,861,265	\$ 2,083,160	\$ 2,392,631	\$ 2,580,251
Connection/Meter Fees	\$ 32,250	\$ 80,863	\$ 16,920	\$ 34,230	\$ 327,667	\$ 17,388	\$ 10,350	\$ 20,400	\$ 7,350	\$ 10,200
Penalties	\$ 40,306	\$ 36,969	\$ 40,396	\$ 43,300	\$ 40,465	\$ 43,570	\$ 41,782	\$ 41,061	\$ 45,718	\$ 41,815
Water/Wastewater Expansion Fund	\$ 481,129	\$ 917,396	\$ 296,950	\$ 513,839	\$ 294,359	\$ 277,015	\$ 152,954	\$ 288,639	\$ 112,632	\$ 161,573
TOTAL	\$ 1,972,159	\$ 2,743,733	\$ 1,592,591	\$ 2,565,352	\$ 2,473,404	\$ 2,458,833	\$ 2,066,351	\$ 2,433,260	\$ 2,558,330	\$ 2,793,839

3.5.5 Status of Existing Debts

Financial data for the Sewer and Wastewater Treatment System was provided by the Village of Los Lunas. Table 3-10 summarizes the existing debts for the Water and Sewer (wastewater) systems.

TABLE 3-10
OUTSTANDING DEBT WATER/SEWER FUND FOR FISCAL YEAR 2012

Lessor/ Creditor	Lease/Loan Number	Lease/Loan Amount	Payment due FY 2012	Loan Balance	Payment Frequency	Maturity Date	Fund/Account Number	Total Outstanding Debt - FY 2012
Chase Equip. Leasing	1003133195	\$ 63,813.00	\$ 14,469.03	\$ 21,703.53	Due 5th of every month	05/12/2013	414215547	WWTP- SEWER
NMED	CWSRF 007/WWTP	\$ 16,000,000.00	\$ 1,070,440.84	\$ 20,338,375.88	Annually	17/09/2030	414215582	
NMED	SRF 87-05	\$ 4,877,409.58	\$ 222,150.30	\$ 1,332,901.79	Monthly	26/01/2018	414215583	
								\$ 21,692,981.20
Chase Equip. Leasing	1000130248	\$ 1,008,594.00	\$ 95,031.84	\$ -	Monthly		414225547	WATER
NMFA	Arsenic DWRLF Loan	\$ 4,053,053.00	\$ 252,734.56	\$ 4,550,899.08	Annually	01/05/2030	414225560	
NMED	SRF 87-05		\$ 109,417.31	\$ 656,503.87	Annually	26/01/2018	414225582	
NMED	RIP 89-17	\$ 213,363.05	\$ 21,434.90	\$ 20,810.58	Annually	22/12/2012	414225583	
NMFA	Well#6 RIP Loan Payoff	\$ 4,070,660.00	\$ 254,582.20	\$ 2,250,111.17	Annually	01/05/2021	414225583	
USDA Rural Development	RUS Joint W/S Bond	\$ 791,000.00	\$ 62,190.00	\$ 361,000.00	Annually	14/08/2018	414225583	
NMED	CWSRF 1438037	\$ 3,217,000.00	\$ 196,741.16	\$ 2,754,376.24	Annually	28/03/2026	414225586	
								\$ 10,593,700.94
Totals		\$ 34,294,892.63	\$ 2,299,192.14	\$ 32,286,682.14				\$ 32,286,682.14

3.6 References

- Wastewater Facilities Plan, Draft, Molzen-Corbin & Associates, 1996.
- Wastewater Facilities Plan and Environmental Information Document, Final, Molzen-Corbin & Associates, 1998.
- Wastewater Facilities Plan Update, Molzen-Corbin & Associates, 2000.
- Wastewater Facilities Plan Addendum Preliminary Engineering Report, Final, Molzen-Corbin & Associates, 2005.
- New Mexico Environment Department, US EPA-Approved Total Maximum Daily Load (TMDL) for the Middle Rio Grande Watershed, June 30, 2010. Document retrieved on May 28, 2012, website:

ftp://ftp.nmenv.state.nm.us/www/swqb/MAS/TMDLs/MRG/CD-ROM/USEPA-ApprovedMRG_TMDL06-30-10.pdf

4.0 NEED FOR PROJECT

This Section of the PER will identify and describe the needs for the proposed project.

4.1 Health and Safety

The standards for effluent quality are based partly on concerns for public health and protection of the environment. The facilities must be capable of meeting current and potential future requirements for disposal of both liquid effluent into the Rio Grande and sludge to the surface disposal site. Similarly, operation of the plant must be considered safe to the Operations Staff and to the public.

4.1.1 Effluent Quality

The requirements for treatment and disposal of the liquid and the sludge components are evaluated separately in the following paragraphs.

4.1.1.1 Liquid Effluent

Effluent limits in the existing NPDES permit are 30 mg/L for BOD and TSS (30-day average concentration). As previously presented in Section 3.4.1.1 of this Report, the Village's wastewater treatment facility has for the most part met the effluent standards established in the current NPDES permit. Several violations to the discharge limits occurred in 2010 due to upsets in the secondary clarifiers during start-up of the MBR plant. However, since the MBR system stabilized, the quality of the effluent discharged to the river has significantly improved, and effluent concentrations are typically below 5 mg/L BOD₅ and TSS, as previously shown in Figure 3-4. A draft of the Village's new NPDES Permit renewal application was released for public comment in December 2012 by EPA. As of May 2013 the final permit has not been issued.

4.1.1.2 Sludge Management

Current methods for sludge treatment and disposal were discussed in detail in Section 3.4.9 of this Report. The sludge treatment process must meet the requirements established in the Code of Federal Regulations (CFR), Title 40: Protection of Environment, Part 503 “Standards for the use or disposal of sewage sludge” as well as State requirements for sludge disposal. The maximum allowable nitrogen concentration for land application currently established by the state of New Mexico is 200 pounds of total nitrogen per acre per year.

4.1.2 Plant Safety

The existing centrifugal blowers which remain in service at the activated sludge plant have been identified as the only significant plant safety concern. These 30-year-old blowers do not likely conform to the Occupational Safety and Health Administration (OSHA) requirement that a noise pollutant be muffled to a sound power no greater than 85 decibels (dB) at a distance of three feet from the unit. In lieu of undertaking the costly measures of retrofitting the blowers with sound-muffling devices or sound enclosures, the Operations Staff should continue to use hearing protection whenever working in or around these blowers.

The only chemicals used in the process are polymer for sludge thickening operations and sodium hypochlorite and citric acid from time to time for chemical cleaning of the membranes. The polymer feed system has a sump for secondary containment in case of leaks. Sodium hypochlorite and citric acid are only purchased when necessary and used immediately. There is no chemical storage at the plant.

4.2 System Operation and Maintenance

4.2.1 Infiltration and Inflow

As discussed in Section 2.4.4, infiltration and inflow (I/I) are not significant flow contributors to the WWTP. The Village Operations Staff should continue to monitor the sewer collection system to address I/I as necessary.

4.2.2 Management

No changes in plant operating procedures or system management are considered necessary at this time. The Operations Staff monitors plant performance and makes changes necessary to produce high-quality effluent from the facility. Inspection of the facilities and preventive maintenance of the equipment are part of the staff's routine. The 30-year-old activated sludge plant and all its components are still fully operational due in significant part to the efforts by the Operations Staff and adequate maintenance through the years.

At this time, the WWTP has a total of nine (9) employees with the following positions and certifications: a) Supervisor, Wastewater (WW) Level 4; b) Assistant Supervisor, WW Level 4; c) Maintenance Man, WW Level 3; d) Lab Technician, Lab Level 2 or WW Level 3; and, e) Laborers (5 total).

When the WWTP receives its new NPDES Permit, the Village of Los Lunas will change from a minor discharger to a major discharger, which will increase frequency of sampling, testing, and maintenance of equipment. The new NPDES Permit will be effective sometime this year (2013), depending on when EPA issues it. At that time, operations staff should be increased by at least one, but preferably two, employees. All positions would be the same as above, with the creation of two positions: one Assistant Lab Technician/Operator (Lab Level 2 or WW Level 3) and one Assistant Maintenance Man/Operator (WW Level 2). An additional laborer is also desirable. Depending on the sludge management alternative, additional Operations Staff may be needed.

4.3 Growth

4.3.1 Population Growth Forecast

Detailed population projections were presented in Section 2.3 of this Report. The population projections showed an increase from 14,845 inhabitants in 2010 to 56,258 residents in the Village at the end of the planning period, or year 2041.

4.3.2 Water Rights

Information regarding the Village of Los Lunas Water Rights was provided by the Village's water resources consultant, Lee Wilson & Associates, as follows:

- The Village currently holds 5,778.65 acre-feet per year (AFY) of diversion rights. The New Mexico State Engineer (OSE) has recently approved a comprehensive water rights permit for the Village of Los Lunas. Under the conditions of this permit, the Village will be able to divert up to 6,320.5 acre-feet (AF) of water rights per year. This diversion limit is based on a population projection of approximately 42,000 residents at 135 gallons per capita per day (GPCD).
- If the Village needs water rights in excess of 6,320.5 AFY, the rights will be provided by those who benefit from the water service. Village policy requires that subdivisions and large commercial users provide water rights adequate to meet the needs of the development prior to hooking up to the water system. If the Village extends service to areas that are currently unincorporated, the new customers will be required to transfer water rights adequate to meet the new demand. The Village has used this approach in its recent extension of water and wastewater service to the CNMCF.
- Return flow credits from the WWTP play an integral role in the Village's water rights accounting.

4.3.3 Wastewater Design Flows

Detailed flow projections were presented in Section 2.4 of this Report. The residential wastewater generation rate was assumed to be 80 gpcd, which is slightly lower than the 100 gpcd typical in many municipalities. The resulting flow at the end of the planning period is approximately 4.7 MGD. This flow includes the 0.17 MGD estimated to be received from the CNMCF, which was connected to the Village's sanitary sewer collection system in November 2011.

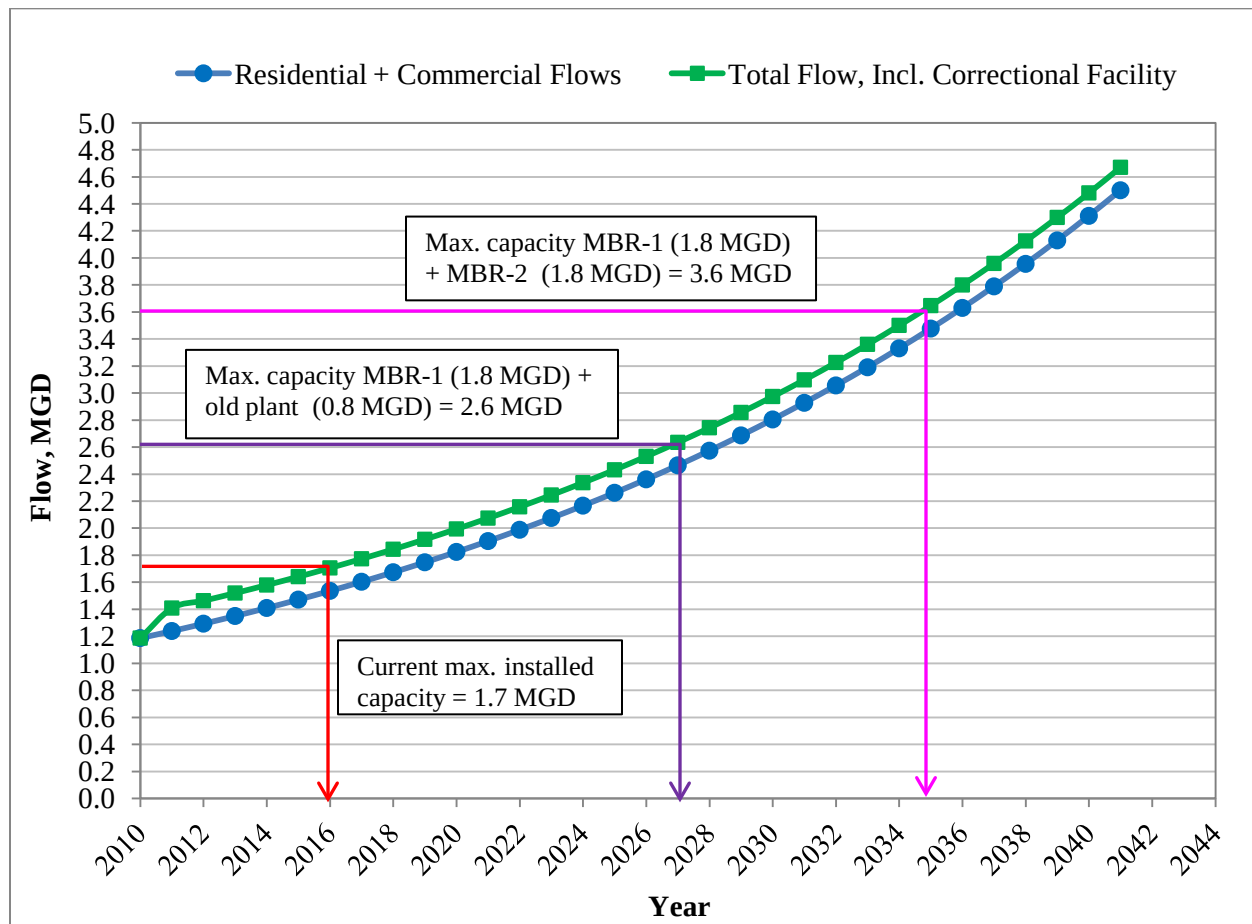


FIGURE 4-1
FLOW PROJECTIONS AND PLANT CAPACITY REQUIREMENTS

4.3.4 Wastewater Composition

The strength of domestic wastewater is typically measured in terms of biochemical oxygen demand (BOD₅), total suspended solids (TSS), and nitrogen, which all impact the capacity of WWTPs. BOD and TSS are two of the most frequently monitored parameters in municipal wastewater treatment facilities as good indicators of the organic strength of raw sewage. The current NPDES permit does not require sampling or monitoring of influent wastewater.

However, the plant Operations Staff periodically takes samples of the raw sewage received at the treatment facilities. Data regarding influent wastewater composition was provided for the period 2009 to 2012, as shown in Figure 4-2.

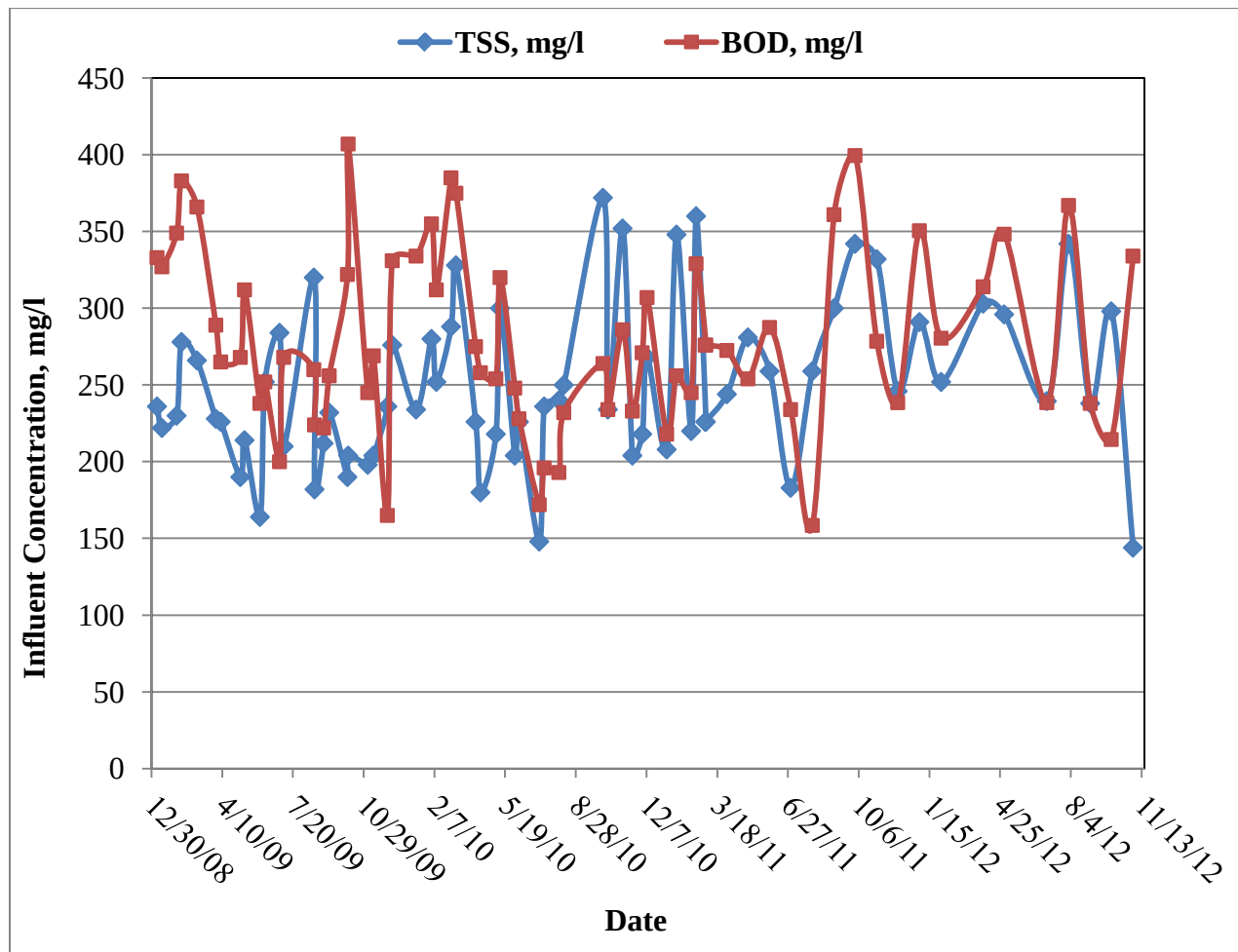


FIGURE 4-2
INFLUENT BOD AND TSS

Table 4-1 shows a summary of BOD and TSS concentrations based on the results of 68 influent samples collected in recent years. The concentrations to be used for design and loading estimates are 300 mg/L BOD and 250 mg/L TSS, which are slightly higher than the average BOD at 280 mg/L and 249 mg/L TSS. However, because of the increase in use of water-saving fixtures and devices at newer homes, concentrations are likely to increase over time.

TABLE 4-1
INFLUENT BOD AND TSS

Condition	BOD, mg/L	TSS, mg/L
Average	280	249
Maximum	407	372
Minimum	159	144

4.3.5 Wastewater Design Loads

Table 4-2 shows the loading projections to the WWTP for BOD and TSS through the planning period at 300 mg/L influent BOD and 250 mg/L TSS. Per capita contributions were also estimated using the projected population through the planning period and mass loadings. Literature values for per capita BOD loadings are in the range of 0.11-0.26 lbs/capita-day, (typical 0.18 lbs/capita-day) and for TSS 0.13-0.33 lbs/capita-day (typical 0.22 lbs/capita-day) ⁽¹⁾. Calculated average loadings through the planning period resulted in 0.22 lbs BOD/capita-day and 0.18 lbs TSS/capita-day, which are well within typical ranges for domestic wastewater.

TABLE 4-2
PROJECTED INFLUENT BOD AND TSS LOADINGS

Year (Approximate)*	Projected Flow, MGD	Plant Loading, lbs/day		Equivalent per Capital Loading, lbs/capita-day	
		BOD (at 300 mg/L)	TSS (at 250 mg/L)	BOD	TSS
2011	1.1	3,528	2,940	0.23	0.19
2012	1.4	3,653	3,044	0.23	0.19
2013	1.5	3,803	3,169	0.23	0.19
2014	1.6	3,953	3,294	0.22	0.19
2015	1.7	4,103	3,419	0.22	0.19
2016	1.8	4,278	3,565	0.22	0.19
2017	1.9	4,429	3,690	0.22	0.18
2018	2.0	4,604	3,836	0.22	0.18
2019	2.1	4,804	4,003	0.22	0.18
2020	2.2	4,979	4,149	0.22	0.18
2021	2.2	5,179	4,316	0.22	0.18
2022	2.3	5,404	4,504	0.22	0.18
2023	2.3	5,630	4,691	0.22	0.18
2024	2.4	5,855	4,879	0.22	0.18
2025	2.4	6,080	5,067	0.22	0.18
2026	2.5	6,330	5,275	0.21	0.18
2027	2.6	6,605	5,504	0.21	0.18
2028	2.7	6,855	5,713	0.21	0.18
2029	2.8	7,156	5,963	0.21	0.18
2030	3.0	7,431	6,192	0.21	0.18
2031	3.1	7,756	6,464	0.21	0.18
2032	3.2	8,081	6,735	0.21	0.18
2033	3.3	8,407	7,006	0.21	0.18
2034	3.5	8,757	7,298	0.21	0.18
2035	3.6	9,132	7,610	0.21	0.18
2036	3.8	9,508	7,923	0.21	0.17
2037	4.0	9,908	8,257	0.21	0.17
2038	4.1	10,333	8,611	0.21	0.17
2039	4.3	10,759	8,966	0.21	0.17
2040	4.5	11,209	9,341	0.21	0.17
2041	4.7	11,684	9,737	0.21	0.17

(*) Minor time adjustments (year) were necessary to round off flows and may not match exactly to the population projections previously presented. Final plant capacity remains the same presented in Table 2-5.

4.3.6 Sludge Production and Biosolids Management

When two plants are operated at the same time and the resulting biosolids and sludge are conveyed to a single sludge treatment process, biosolids production estimates can be difficult to obtain. Because the Village is currently operating two facilities which receive flow from different portions of the community, sludge production was calculated separately for the activated sludge plant (old plant) and the MBR facilities. This was due to the different solids production yield, which is related to the type of biological process used for wastewater treatment. Other important differences between these two processes include: 1) wasted sludge solids concentration is significantly higher in the MBR process; 2) sludge wasting frequency is required more often for the activated sludge; 3) operational conditions for sludge wasting (i.e. duration and pumping rate) are process-related and different for the two plants; and, 4) polymer requirements for thickening are higher for the MBR plant.

In lieu of presenting all the calculations and results for each process, a summary table that combines the two plants was prepared. First, it is assumed that the old (activated sludge) plant will continue to be operated at a reduced capacity of 0.5 MGD which, per the Operations Staff's comments, is a reliable hydraulic loading that results in process stability and good effluent quality. Wastewater flows to meet future growth needs were added only to the MBR facilities. The current thickening process used at the WWTP is a GBT which is capable of achieving solids concentration of about 6%. However, due to recent operational problems and performance issues with the digesters, it is recommended to thicken sludge up to a maximum of 3.5% to 4.0%. For sludge production calculations, it has been assumed that sludge will continue to be thickened within this range prior to digestion.

The maximum capacity of the existing GBT has been estimated to be equivalent to an influent flow of 2.7 MGD, which is expected to be generated in or around year 2028. At this flow rate, the GBT will have to be in operation for 7 to 8 hours per day, 5 days per week, to thicken the sludge produced by the process. The existing GBT is about 16 years old, but is still in good operational condition; however, there is no backup unit. Therefore, if the GBT needs to be taken out of service for maintenance, the sludge cannot be thickened and the digesters would have to

be fed with raw sludge. The main implication would be a reduction in the capacity of the digesters, thus compromising the performance to achieve Class B sludge.

Table 4-3 shows the sludge production projections for both plants at a common point, which is after thickening and/or feeding to the aerobic digesters. At the end of the 30-year planning period, for a plant flow of 4.7 MGD, it was estimated that sludge will be produced at a rate of approximately 27,000 gallons per day (after thickening), and a mass of 7,800 lbs of solids will be wasted from the treatment process. These projections are, however, subject to change depending on influent wastewater composition or plant operational conditions.

The last component of the sludge treatment and management process is final disposal of biosolids. The Village of Los Lunas currently owns approximately 220 acres of land, of which 200 acres can be used for final disposal of sludge. This site has been used since 1996, when the existing sludge treatment facilities were added to the overall treatment process at the WWTP.

TABLE 4-3
PROJECTED SLUDGE PRODUCTION

Total Plant Flow, MGD	Year (Approximate)*	Solids Production, MBR Plant + Activated Sludge Plant	
		Flow to Digester After Thickening	Total Solids to Digester
		gal/day	dry lbs/day
1.1	2011	7,125	2,019
1.2	2011	7,688	2,180
1.3	2011	8,250	2,341
1.4	2012	8,813	2,501
1.5	2013	9,375	2,662
1.6	2014	9,938	2,822
1.7	2015	10,500	2,983
1.8	2016	11,063	3,143
1.9	2017	11,625	3,304
2.0	2018	12,188	3,464
2.1	2019	12,750	3,625
2.2	2021	13,313	3,786
2.3	2023	13,875	3,946
2.4	2025	14,438	4,107
2.5	2026	15,000	4,267
2.6	2027	15,563	4,428
2.7	2028	16,125	4,588
2.8	2029	16,688	4,749
3.0	2030	17,813	5,070
3.1	2031	18,375	5,230
3.2	2032	18,938	5,391
3.3	2033	19,500	5,552
3.5	2034	20,625	5,873
3.6	2035	21,188	6,033
3.8	2036	22,313	6,354
4.0	2037	23,438	6,675
4.1	2038	24,000	6,836
4.3	2039	25,125	7,157
4.5	2040	26,250	7,478
4.7	2041	27,375	7,799

(*) Minor time adjustments (year) were necessary to round off flows and may not match exactly to the population projections presented in Section 2. Final plant capacity remains as shown in Table 2-5.

Table 4-4 shows the projected flows and mass of digested sludge for final disposal. These projections assume maximum solids concentration in the digested sludge of 4.0%. A total nitrogen concentration of 50,000 mg/kg (dry weight basis) was used for nitrogen loading calculations. This concentration is based on the most recent total nitrogen concentrations measured in digested sludge (about 100,000 mg/kg dry weight basis) and assumes that the digesters will be modified to achieve 50% total nitrogen removal from current concentrations.

According to these projections, the existing sludge disposal site can receive digested sludge generated by an influent flow of 1.8 MGD. This assumes improvements to the existing digestion process are in place. At the end of the planning period, 285 acres of additional land would be necessary for solids disposal if the only method is surface disposal.

TABLE 4-4

FINAL SLUDGE DISPOSAL FLOWS AND PROJECTED NITROGEN LOADING

Total Flow, MGD	Year (Approx.)*	Digested Sludge Disposal Requirements				Nitrogen Loading Projections		Additional Land Required
						Per Each Section		
		lbs/day	lbs/month	gal/day	gal/wk	lbs/month	lbs/acre per year	acres
1.1	2011	1,662	49,858	4,984	34,885	2,493	125	sufficient available
1.2	2011	1,795	53,862	5,384	37,686	2,693	135	sufficient available
1.3	2011	1,929	57,865	5,784	40,488	2,893	145	sufficient available
1.4	2012	2,062	61,869	6,184	43,289	3,093	155	sufficient available
1.5	2013	2,196	65,873	6,584	46,091	3,294	165	sufficient available
1.6	2014	2,329	69,876	6,985	48,892	3,494	175	sufficient available
1.7	2015	2,463	73,880	7,385	51,693	3,694	185	sufficient available
1.8	2016	2,596	77,884	7,785	54,495	3,894	195	sufficient available
1.9	2017	2,730	81,887	8,185	57,296	4,094	205	5
2.0	2018	2,863	85,891	8,585	60,097	4,295	215	15
2.1	2019	2,996	89,895	8,986	62,899	4,495	225	25
2.2	2021	3,130	93,899	9,386	65,700	4,695	235	35
2.3	2023	3,263	97,902	9,786	68,501	4,895	245	45
2.4	2025	3,397	101,906	10,186	71,303	5,095	255	55
2.5	2026	3,530	105,910	10,586	74,104	5,295	265	65
2.6	2027	3,664	109,913	10,986	76,905	5,496	275	75
2.7	2028	3,797	113,917	11,387	79,707	5,696	285	85
2.8	2029	3,931	117,921	11,787	82,508	5,896	295	95
3.0	2030	4,198	125,928	12,587	88,111	6,296	315	115
3.1	2031	4,331	129,932	12,987	90,912	6,497	325	125
3.2	2032	4,465	133,936	13,388	93,714	6,697	335	135
3.3	2033	4,598	137,939	13,788	96,515	6,897	345	145
3.5	2034	4,865	145,947	14,588	102,118	7,297	365	165
3.6	2035	4,998	149,950	14,988	104,919	7,498	375	175
3.8	2036	5,265	157,958	15,789	110,522	7,898	395	195
4.0	2037	5,532	165,965	16,589	116,124	8,298	415	215
4.1	2038	5,666	169,969	16,989	118,926	8,498	425	225
4.3	2039	5,933	177,976	17,790	124,529	8,899	445	245
4.5	2040	6,199	185,984	18,590	130,131	9,299	465	265
4.7	2041	6,466	193,991	19,391	135,734	9,700	485	285

(*) Minor time adjustments (year) were necessary to round off flows and may not match exactly to the population projections previously presented. Final plant capacity remains the same presented in Table 2-5.

Sludge hauling requirements for transportation of the digested product to the land application site are also expected to increase significantly as influent flows to the plant rise. Per the projections shown in Table 4-4, at the end of the planning period, or year 2041, it will be required to haul sludge on a daily basis at a rate of approximately five trips per day. According to the plant Operations Staff, under the best-case scenario, if operators and truck drivers are available all day, due to the distance from the WWTP to the surface disposal site and road conditions the maximum number of trips per day is four. Therefore, additional equipment and operators will be needed as flows to the plant and sludge disposal requirements increase. A second tanker truck will likely be needed to serve as a backup in case of failure.

With regards to the nitrogen application rate, the Village will reach the maximum of 200 lbs/acres-year at an equivalent plant flow of 1.8 MGD, which is expected to occur in 2016. This projection assumes that modifications to the aerobic digesters to achieve total nitrogen removal will be implemented in the near future.

The Engineer recommends implementing actions immediately to retrofit and/or operate the existing digesters to achieve total nitrogen removal. Some nitrogen removal can be achieved by implementing the operational changes recommended in Section 3.4.9.1 of this Report, which consist of frequent monitoring of the digester's performance and turning the aeration system on/off as necessary to achieve nitrification and denitrification.

If the Village wishes to continue with the surface disposal method for sludge disposal, land requirements will increase significantly. By the end of the project planning period, the land required for disposal of the total amount of sludge has been estimated at 485 acres. This is the best-case scenario and assumes that the digesters are operated for total nitrogen removal and that nitrogen content in digested sludge is below 50,000 mg/kg dry weight basis. Other alternatives for sludge disposal must also be considered in the event that additional land for purchase by the Village is not available.

4.3.7 Construction Phasing and Expandability

This PER is being prepared for a 30-year project planning period; thus, phasing alternatives will be evaluated for both the liquid and sludge treatment processes. Phasing and expandability alternatives will be presented in Section 7.0 of this Report for the proposed project.

4.4 References

1. Wastewater Engineering Treatment and Reuse, Metcalf & Eddy, Fourth Ed., Table 3-12, page 182, 2003.

5.0 ALTERNATIVES CONSIDERED

This Section of the PER presents alternatives considered for treatment of the Village's wastewater and sludge flows throughout the 30-year planning period. These alternatives would enable the Village to comply with state and federal wastewater and sludge disposal regulations and to accommodate population growth within the planning area.

Since the Village already owns and operates a state-of-the-art MBR plant, other technologies are not evaluated for the liquid portion of the process. However, an evaluation of the alternatives and phasing options to increase the hydraulic capacity of these facilities over the next 30 years is presented.

Regarding sludge treatment and disposal, several alternatives are evaluated in this Section. Special consideration is given to the alternatives for final disposal of sludge to provide more flexibility in the future.

5.1 Evaluation Criteria

A number of treatment alternatives and technologies are presented in Section 5.0 for consideration. A cursory screen of these alternatives will be first conducted, and only those deemed feasible will be examined in detail in Section 6.0 of this PER. The feasible alternatives will be evaluated and ranked according to the following criteria presented.

5.1.1 Regulatory Compliance

The plant must be capable of continued and consistent compliance with all applicable state and federal regulations. These regulations apply to the plant effluent discharged into the Rio Grande and sludge disposal.

For the liquid portion of the treatment, the existing MBR facility was designed to produce a high-quality effluent which meets all current limits in the NPDES permit. Currently, some of the

parameters that are required to be measured are below detection limits by Standard Methods. The design of the existing MBR plant also allows for the incorporation of anaerobic basins. These basins would allow for biological phosphorus removal, if this pollutant is added to the NPDES in the future.

Sludge management alternatives deemed feasible in this Section will have to meet the requirements established in the Code of Federal Regulations (CFR), Title 40: Protection of Environment, Part 503 “Standards for the use or disposal of sewage sludge”, as well as the requirements established by the New Mexico Environment Department for sludge disposal. Special attention will be given to the requirements set up in Subpart D (pathogen and vector attraction reduction) of the 503 CFR 40 regulations, which apply to sewage sludge and domestic septage applied to the land or placed on a surface disposal site.

As part of any improvements or construction projects, a Storm Water Pollution Prevention Plan (SWPPP) will be implemented and maintained as required by current regulations.

5.1.2 Expandability

Expandability and phased construction of the treatment facilities is advantageous and highly recommended for the Village wastewater and sludge treatment facilities.

5.1.3 Site Efficiency and Constructability

Alternatives that use fewer and/or smaller treatment components are considered more site-efficient because they require less space. They are also more “constructable” because they can be built more quickly. The existing MBR plant was designed and built using this approach. As a result, the footprint of the plant is small compared to its treatment capacity. A large portion of the site that the Village owns for the wastewater treatment facilities remains available for future expansions. A site use plan for current and future facilities will be included in this Report.

Because the site where the existing WWTP is located and where future facilities will be constructed is near the Rio Grande, the water table is high. Therefore, existing and future facilities will be constructed above ground.

While considering options for the sludge treatment process, treatment technologies and disposal alternatives that require smaller spaces are highly desirable.

5.1.4 Operation and Maintenance

Plant operation should be as simple as possible, but always keeping in mind that compliance with discharge limits and regulations, as well as public health protection, are the main objectives. The treatment processes and individual components and equipment should not be so complex that they cannot be sustained by a New Mexico Class 4 Operator.

The plant equipment and components should be sufficiently robust that frequent repairs are not required. For specialized repairs, manufacturers' or vendors' representatives should be readily available. Care should be taken when evaluating highly specialized or proprietary equipment to ensure that spare parts and technical assistance will be readily available.

5.1.5 Public Acceptance

The treatment plant and sludge management process should not produce excessive odor. The public should accept the plant technology as safe, reliable, and environmentally friendly. Public acceptance is particularly important because the plant is proximate to residential areas and discharges effluent into the river. Regarding sludge disposal, the existing site for land application is distant from residential and/or commercial areas. The site is already disturbed and has been in use for the past 16 years.

5.1.6 Cost

The proposed facilities should minimize the capital investment and annual operating costs, which are combined into a present worth of cost. For cost comparison purposes, in cases of comparable present worth, capital costs should be preferred to operating costs. Conceptual cost estimates will be prepared for those alternatives deemed feasible.

5.2 Liquid Treatment Process

This Section presents a brief history of the most recent Wastewater Facilities Plans and Preliminary Engineering Reports, which were prepared to address wastewater treatment requirements and need for facilities upgrades and expansion.

In the 1996 Village of Los Lunas Wastewater Facilities Plan, three options were screened for treatment and disposal of projected wastewater flows:

1. Capacity expansion of existing treatment facilities, which were at that time the activated sludge plant still in use
2. Construction of nitrification aeration treatment facilities
3. Construction of denitrification aeration treatment facilities

The **first alternative** that was evaluated consisted of expansion of the activated sludge plant. However, modifying the existing facilities would not significantly increase plant capacity without construction of a new aeration basin and two clarifiers, so further evaluation of this option was discontinued.

The **second alternative** included the construction of a parallel activated sludge treatment plant using nitrification-aeration processes. In this scenario, the existing treatment plant would remain online, but a new facility would be constructed and used to treat incoming sewage alongside the old plant. The treatment plant would continue to discharge to the Rio Grande. A phased approach that would spread full expansion and the cost of improvements over several years was outlined for this alternative.

The 1996 Facilities Plan also evaluated a **third alternative**, which was an aerated denitrification process and land disposal. A golf course, which was at that time being planned for in Los Lunas, was considered as the main user for effluent reuse. However, projected flows exceeded available land for disposal or storage. Furthermore, little irrigation occurs during winter months, requiring an alternate location for disposal. Because sufficient storage capacity for reduced winter water demand would be expensive to construct, the estimated cost of the denitrification treatment and land disposal alternative greatly exceeded that of the parallel treatment plant with continued disposal to the river; therefore, the reuse option was not selected.

The 1996 Facilities Plan concluded that the parallel activated sludge treatment process would most effectively serve the Village, and suggested that land south of the existing plant be purchased for the wastewater treatment plant expansion. The Facilities Plan was updated in 2000 and concluded that an activated sludge process including both nitrification and denitrification was desired to comply with WET testing permit requirements, reduced operation and maintenance costs through energy savings, and potential future effluent reuse. During the Facilities Plan update, the Village had begun the process of acquiring an adjacent parcel of land, south of the existing WWTP. Land acquisition negotiations were met with resistance, however, from landowners, private associations, and county and state agencies. Legal action ensued involving the Village, the Valencia County Farm Bureau, the New Mexico Farm Bureau, the Historic Tomé Adelino Neighborhood Association, the Assessment Payer Association of the Middle Rio Grande Conservancy District, the Valencia County Citizens for Responsible Growth, the Rio Grande Restoration, and the US EPA. Concerns revolved around condemnation of active farmland, quality and quantity of water discharged to the Rio Grande, and the critical habitat of several endangered species, including the Rio Grande Silvery Minnow, the Southwestern Willow Flycatcher, the Whooping Crane, and the Bald Eagle.

After several years of legal proceedings, an agreement was reached, condemning 12 of the 17 acres the Village sought to acquire. The terms of the settlement required the Village to meet several stipulations regarding operations conducted on the parcel of condemned land. The settlement focused on reducing impact to the natural environment, including construction of buffer zones vegetated with native shrubbery to promote native habitat, handling of sludge

indoors, compliance with the Night Sky Protection Act and other applicable ordinances and statutes regarding light, noise, and dust, and limiting construction of buildings to 35 feet high. All operations conducted on the parcel of condemned land were to be environmentally sensitive.

Consideration of treatment techniques in the 1996 Wastewater Treatment Facilities Plan and the 2000 Facilities Plan update indicated that construction of an activated sludge process would be sufficient for the Village. However, tensions about the construction of an activated sludge plant, which has a large footprint and is built outdoors, on the acquired parcel of land promoted the consideration of a state-of-the-art technology: MBR plant. MBR technology combines biological treatment and microfiltration in a process where clear permeate is separated from the mixed liquor solids by polymeric membranes. The Village was interested in pursuing such technology because of its smaller footprint given the reduced property size obtained through condemnation, the ability to meet current and potentially more stringent future effluent limits, and its enclosed treatment processes. Village representatives and their consulting engineers visited other facilities, including an MBR plant that was designed to meet stringent phosphorous limits. MBR treatment was ultimately selected for its production of superior effluent and minimal land requirements. By blending effluent from the activated sludge and MBR plants, the Village could discharge high-quality water into the river. An additional advantage of the MBR is its minimal aesthetic impact; the wastewater is treated indoors or in covered basins, eliminating odors and unsightly facilities. Utilization of an MBR plant maintained an environmentally sensitive approach, in principle with the settlement regarding the WWTP land transfer.

Construction of the existing WWTP MBR facilities began in 2007, and the plant commenced operation in 2010. To account for potential changes in future NPDES permits, which may require plant nutrients (nitrogen and/or phosphorus) removal, the hydraulic profile of the MBR plant includes a future anaerobic basin, which would allow for biological phosphorus removal. The existing MBR plant also includes aerobic and anoxic zones for biological nitrogen removal, as recommended in the 2000 Facilities Plan update, which enable the Village to comply with the WET testing requirements of the NPDES permit while also realizing energy savings through reduced aeration requirements by denitrification. In addition, some of the unit operations, such as the entrance works and the permeate pump station, were designed and constructed for installation

of equipment in the future to support another MBR plant, thus that part of the capital investment is already in place.

By having an MBR plant in service at this time and blending the effluent to the two facilities, the Village is discharging an effluent of superior quality to the Rio Grande, thus protecting wildlife. Ultimately, the existing activated sludge plant will be taken off-line and the capacity replaced by MBR treatment, ensuring a very high effluent quality. Furthermore, should the community decide to implement an effluent reuse system in the future, the filtration process to meet effluent turbidity requirements would already be in place, which would facilitate the implementation of an effluent reuse system. In fact, the MBR plant can produce Class 1A effluent, which is the highest reclaimed wastewater quality in the State of New Mexico.

5.2.1 MBR Facility Considerations

The Village owns and operates two different types of wastewater treatment processes: an activated sludge plant, which is over 30 years old, and the MBR plant that started operations in 2010. The activated sludge plant remains in service, and the Village continues to combine the effluent from the activated sludge and MBR plants prior to discharge to the river. However, incorporating facilities that use different treatment technologies and equipment introduces inefficiencies in overall plant operations. With respect to the WWTP staff, procedures are encumbered by treatment plants that use different technology. Consistency between treatment technologies facilitates straightforward operational procedures.

Currently, the Village owns approximately 19.9 acres at the site where the existing facilities are located. This allowed planning for a *campus arrangement* for the construction of the MBR plant in 2007 and took into account the construction of future facilities, including:

- New MBR treatment facilities to replace the existing activated sludge plant
- New MBR treatment facilities to increase overall treatment capacity
- New administration and laboratory building
- Additional sludge handling facilities

When the Village decommissions the existing activated sludge plant, it is recommended to construct a facility using the same technology as their current MBR process to streamline plant

operations. Furthermore, because WWTP staff are already trained in the operational procedures of an MBR plant, it is advisable to construct similar facilities. Because expansion of the existing process and construction of an additional MBR plant would simplify treatment operations and honor the terms of the land acquisition settlement, the MBR is the technology chosen for expansion of the Village wastewater treatment facilities.

Because of the reasons previously stated and in order to support the Village's vision of discharging high-quality effluent to the Rio Grande and complying with environmental regulations, the recommended technology for the liquid treatment and capacity expansion is MBR facilities. As was done with the design and construction of the existing MBR plant, future MBR facilities will also be designed for phased construction, which will be dictated by population growth and increase in wastewater flows.

5.2.2 Entrance Works Considerations

The existing entrance works at the MBR plant were designed and built to account for future expansion of the MBR facilities. Provisions for future expansions included:

- Space and piping to add a third rotary drum screen
- Outlet pipes to connect the entrance works to future MBR facilities
- The design of the existing facilities to allow for ease in capacity expansion at a minimal capital expense (mainly the cost of the new screen)

5.2.3 Effluent Disposal Pipeline Considerations

As previously mentioned in Section 3.4.8, the existing effluent pipeline is a 16-inch diameter ductile iron pipe, which is approximately 30 years old. This effluent line is capable of handling a peak day flow of 3.4 MGD and an estimated average day flow of 1.7 MGD. The line needs to be replaced in the near future (preferably by or before year 2016). Due to the environmental clearance and permit requirements needed for implementation of this project, replacement of the existing 16-inch effluent disposal line with a 24-inch pipeline is recommended to ensure sufficient capacity is available for the next 30 years.

5.2.4 Administration/Laboratory Facilities Considerations

As was previously described in Section 3.0 of this Report, the only administration and laboratory facilities available at this time are the ones that were constructed as part of the activated sludge plant more than 30 years ago. The existing spaces are insufficient for the current size of WWTP and Operations Staff. These facilities are in need of expansion and improvements in the near future. Furthermore, because the WWTP will change from a minor to a major facility, more testing and monitoring requirements will be included in the next discharge permit. Consequently, the workload and space requirements in the laboratory will also increase.

The new Administration and Laboratory Building will include the following areas and uses: laboratory (with space for wastewater analyses, storage room, and dedicated office space), mechanical area (with water heater and water softener), office space for administrative personnel, training room, break room, and laundry and shower facilities for Operations Staff.

5.3 Initial Screening of Sludge Treatment and Management Alternatives

A detailed description and evaluation of the condition of the existing sludge treatment and disposal facilities was presented in Section 3.0 and Appendix F of this Report.

5.3.1 Pre-Digestion Thickening

The objective of this solids pre-treatment process is to remove water and concentrate the solids by using a thickening mechanism. Thickening reduces the volume of sludge to process by removing excess water, improves operation, and reduces costs for subsequent storage, processing, transporting, and final disposal. For example, thickening liquid-solids (slurry) from 1.5% to 3% will reduce the volume by 50%.

5.3.1.1 Gravity Thickening

A gravity thickener is essentially a circular concrete tank, usually with a conical bottom that is fitted with collectors or scrapers, similar to secondary clarifiers. This type of process has the advantages of simple operation and low operation and maintenance cost. However, it also has some disadvantages: 1) since thickening is done prior to sludge treatment (i.e. digestion), the sludge is still laden with volatile organics which may decompose anaerobically and cause odor problems; 2) they require more land area for construction, compared to mechanical thickening; 3) gravity thickeners are susceptible to weather conditions, particularly to low temperatures and snow; and, 4) gravity thickeners may only yield 2%-4% solids concentration in the sludge; thus, the volume of the basins for solids treatment/stabilization would still be considerably large.

*For these reasons, **gravity thickening for the Village is not recommended.***

5.3.1.2 Centrifuge

Centrifugal thickening and dewatering is a high-speed process that uses the force from rapid rotation of a cylindrical bowl to separate wastewater solids from liquid. The expected solids concentration in a cake thickened by a centrifuge is 4-8% ⁽¹⁾. The addition of polymer is required for this process.

The advantages of centrifuges include: 1) small amount of floor space relative to their capacity; 2) minimal operator attention when operations are stable; 3) operators have low exposure to the sludge, thus reducing occupational health hazards; 4) centrifuges are easy to clean, and 5) they can handle higher than design loadings ⁽²⁾; centrifuges are good thickening alternatives for medium to large plants ⁽¹⁾.

The disadvantages of centrifuges include: 1) repair work is usually performed by the equipment manufacturer; 2) this equipment has high power consumption and is fairly noisy; 3) experience operating the equipment is required to optimize performance (centrifuges are currently being used in nearby WWTPs); 4) performance is difficult to monitor because the process occurs inside

the equipment and operator's view is obstructed; 5) special structural considerations must be taken into account to safely install and operate this equipment; 6) spare parts are expensive and internal parts are subject to abrasive wear, and 7) start-up and shutdown may take an hour to gradually bring the centrifuge up to speed and slow it down for clean-out prior to shutdown ⁽²⁾.

*For these reasons, **centrifuge thickening for the Village is not recommended.***

5.3.1.3 Gravity Belt Thickening

A GBT concentrates sludge using gravity-induced settling and compaction of sludge solids. Polymers are commonly used to chemically condition the biosolids and to enhance formation of solids conglomerates or flocs. The conditioned sludge is fed to the inlet or distribution box of the gravity belt thickener. Turbulence is undesirable because it can disrupt or break the flocs. The belt is a moving, porous, synthetic mesh where water drains readily through it while the solids are retained on the top. V-shaped plows are positioned to ride on the top surface of the belt as it conveys the sludge. The function of the plows is to move the solids from side to side as they move with the belt. Standard belt widths are 1.2 meters (3.9 feet), 1.7 m (5.6 ft), 2.2 m (7.2 ft), 2.7 m (8.9 ft), and 3.2 m (10.5 ft). The solids concentration in a thickened cake by a gravity belt thickener is between 4% and 8% ⁽¹⁾.

GBTs offer the following advantages: 1) the short residence time of a belt thickener reduces the potential for odor problems; 2) the solids content in the sludge is higher, thus reducing the volume of digester needed for solids treatment; 3) ease of maintenance and cleaning; 4) operators can see the equipment and sludge while the equipment is running, thus allowing for adjustments; and, 5), the Village owns a 2-meter-wide gravity belt thickener (maximum estimated hydraulic capacity of 400 gpm), which has been in operation since 1996 without major mechanical or maintenance issues. The Operations Staff is very familiar with this piece of equipment, its performance, and maintenance requirements.

*For these reasons, **a gravity belt thickener will be considered further for solids thickening at the Village's WWTP.***

5.3.1.4 Membrane Thickening

Membrane thickening (MTB) is still considered an innovative technology ⁽³⁾. However, membrane processes have an extensive history in Europe and Japan in both liquid and sludge applications. By the end of 2011, there were approximately 30 flat plate (Kubota membranes) sludge thickening installations in the United States.

Figure 5-1 shows a schematic of a membrane thickening process followed by aerobic digestion ⁽⁴⁾. The sludge flows in a loop between a digester, a membrane thickener, and an anoxic tank before being discharged from a second digester. Combining the thickener and an anoxic tank with the aerobic digestion process offers several advantages: 1) reduction in the tank volume required to meet time and temperature criteria for Class B sludge; 2) less water to warm, thus increasing the operating temperature; 3) smaller tanks also reduce the energy costs for aerating the digesters; 4) the un-aerated zone provides automatic anoxic conditions stimulating denitrification and pH adjustment; and 5) the nitrification/denitrification cycle in the process reduces total nitrogen in the recycle back to the liquid stream.

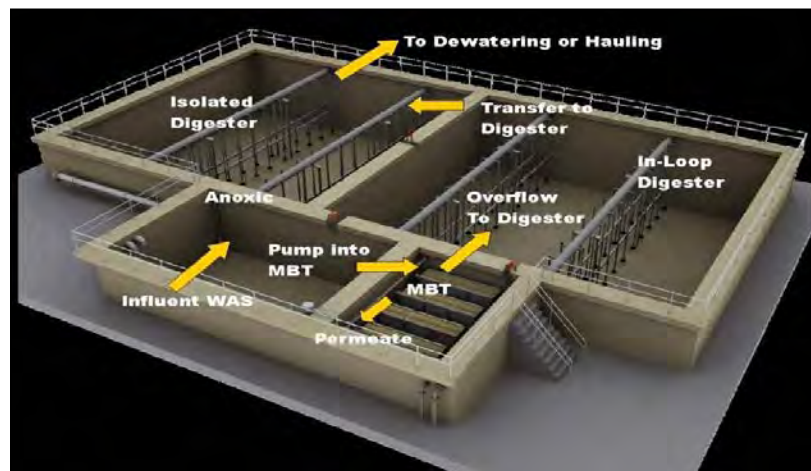


FIGURE 5-1

MEMBRANE THICKENING COUPLED WITH AEROBIC DIGESTION

Source ⁽⁴⁾: http://www.sawea.org/pres/Session_E/Stephen_Kennedy.pdf

Among the benefits of the membrane thickening process are ⁽⁴⁾: 1) improved thickening of wasted sludge without polymer addition; 2) reduction in O&M cost because there is no need for polymer addition; 3) less sludge volume to handle or dispose of due to the increased solids concentration; 4) automated process reduces operator attendance; 5) continuous process, which results in no set-up or clean-up time; 6) reduced footprint because of the smaller tanks; 7) existing or overloaded digesters may be retrofitted; 8) the technology produces a high-quality permeate when used with an aerated digester; 9) reduction in total nitrogen (NH_3/NO_3) and phosphorus in the permeate; 10) filtrate stream can be combined with effluent without reducing quality; and, 11) the sludge for disposal has lower nitrogen concentration.

Currently, the number of MBT installations in the United States is very limited, and long-term performance of these facilities is unknown at this time. Compared to other mechanical thickening processes, the MBT technology may have a higher capital cost and may be intimidating to Operations Staff who are not familiar with membrane technologies and/or with this application of membranes. Regular cleaning is automated, with the exception of a chemical cleaning approximately once every six months. Because chemicals are needed, the O&M cost increases compared to other technologies. In addition, the Village of Los Lunas owns a GBT, which is in good mechanical condition; thus, if MBT is implemented, the GBT would not be necessary. For implementation of the membrane thickening process, significant retrofitting of existing facilities will be required, including additional screening of the sludge wasted from the activated sludge plant due to the potential to have debris that could damage the membranes used for thickening.

For these reasons, membrane thickening will not be considered further for solids thickening at the Village WWTP.

5.3.2 Digestion

It is often recommended that sludge be stabilized prior to final disposal. It can also be a requirement for some disposal alternatives for several reasons: 1) to reduce pathogens and minimize environmental impact and for health protection; 2) to minimize volatile organics and materials that may cause offensive odors; 3) to inhibit, reduce, or eliminate potential for

putrefaction; 4) to improve the characteristics of sludge prior to dewatering; and, 5) to reduce the volume of solids to be disposed of ⁽¹⁾. Among the methods for biosolids stabilization are aerobic digestion, anaerobic digestion, and auto-thermal thermophilic aerobic digestion ⁽¹⁾.

5.3.2.1 Aerobic Digestion

Aerobic digestion consists of the biological conversion of organic matter present in the sludge by supplying air to the contents (sewage sludge) in a concrete basin. As the supply of available substrate food and organics is depleted, the microorganisms begin to consume their own cell material to obtain energy. Cell tissue is aerobically oxidized to carbon dioxide, water, and ammonia. Typically, only 75-80% of the cell tissue can be oxidized, and the rest is considered the non-biodegradable fraction.

Among the advantages of aerobic digestion are: 1) it is a well-known, stable process; 2) it is used in a lot of wastewater treatment facilities due to its simple operation and effectiveness; 3) capital costs are lower compared to anaerobic digestion; 4) the end product is biologically stable and typically odorless; and, 5) the technology is suitable for digesting nutrient-rich biosolids ⁽¹⁾.

The aerobic digestion process has the following disadvantages: 1) energy-intensive because it requires air for the biodegradation process to occur and for mixing; and, 2) the process is significantly affected by a series of factors, including temperature, feed solids concentration, type of aeration/mixing devices, and type and geometry of tanks ⁽¹⁾.

Aerobic digestion is recommended for continued use in biosolids stabilization at the Village WWTP. Aerobic digesters designed for nitrification/denitrification should be evaluated for future sludge treatment facilities.

5.3.2.2 Anaerobic Digestion

Anaerobic digestion consists of the biological conversion of organic matter in the absence of oxygen. Biogas (a mix of methane, carbon dioxide, and other gases) is produced during the process.

Anaerobic digestion for biosolids stabilization offers the following advantages: 1) with proper processing, biogas can be used within the treatment facility to heat buildings, heat tanks, or with additional equipment, generate electricity; 2) the resulting biosolids are typically suitable for land application; and, 3) in large plants, the heat or electricity generated may be enough to meet many of the energy needs for plant operation ⁽¹⁾.

This process also has some disadvantages: 1) anaerobic digestion is most often employed at plants digesting both primary (sludge from primary clarifiers) and waste-activated sludge because the mixture degrades readily; 2) it requires more skilled operation than aerobic digestion; 3) the process is susceptible to upsets and recovery is slow; 4) it is very sensitive to temperatures, and heating of the reactors is frequently needed; and, 5) anaerobic digestion is also highly sensitive to pH, alkalinity concentration, and inhibitory substances. In addition, this process is more suitable for large plants due to the high capital investment for construction. The absence of primary clarifiers and having a well-stabilized WAS from the MBR treatment process have the potential to greatly reduce the effectiveness of anaerobic digestion for the Village.

Anaerobic digestion for biosolids stabilization for the Village WWTP will not be considered for further evaluation.

5.3.2.3 Autothermal Thermophilic Aerobic Digestion (ATAD)

Autothermal Thermophilic Aerobic Digestion (ATAD) was developed in the 1970s. ATAD is a two-stage process that operates under thermophilic conditions (40°C to 80°C) without supplemental heat ⁽⁵⁾. Typical ATAD systems operate at 55°C and reach 60°C to 65°C in the second stage ⁽⁵⁾. Thermophilic operating temperatures can be achieved by using the heat released

from the oxidation of volatile solids during the digestion process ⁽¹⁾. Insulation of the reactors is necessary to conserve the heat. The process is called “auto-thermal” because supplemental heat is not provided.

The major advantages of ATAD systems include: 1) high disinfection capability ⁽⁵⁾; 2) low space and tankage requirements ⁽⁵⁾; 3) easy to operate ^(1,5); 4) retention times required to achieve a given solids reduction are decreased significantly (to about 5 to 6 days) to achieve VSS reduction of 30-50%, similar to aerobic digestion ⁽¹⁾; and, 5) when temperature is maintained at 55°C and above and the reactor is well mixed, the concentration of most microorganisms can be reduced to below detectable levels, thus meeting the requirements for Class A biosolids ⁽¹⁾.

The disadvantages of ATAD include ⁽¹⁾: 1) odor issues; 2) poor dewatering characteristics of the end product; and, 3) lack of nitrification. Odors have been the main complaint and the reason why this process has not gained much popularity. This could be a potential problem for the Village because residential areas are located in close proximity to the WWTP.

Autothermal Thermophilic Aerobic Digestion (ATAD) for biosolids stabilization at the Village’s WWTP is not recommended.

5.3.3 Sludge Dewatering

The existing sludge treatment facilities and handling process at the Los Lunas WWTP do not include sludge dewatering. As previously described in Section 3.0, the Village’s sludge management includes thickening of wasted sludge, stabilization in the aerobic digesters, and hauling offsite for final disposal. Digested sludge is hauled by a tanker truck approximately three times per month for land application.

Dewatering consists of the separation of water and digested sludge or waste activated sludge. This process increases the sludge solids concentration to 15-40%, producing a material with the properties of a solid even though the sludge is still mostly water. Dewatered solids can be

transported in a dump truck. Among the treatment alternatives for dewatering are belt filter presses, centrifuges, and sludge drying beds ⁽³⁾.

5.3.3.1 Belt Filter Press

The belt filter press (BFP) is one of the most common pieces of equipment used for mechanical sludge dewatering. BFPs are continuously fed with chemically conditioned sludge; then mechanically-applied pressure dewater the sludge by squeezing out the water. In most types of BFPs, conditioned sludge is introduced on a gravity drainage section where it is allowed to thicken and water is removed by gravity ⁽¹⁾. Following gravity drainage, the sludge is trapped between two tensioned porous belts and passed over and under rollers of various diameters ⁽⁶⁾. Increased pressure is created as the belt passes over rollers which decrease in diameter ⁽⁶⁾. Solids concentration in the dewatered sludge, also known as “cake”, ranges from 16-18% for aerobically digested feed sludge ⁽¹⁾.

Belt filter presses offer the following advantages: 1) low labor required for equipment operation and equipment shutdown ^(1,6); 2) maintenance is relatively simple and can usually be completed by a WWTP maintenance crew ^(1,6); 3) replacing the belt is the major maintenance cost ⁽⁶⁾; 4) belt presses can be started and shut down quickly compared to centrifuges ⁽⁶⁾; 5) low energy requirements ⁽¹⁾; 6) high-pressure machines are capable of producing very dry cake ⁽¹⁾; and, 7) there is less noise associated with belt presses compared to centrifuges ⁽⁶⁾.

Among the disadvantages of belt filter presses are: 1) odors may be a problem, but can be controlled with good ventilation systems and addition of chemicals in some cases ^(1,6); 2) solids with higher concentrations of oil and grease can result in blinding the belt filter and lower solids content cake ⁽⁶⁾; 3) wastewater solids must be screened and/or ground to minimize the risk of sharp objects damaging the belt ^(1,6); and, 4) belt washing at the end of each shift can be time-consuming and require large amounts of water ⁽⁶⁾.

A belt filter press is recommended as a dewatering technology, if the Village desires to pursue landfill disposal or composting of digested sludge. Additionally, the BFP will be very similar in

operation to the Village's existing GBT, which will reduce the learning curve for the WWTP Operations Staff.

5.3.3.2 Centrifuges

The use of centrifuges for sludge thickening was described in Section 5.3.1.2. This piece of equipment also has application for sludge dewatering. *However, **this technology was deemed as not recommended for the Village of Los Lunas for sludge thickening, and for the same reasons is not recommended for sludge dewatering.***

5.3.3.3 Sludge Drying Beds

Sludge drying beds are the most widely-used method of sludge dewatering in the United States, particularly in small and medium size WWTPs ⁽¹⁾. Digested solids are deposited on the drying beds, which can be conventional sand beds or paved drying beds to allow for water to evaporate and/or drain, thus concentrating the solids. After drying, the solids can be either disposed of in a landfill or used as a soil conditioner ⁽¹⁾. Sludge drying beds were part of the original components of the extended aeration plant built in 1981. The beds were abandoned in 1996 when the current sludge treatment and handling facilities began operations. They were recently used (2011 and 2012) as an emergency measure to discharge partially digested sludge from the aerobic digesters due to a process upset and ammonia inhibition.

The principal advantages of drying beds are: 1) low capital cost; 2) high solids content in the dried product; 3) minimum operator attention requirements; 4) low energy consumption; and, 5) product has higher solids concentration than sludge dewatered by mechanical methods ⁽¹⁾.

The disadvantages of using sludge drying beds for dewatering include: 1) large land/space requirements; 2) process is highly sensitive to climatic/weather conditions; 3) labor-intensive to remove dried sludge, and special equipment may be required for this task; and, 4) potential odor issues and insects attraction.

Sludge drying beds for the Village as a permanent sludge disposal method are not recommended due to the proximity to residential areas. However, the sludge drying beds can still be used as a temporary alternative for sludge disposal, until permanent improvements and expansion of existing facilities are implemented. Per the WWTP Operations Staff request, during design of the new sludge management facilities, the possibility of keeping up to three drying beds as part of the facilities will be evaluated.

5.3.4 Disposal

The last step of the solids handling process used at the Village wastewater treatment facility is final disposal of digested sludge. An evaluation of the current method for disposal and other alternatives will be presented in the following paragraphs.

5.3.4.1 Surface (Land) Disposal

This sludge disposal method is defined as the spreading of biosolids on or just below the soil surface ⁽¹⁾. Biosolids can be applied to agricultural land, forest land, disturbed land, or at dedicated land disposal sites. Land application is well-suited for managing solids from any size WWTP; however, it is more easily implemented where agricultural land is available near the site of biosolids production.

Class B sewage sludge disposal with limited public access represents the Village's current sludge disposal practice. With this classification, previously described in Section 3.0 of this Report, both pathogen and vector attraction reduction compliance is achievable through the aerobic digestion process.

Los Lunas currently owns a sludge disposal site approximately nine miles southwest of the Village. As previously presented in Section 4.3.6 "Sludge Production and Biosolids Management", the sludge disposal site is approximately 220 acres, but only about 200 acres are currently used due to the topography of the terrain that limits complete use of the site. To continue complying with the maximum nitrogen loading rate of 200 lbs/acre-year, the Village

must acquire more land for sludge disposal as soon as possible, if surface disposal continues to be the only method used for final disposal of biosolids.

The sludge disposal projections presented in Table 4-5 indicate that at the end of the 30-year project planning period used for this PER, a total of 485 acres would be required for surface disposal of digested sludge. Furthermore, within the next five years the Village will be using the existing site at its maximum capacity. These projections, however, assume the best-case scenario where total nitrogen in digested sludge can be reduced to 50,000 mg/kg (dry weight basis) or less. In the event that nitrogen cannot be reduced to this concentration, the capacity of the site in terms of nitrogen application rates will be reduced to less than five years.

Land application of biosolids is still recommended as an alternative for sludge disposal for the Village of Los Lunas, but other options must be evaluated if additional land purchase is not feasible or if more operational flexibility is desired.

5.3.4.2 Landfill Disposal

The design and operation of co-disposal landfills (those that receive biosolids and municipal solid waste) are regulated by EPA under Subpart I of 40 CFR, Part 258 “Criteria for Municipal Solid Waste Landfills” ⁽¹⁾. Per the NMED current regulations, sludge is considered a “special waste”, which is subject to unique handling, transportation, and/or disposal requirements. A sludge Disposal Management Plan (DMP) must be approved by the NMED Solid Waste Bureau prior to transportation and/or disposal of sludge to a landfill. Currently, the Valencia Regional Landfill is permitted to accept biosolids (sludge) from wastewater treatment plants. This facility is located in Valencia County, approximately 17 miles west of the Village of Los Lunas.

Among the advantages of landfill disposal of sludge are: 1) additional land for continued sludge spreading will not be an urgent need for the Village; 2) if a dewatering process/equipment is used, the volume of biosolids would be reduced, thus minimizing tipping fees; and, 3) sampling and record-keeping requirements would be simplified for the WWTP Operations Staff.

Landfill disposal of sludge also has some disadvantages: 1) large plants try to avoid this due to the tipping fees that may be imposed; 2) landfills permitted to receive sludge may choose not to do it; thus, an alternate disposal method would be needed; and, 3) additional equipment to process and transport the sludge to the final disposal facility may be needed.

Landfill disposal of biosolids is a recommended alternative for the Village as an additional method to surface disposal and also to increase operational flexibility.

5.3.4.3 Composting

During the composting process, the organic matter present in digested sludge undergoes biological degradation to a stable end product. The end product is usually a Class A, humus-like material without detectable levels of pathogens that can be applied as a soil conditioner and fertilizer. The three most common composting methods are: aerated static-pile, windrows, and in-vessel composting. All three composting methods require the use of bulking agents, but the type of agent varies. Wood chips, sawdust, leaves and yard waste, and shredded tires are commonly used ⁽¹⁾.

- An **aerated static-pile composting** system simply puts dewatered sludge onto a perforated platform, allowing a blower to draw air through the pile. The air is usually put to the aeration basins for odor control. The static-pile method takes less room and controls odor, but it is more expensive and requires more operation.
- A **windrow composting** system would require the purchase of a canopy to cover the windrow area, making the system possible during the winter months. The Village would need a specialized machine to rotate the windrows, as a way of aerating them and maintaining the aerobic biodegradation within the pile. Such a system could be relatively inexpensive, but it would be inefficient during cold weather and may cause odor problems.
- An **in-vessel composting** system could be used, but in-vessel systems are rarely installed due to difficulty in operation and maintenance.

Composting is one of several methods for treating biosolids to create a marketable end-product that is easy to handle, store, and use. However, for WWTPs, a composting process also has some disadvantages, including: 1) increase in labor requirements; 2) purchase of specialized equipment for composting may be necessary; 3) land requirements may be significant to store equipment and for compost processing; 4) specific process monitoring and record-keeping requirements; 5) need to find available “bulking” agents (wood chips, tree branches, etc.); and 6) final disposal of end-product needs to be found either by farmers willing to use the product or selling the product.

*Even though composting of sludge is a sustainable alternative, due to disadvantages mentioned above, **this alternative is not recommended at this time for the Village.*** However, if the Village proceeds with the installation of dewatering equipment, they will have the opportunity to pursue composting at a later date, if desired.

5.4 Summary of Feasible Alternatives

The advantages and disadvantages of several sludge handling and treatment alternatives were assessed. For the Village, the alternatives that were evaluated for each unit operation are listed in Table 5-1. **The alternatives that were deemed feasible for further evaluation are:** 1) for sludge thickening: continued use of the existing GBT and future addition of another GBT; 2) for biosolids treatment/stabilization: aerobic digestion; 3) for dewatering: belt filter press; and, 4) for final disposal: continued land application and supplement with landfill disposal.

TABLE 5-1
SUMMARY OF SLUDGE MANAGEMENT ALTERNATIVES INITIALLY SCREENED

Unit Operation	Technology or Equipment	Further Evaluation
Thickening	Gravity Thickener	No
	Centrifuges	No
	Gravity Belt Thickening	Yes
	Membrane Thickening	No
Treatment/Stabilization	Aerobic Digestion	Yes
	Anaerobic Digestion	No
	Autothermal Thermophilic Aerobic Digestion (ATAD)	No
Dewatering	Belt Filter Press	Yes
	Centrifuges	No
	Sludge Drying Beds	No
Final Disposal	Land Application	Yes
	Landfill Disposal	Yes
	Composting	No

5.5 References

1. Metcalf & Eddy, Wastewater Engineering Treatment and Reuse, 4th Ed., 2003.
2. EPA Biosolids Technology Fact Sheet, Centrifuge Thickening and Dewatering, Ref. 832-F-00-053, September 2000.
3. EPA Emerging Technologies for Biosolids Management, Ref. EPA 832-R-06-005, September 2006.
4. Aerobic Digesters with Membrane Thickening, Conference Presentation by Stephen Kennedy, Ovivo Integrated Solutions Group Manager. Saudi Arabia Water Environment Association (SAWEA) Conference, Kingdom of Bahrain, February 2011. Webpage retrieved April 6, 2011: http://www.sawea.org/pres/Session_E/Stephen_Kennedy.pdf
5. EPA Autothermal Thermophilic Aerobic Digestion (ATAD) of Municipal Wastewater Sludge, Ref. EPA/625/10-90/007, September 1990.
6. EPA Biosolids Technology Fact Sheet, Belt Filter Press. Ref. EPA 832-F-00-057, September 2000.

6.0 SELECTION OF AN ALTERNATIVE

Section 5.0 of this Preliminary Engineering Report (PER) presented the alternatives considered for treatment of wastewater and sludge flows throughout the end of the planning period. Because the Village already operates a state-of-the-art MBR plant, and in conformity with the terms of the settlement agreement that allowed the acquisition of some of the land where the WWTP is located, other technologies were not evaluated for liquid treatment. The existing activated sludge treatment plant will ultimately be removed from service, allowing all wastewater to be treated with MBRs in the future. A description of the proposed expansion and phasing alternatives for the MBR facilities will be presented in this Section.

Several alternatives for sludge treatment and final disposal of biosolids were identified and described in Section 5.0 of this Report. The alternatives that were deemed feasible will be further evaluated in this Section of the PER.

6.1 Alternatives for the Expansion of the Liquid Treatment Process

A description of the need for improvements and additional capacity requirements for the entrance works, the MBR facilities, and the effluent disposal line is presented in the following sections. The Administration and Laboratory Building is also included in this Section.

6.1.1 Entrance Works

The equipment currently installed at the entrance works for the MBR process (two rotary drum fine screens and one aerated grit chamber) can fully support the expansion of this facility from 0.9 MGD to 1.8 MGD, which can be achieved by adding the upper membrane cassettes.

A third fine screen will be needed to handle the flows from new MBR facilities exceeding 1.8 MGD average day flow. The floor space and piping to add this equipment, as well as outlet pipes to future MBR plants, were included during the design of the existing entrance works. Three fine screens installed and the existing aerated grit chamber can support the flows from two

MBR plants, each at 1.8 MGD, which results in total hydraulic capacity of 3.6 MGD average day flow.

The influent flow to the WWTP at the end of the 30-year planning period used for this project has been estimated at 4.7 MGD. The fully equipped entrance works (two fine screens in operation and one standby unit, and the grit chamber) can handle peak flows between 9.0 MGD and 13.2 MGD. Therefore, assuming a peaking factor of 2.0, the existing facilities will be capable of handling projected future flows. However, it is recommended that the Village monitors and records influent peak flow conditions at the plant, which would dictate whether or not an expansion of the entrance works is needed in the future, for flows higher than 3.6 MGD average day.

6.1.2 MBR Facilities

The following presents a timeline for expansion of the existing MBR facilities. The proposed phasing for the MBR facilities is described in the following paragraphs.

- **Phase 1 (year 2013 or immediate future):** Expand the capacity of the existing MBR facility (MBR-1) from 0.9 MGD to 1.8 MGD.
 - **Equipment needed:** upper membrane cassettes.
 - The upper cassettes will be installed in the existing basins. This phase can be completed at a minimum cost, as all the other the infrastructure and equipment are already in place.
 - The MBR-1 plant will have a maximum capacity of 1.8 MGD, which would be exceeded by year 2018, if the old plant is taken out of service.
 - The MBR-1 plant combined with the activated sludge plant will have a combined maximum hydraulic capacity of 2.7 MGD which, according to flow projections, would be reached by year 2028.
- **Phase 2 (year 2015 – near future):** Expand the capacity of the existing MBR system from 1.8 MGD (MBR-1) to 2.7 MGD by adding a new MBR plant (MBR-2) initially equipped with lower cassettes only, 0.9 MGD. **Note:** Implementation of this phase can be delayed if

the activated sludge plant is maintained in service, and both the MBR-1 (1.8 MGD) and the old plant (0.8 MGD), are operated at their maximum capacities.

- **Equipment needed:** complete new MBR system – lower level membrane cassettes, blower, pumps, UV disinfection system, and all ancillary equipment.
 - Flow projections indicate that 1.8 MGD could be generated by 2018.
 - If the old activated sludge plant is taken offline, the new MBR-2 (equipped with lower cassettes only) would replace that facility. The combined capacity of MBR-1 (fully equipped) and MBR-2 (lower cassettes) would be 2.7 MGD. This flow is projected to be received by year 2028.
-
- **Phase 3 (starting year 2025):** Expand the capacity of the existing MBR-2 system (constructed in Phase 2) from 0.9 MGD to 1.8 MGD by adding the upper cassettes. At the time of implementation of this project, it is likely that the process in place would be only MBR plants and the old plant would have been decommissioned.
 - **Equipment needed:** upper membrane cassettes.
 - Prior to this expansion, the existing combined capacity of MBR-1 and MBR-2 would be 2.7 MGD. An influent flow of 2.7 MGD is projected to be generated by 2028.
 - The combined capacity of fully equipped MBR-1 and MBR-2 would be increased from 2.7 MGD to 3.6 MGD. An influent flow of 3.6 MGD is projected to be generated by 2035.
-
- **Phase 4 (starting year 2031):** Expand the capacity of the existing combined MBRs capacity from 3.6 MGD to 4.7 MGD by adding a new MBR plant (potential MBR-3, 1.1 MGD). This expansion would cover all capacity requirements until the end of the 30-year planning period used for this project. Per recent conversations with the MBR equipment representatives, the treatment capacity per cassette is evolving and the newest units have more hydraulic capacity per square foot of surface area, compared to the first units that were developed years ago. Consequently, as more investigation is done and the existing filtration technology is improved, there is a possibility that cassettes with more treatment capacity per unit could be installed in the future in the existing basins. This could result in getting to the projected 4.7 MGD capacity required without adding a new MBR plant. This, however, remains

unknown at present, but it is a possibility that will need to be evaluated prior to design and construction of MBR-3.

- o **Equipment needed:** complete new MBR system with equipment previously described for MBR-1 and MBR-2, or replacement of cassettes in existing MBRs with newest technology with more capacity per cassette.
- o Prior to implementation of this expansion or phase, the existing combined capacity of MBR-1 and MBR-2 would be 3.6 MGD. An influent flow of 3.6 MGD is projected to be generated by 2035.

Figure 6-1 shows a timeline of capacity increase and project phasing for the MBR facilities.

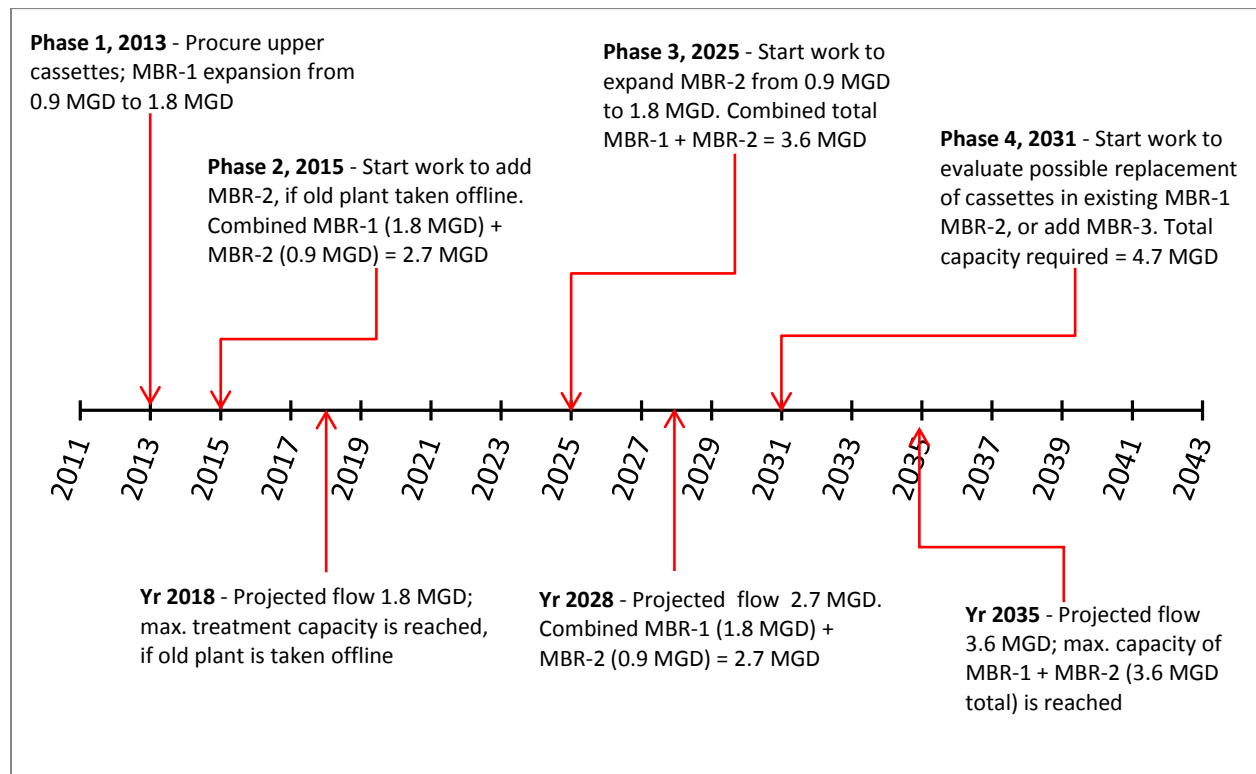
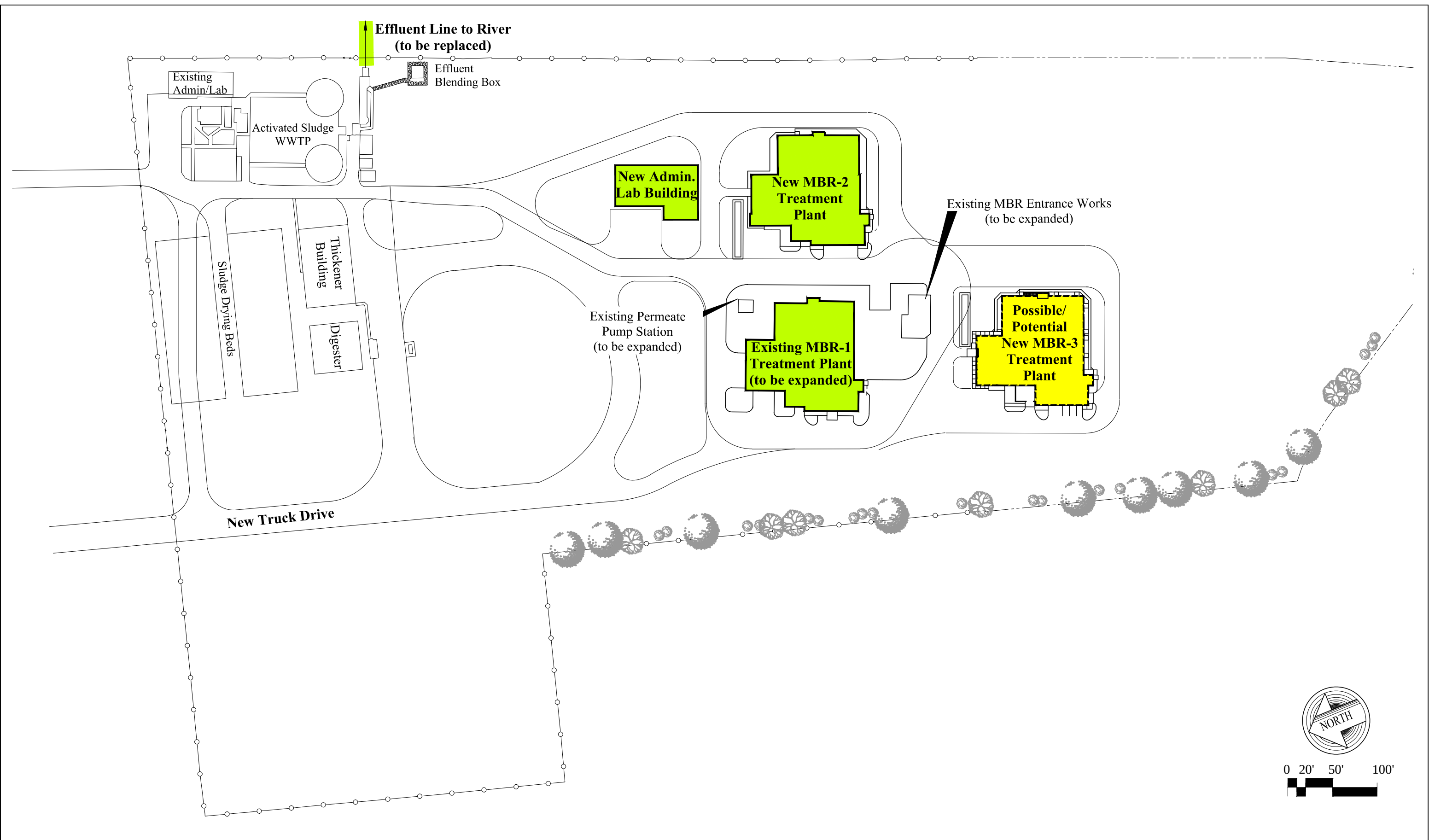


FIGURE 6-1

**TIMELINE FOR IMPLEMENTATION OF CAPACITY EXPANSION
FOR THE LIQUID TREATMENT PROCESS**

Figure 6-2 presents the layout of the existing facilities and the new liquid treatment process structures and administration/laboratory building.



6.1.3 Effluent Discharge Line

The existing 16-inch effluent disposal has an estimated capacity to convey 1.7 MGD average day flow (3.4 MGD peak flow), which will be reached by year 2016. It is recommended to replace the existing 16-inch line with a 24-inch line, which will be capable of handling the flow expected at the end of the 30-year planning period used for this project.

As shown in the pictures included in Appendix G of this Report, the effluent line crosses underneath an irrigation canal, then through the *Rio Grande Bosque* to reach the point of discharge. Because of the permitting process and environmental clearance required for implementation of this project, it is important to initiate in the near future the required paperwork to obtain permits and funding for design and construction.

6.1.4 Administration/Laboratory Facilities

Another area in need of improvement and expansion in the near future is the administration and laboratory facilities. The existing Administration/Laboratory Building is part of the WWTP constructed in the 1980s. As such, the floor space available for current operations is inadequate. Furthermore, the Village's WWTP will change from a minor to a major facility (a plant with flow higher than 1.0 MGD flow is a major facility) with the pending NPDES permit which requires more sampling and monitoring; thus, more laboratory space will be needed.

The new Administration and Laboratory Building will include the following areas and uses: laboratory (with space for wastewater analyses, storage room, and dedicated office space), mechanical area (with water heater and water softener), office space for administrative personnel, training room, break room, and laundry and shower facilities for operations staff. The location of the proposed new administration facilities is shown in Figure 6-1. The existing Administration and Laboratory Building could be used for other purposes, such as storage or maintenance shop, if needed.

6.2 Description of Sludge Treatment and Management Alternatives

The technologies and processes that were deemed feasible for further consideration in Section 5.0 of this Report are:

- Thickening: GBT
- Treatment/Stabilization: aerobic digestion
- Dewatering: BFP
- Disposal: surface disposal and/or landfill disposal

These alternatives for sludge management and disposal will be evaluated in detail in this Section of the PER, and an alternative will be recommended for implementation.

6.2.1 Sludge Thickening – Gravity Belt Thickener

The existing 2-meter-wide GBT at the Village of Los Lunas WWTP is about 16 years old, but it is still fully functional and in good operational condition. Operated at its maximum hydraulic capacity, 7 to 8 hours/day and 5 days/week, this machine can process the sludge produced by an equivalent influent flow of about 2.7 MGD (combined sludge wasted from the activated sludge and MBR plants). However, there is no backup unit, and if this machine fails or requires extensive maintenance, there are no means to thicken the sludge. Bypassing the GBT would result in feeding sludge with less solids and more water to the aerobic digesters, thus compromising the digestion process and perhaps the ability of the system to meet Class B requirements for surface disposal of digested sludge.

One 2-meter-wide GBT in optimal mechanical condition and operated 8 hours/day, 5 days/week, would be capable of handling the sludge produced by the MBR facilities for up to a flow of approximately 3.6 MGD (assuming the solids concentration in the waste activated sludge is about 11,000 mg/L). However, as stated previously, the processing capacity would be reduced to 2.7 MGD if the sludge to be thickened is wasted from both the MBR and the old activated sludge plant. This de-rating is applied because the sludge from the old plant has to be wasted on a more

frequent basis, and wasting flow rates are higher due to the lower solids concentration in the sludge wasted from this facility.

The projected influent flow to the WWTP at the end of the 30-year planning period, or year 2041, is estimated at 4.7 MGD. At this flow rate, the sludge to be wasted from the process would be approximately 96,000 gpd (assuming that all the sludge is from MBR facilities and the influent BOD remains at 300 mg/L). In terms of the time required to thicken the volume of sludge produced on a weekly basis by a 4.7 MGD treatment plant, one 2-meter-wide GBT in optimal mechanical condition would need to be in operation for approximately 51 hours/week. It is important to consider that these are only estimates based on the information available at this time, and will vary in accordance with the characteristics of the influent wastewater and specific process performance.

There are several options to process this sludge flow rate, depending on the frequency of wasting and duration of the wasting/thickening process. The first alternative would be to operate one GBT during 7 days/week for about 7 to 8 hours/day to handle the sludge produced by the 4.7 MGD MBR facilities. However, implementation of this alternative is impractical due to the labor requirements and the lack of equipment redundancy, in case of failure. The second alternative would be to use two GBTs, each one operated 5 days/week for about 5 hours/day. This alternative also provides redundancy, which would allow waste sludge to continue to be thickened, even if one of the GBTs has to be taken out of service for maintenance or repairs. Wasting could also be implemented during normal working hours; thus, the active personnel could oversee the process.

6.2.2 Aerobic Digestion

As previously mentioned in Section 3.0 of this Report, the Village of Los Lunas has been using aerobic digesters for over 16 years for sludge stabilization prior to final surface disposal. The sludge fed into the aerobic digesters consists mainly of biomass or bacteria cells wasted from both the activated sludge process and the MBR plant. Aerobic digestion facilitates *endogenous decay* in which the bacteria feed upon themselves. When bacteria metabolize other bacteria, the

organic nitrogen contained in the mass of the consumed cells is converted to ammonia, which then through nitrification is oxidized to nitrate. To reduce the nitrogen content in the digester sludge as well as that of the decant (supernatant) that may be returned to the liquid treatment process, it is preferable to remove this nitrate from the digesters. Ideally, aerobic digesters should be designed and operated to achieve total nitrogen removal, which is possible by providing periods of aerobic (air on) and anoxic (air off) conditions. The existing digesters were not designed for total nitrogen removal; thus, nitrogen concentration in the digested sludge can be high.

Current State of New Mexico regulations for solids disposal limit the amount of nitrogen that may be applied per unit area of ground to 200 pounds of nitrogen per acre per year. This restricts the amount of sludge that can be land-applied, thus increasing the acreage necessary for disposal of sludge as flows to the wastewater treatment plant increase. The effect of having high nitrogen concentration in digested sludge is that lower quantities must be applied to comply with the allowed maximum nitrogen application rate of 200 lbs/acre-year.

Per current federal regulations, two requirements for the current method of land disposal need to be met: 1) reduction of vector attraction, and 2) reduction of pathogens. Reduction of volatile solids (VS) through aerobic digestion is one of the methods used for vector attraction reduction established in the Title 40 Code of Federal Regulations (CFR) Part 503.

In theory, an equivalent detention time of 400 degree-days is capable of achieving the minimum 38% VS reduction, which meets the requirements for vector attraction reduction. Pathogen destruction can be achieved by increasing retention times for aerobic digestion to meet the time-temperature requirements equivalent to 40 days at 20°C (equivalent to 800 degree-days) or 60 days at 15°C (equivalent to 900 degree-days). Because winter temperatures in the Village can get sufficiently low at times, if surface disposal continues to be the method used for final disposal of digested sludge, the detention time of 60 days at 15°C (900 degree-days) is the governing design condition for this process. This would determine the volume of aerobic digesters needed. The maximum capacity of the existing system was estimated at approximately

1.2 MGD of equivalent influent flow, which will allow meeting minimum retention times required for Class B sludge.

6.2.2.1 Modifications to Existing Aerobic Digesters

The condition of the existing aerobic digesters and aeration system has been previously addressed in Section 3.4.9 and can be observed in the pictures included in Appendix G of this PER. Due to the harsh environment inside the basins, the aeration system (pipes) and concrete walls show signs of corrosion and deterioration. Within the past four years, emergency repairs have been implemented to alleviate some immediate operational problems, but the digesters are in need of major improvements for continued use. The condition inside the basins and under the covers remains unknown at this time because the covers cannot be easily removed for inspection.

In addition, the digesters were not designed or equipped for total nitrogen removal; thus, nitrogen in the digested sludge is high compared to the product of systems that can achieve nitrification-denitrification. The outcome is higher nitrogen loading to the sludge disposal site per mass of sludge (dry solids) applied. Because the current State standards limit nitrogen application rates to 200 pounds per acre per year, the Village will likely be at the maximum application rate and capacity prior to the end of 2013.

As previously presented in Section 4.3.6, there is an immediate need to retrofit the existing aerobic digesters to achieve total nitrogen removal as a temporary means to extend the capacity of the existing sludge treatment process and useful life of the sludge disposal site. The Village has already made modifications to the sludge feed pipe to allow for feeding into different cells and received guidance on operational changes to achieve total nitrogen removal (aeration system is being manually operated/controlled as aerobic/anoxic).

Among the recommended improvements for the aerobic digestion system are:

- New aeration system and blowers with turn-down capability to achieve aerobic/anoxic conditions
- Installation of submersible mixers in the existing basins

- Instrumentation: add online probes for monitoring of temperature, dissolved oxygen, and pH in the basins

However, it is important to consider that, even after implementation of the improvements previously mentioned, the hydraulic capacity of the digesters will not increase, as it is governed by the detention time and temperature requirements to comply with pathogen and vector attraction reductions. Based on this criterion (assuming a conservative condition of 15°C and 60 days detention time), the digesters can provide treatment to the sludge produced by an influent plant flow of approximately 1.2 MGD.

6.2.2.2 Addition of Aerobic Digesters

The volume of the existing aerobic digestion system is approximately 55,000 cubic feet (cu.ft.), which is sufficient to provide treatment to an estimated influent plant flow of 1.2 MGD (at 15°C temperature). Calculations were performed to determine additional digester volume needs for future plant flows. Additional capacity requirements were determined under several design conditions and sludge treatment requirements for surface disposal of digested sludge. For these calculations, an influent wastewater concentration of 300 mg/L as BOD and a total solids concentration of 3.5% in the sludge fed to the digesters were assumed.

Table 6-1 shows a summary of the total volume of aerobic digesters required for ultimate plant capacity of 4.7 MGD. As previously mentioned, the most critical condition is compliance with the detention time required for pathogen reduction at low temperatures; in this case, at 15°C for winter time. To comply with this requirement, the total volume of digesters needed to achieve the detention time of 60 days at 15°C (900 degree-days equivalent) is calculated at 208,000 cu.ft. This will result in additional volume of 153,000 cu.ft. The final total volume requirements are equivalent to adding three more aerobic digestion systems of the same dimensions as the existing one by the end of the planning period or year 2041. However, because the increase in flow and solids production will be gradual, construction phasing scenarios to reach this capacity will be proposed. Table 6-2 shows the projected wastewater flows and corresponding aerobic digester requirements to meet the most stringent retention time of 900-degree-days.

TABLE 6-1
SUMMARY OF AEROBIC DIGESTER VOLUME REQUIREMENTS
FOR ULTIMATE PLANT CAPACITY OF 4.7 MGD^(*)

Design Condition	Digester Volume, cu.ft.
CFR at 60 days SRT at 15°C for pathogens reduction (<i>Governing condition</i>)	208,000
CFR at 40 days SRT at 20°C for pathogens reduction	139,000
Ten States Standards: Theoretical SRT-temperature (405 degree-days) to meet 38% VS reduction, at 15°C	94,400

(*) Calculations based on typical solids yield and VS concentrations for MBR processes,
influent BOD = 300 mg/L, and sludge thickened to 3.5% total solids.

Based on the flow projections shown in Table 6-2, a second aerobic digestion system will be needed in the near future, when flows reach about 1.3 MGD. The second new system (for a total of three) will be needed when flow increases to approximately 2.5 MGD, which is projected to occur around year 2026. Finally, when influent flow to the WWTP reaches 3.9 MGD, a fourth aerobic digestion system will be required. Four aerobic digestion systems will have enough capacity to provide treatment to the ultimate plant flow of 4.7 MGD. All these projections are based on the assumption that more land is acquired and that surface disposal is the only method used for final solids disposal. Land requirements were previously shown in Table 4-5 in Section 4.0 of this Report.

However, if alternate or additional methods for final disposal of sludge are implemented (i.e., landfill disposal), the volume of aerobic digesters needed in the future could be reduced. It is recommended to, at a minimum, add one more aerobic digestion system for redundancy of the existing process and to allow for more operational flexibility with regard to sludge management if land application of sludge continues to be a disposal method. Two aerobic digesters (assuming the second has the same capacity as the existing one) would be capable of handling a plant flow of up to 2.4 MGD which, based on current projections, could be generated by year 2025.

TABLE 6-2
TOTAL AEROBIC DIGESTER VOLUME REQUIREMENTS
AND NUMBER OF DIGESTERS IN OPERATION

Plant Flow, MGD	Approximate Year	Total Digester Volume Required, cu.ft.	Additional Volume Required, cu.ft.	Aerobic Digesters in Operation
1.1	2011	49,000	Sufficient volume available	1
1.3	2012	58,000	3,000	2
1.5	2013	67,000	12,000	2
1.7	2015	76,000	21,000	2
1.9	2017	84,000	29,000	2
2.1	2019	93,000	38,000	2
2.3	2023	102,000	47,000	2
2.5	2026	111,000	56,000	3
2.7	2028	120,000	65,000	3
2.9	2029	129,000	74,000	3
3.1	2031	138,000	83,000	3
3.3	2033	146,000	91,000	3
3.5	2034	155,000	100,000	3
3.7	2035	164,000	109,000	3
3.9	2037	172,000	117,000	4
4.1	2038	182,000	127,000	4
4.3	2039	191,000	136,000	4
4.5	2040	199,000	144,000	4
4.7	2041	208,000	153,000	4

6.2.3 Sludge Dewatering – Belt Filter Press

At present, the Village does not have sludge dewatering equipment. The only option for dewatering is to discharge digested sludge into the sludge sand drying beds and allow for natural drying which, depending on ambient conditions, can be a lengthy process. Furthermore, the capacity of the drying beds is inadequate for current or future flows, and they are in need of rehabilitation (i.e., new sand, improvements in the under drain system, etc.).

Section 5.3.3 of this PER screened three alternatives for sludge dewatering: BFP, centrifuges, and sludge drying beds. The recommended alternative for further evaluation was the BFP.

Table 6-3 presents a projection of solids production and disposal requirements based on various influent plant flows. The calculations are based on solids yield and sludge production from MBR systems because in the long term, this would be the only liquid treatment process in use. The total solids concentration in the dewatered sludge has been assumed to be 16%.

TABLE 6-3
DEWATERED SLUDGE PRODUCTION AND LANDFILL DISPOSAL REQUIREMENTS

Flow to MBR Plant	Sludge Production		Digested Sludge Disposal Requirements		Sludge to Dewatering Equipment			Dewatered Sludge to Landfill	
	Mass of Solids	Flow After Thickening							
MGD	dry lbs/day	gal/day	dry lbs/day	gal/day	wet lbs/day	gal/day	cu.ft/day	cu.ft/day	cu.yd/day
0.9	1,445	5,063	1,201	3,602	30,028	3,600	481	75	3
1.1	1,766	6,188	1,468	4,402	36,701	4,401	588	92	3
1.3	2,087	7,313	1,735	5,203	43,373	5,201	695	109	4
1.5	2,408	8,438	2,002	6,003	50,046	6,001	802	126	5
1.7	2,729	9,563	2,269	6,803	56,719	6,801	909	143	5
1.9	3,051	10,688	2,536	7,604	63,392	7,601	1,016	159	6
2.1	3,372	11,813	2,803	8,404	70,065	8,401	1,123	176	7
2.3	3,693	12,938	3,070	9,204	76,738	9,201	1,230	193	7
2.5	4,014	14,063	3,336	10,005	83,410	10,001	1,337	210	8
2.7	4,335	15,188	3,603	10,805	90,083	10,801	1,444	226	8
2.9	4,656	16,313	3,870	11,606	96,756	11,601	1,551	243	9
3.1	4,977	17,438	4,137	12,406	103,429	12,402	1,658	260	10
3.3	5,298	18,563	4,404	13,206	110,102	13,202	1,765	277	10
3.5	5,619	19,688	4,671	14,007	116,775	14,002	1,872	294	11
3.7	5,940	20,813	4,938	14,807	123,447	14,802	1,979	310	11
3.9	6,262	21,938	5,205	15,608	130,120	15,602	2,086	327	12
4.1	6,583	23,063	5,472	16,408	136,793	16,402	2,193	344	13
4.3	6,904	24,188	5,739	17,208	143,466	17,202	2,300	361	13
4.5	7,225	25,313	6,006	18,009	150,139	18,002	2,407	377	14
4.7	7,546	26,438	6,272	18,809	156,812	18,802	2,514	394	15

6.2.4 Sludge Disposal

The two methods being evaluated for final disposal of solids are surface disposal at a dedicated site and landfill disposal.

Surface Disposal

As previously shown in Table 4-5, the capacity of the existing surface disposal site allows for disposal of the sludge generated by a maximum plant influent flow of 1.8 MGD which, according to flow projects, would occur around year 2016. This, however, assumes that the improvements in the digesters to achieve total nitrogen removal are in place; otherwise, the loading capacity of the site would be reduced. If the aerobic digesters can achieve a lower nitrogen concentration, the useful life and capacity of the site to receive more sludge would be extended.

The total amount of land required for disposal of digested sludge is 485 acres, which corresponds to a plant flow of 4.7 MGD. The Village currently owns approximately 200 acres of useful land for solids disposal; thus, an additional 285 acres would be needed by the end of the planning period. The Village has expressed some concerns about the feasibility of finding a piece of land this size available for sale. Small parcels may be available, but ideally, the number of sites used for disposal should remain at a minimum.

Landfill Disposal

Per the NMED regulations, sludge is considered “special waste”, which is subject to particular handling, transportation, and/or disposal requirements. Currently, the landfill in Valencia County operated by Waste Management of New Mexico is permitted to receive special waste.

The main concern related to the implementation of a 100% landfill disposal alternative is the annual cost the Village will pay as landfill tipping fees. However, several combinations of solids disposal scenarios can be prepared, assuming that the surface disposal site is utilized at its maximum loading capacity. One 2-meter wide BFP operated for 40 hours per week can handle the solids generated by an influent flow of 2.4 MGD. Therefore, one or two BFPs would be needed depending on the surface/landfill disposal scenario.

Advantages and Disadvantages of Sludge Disposal Alternatives

Table 6-4 presents a summary of the advantages and disadvantages of each sludge disposal alternative.

TABLE 6-4

ADVANTAGES AND DISADVANTAGES OF SLUDGE DISPOSAL ALTERNATIVES

Surface Disposal		Landfill Disposal	
Advantages	Disadvantages	Advantages	Disadvantages
– Operations staff is familiar with this sludge disposal method. – The Village owns a site that is already permitted for this use. – There are no tipping fees to pay for disposal of sludge. – Some of the equipment currently used is in good operational condition and can continue to be used in the future (i.e., gravity belt thickener, Terragator, vehicle storage building).	– The sludge must be treated to meet Class B requirements. – The existing aerobic digesters, which are needed to meet Class B requirements, are very deteriorated and in need of major improvements and capacity expansion. – Aerobic digestion requires frequent monitoring and control to achieve Class B treatment requirements. – The existing disposal site is limited to receive the sludge produced by approx. 1.8 MGD day flow. – For ultimate flows, the Village would need to acquire about 285 acres of additional land for sludge disposal. – Additional aerobic digestion volume, a second gravity belt thickener, and another tanker truck will be needed to treat future flows. – As the flows increase, more trips to the disposal site would be needed on a daily basis, thus increasing labor and transportations costs.	– Combined with surface disposal, will offer great operational flexibility to the WWTP. – Sludge does not need to meet Class B requirements, thus it can be wasted and dewatered directly from the process basins. – Less labor intensive compared to surface disposal. – There is no need for additional land purchase. The new dewatering unit and building to install it can be constructed at the existing WWTP site.	– This would be a new process and equipment for operations staff to learn, but similar to existing gravity belt thickener. – A dewatering unit will need to be purchased for implementation of this disposal method. – There are tipping fees associated with disposal at the landfill. – A sludge hauler would need to be hired or trained/certified to transport the sludge to the landfill. – A special waste disposal permit for sludge would need to be obtained by the Village.

6.2.4.1 Sludge Disposal Alternatives

Three options for sludge disposal are feasible for the Village of Los Lunas WWTP: Option A – 100% Surface Disposal, Option B – 100% Landfill Disposal, and Option C – Combined Surface Disposal and Landfill Disposal.

Option A – 100% Surface Disposal

To implement this alternative to provide treatment for the sludge generated by an ultimate plant capacity of 4.7 MGD (year 2041), the following infrastructure would be required:

- Equipment needed: Aerobic digesters for a total volume of approximately 220,000 cubic feet (cu.ft.). This is equivalent to adding three more digesters, if the same dimensions of the existing basins are maintained (existing digester volume 55,000 cu.ft.). Additional 285 acres of land suitable for sludge disposal, for a total of 485 acres at the end of the planning period. To keep pace with growth projections, at a minimum 10 acres must be acquired annually, but a larger, single property is recommended to minimize travel time to multiple sludge disposal sites.

The proposed phasing for implementation of the sludge 100% surface disposal alternative is:

- **Phase 1 (2013 – near future):** Increase overall capacity of the sludge treatment facilities to up to 2.5 MGD equivalent influent flow.
 - Immediately or as soon as possible:
 - Modifications and improvements to the existing aerobic digestion system to achieve total nitrogen removal. Improvements include: modifications to current process operation to achieve better nitrogen removal (aerobic/anoxic operation), new blowers with turn-down capability to achieve aerobic/anoxic conditions and total nitrogen removal, installation of submersible mixers in the existing basins, instrumentation improvements (installation of online probes for monitoring of temperature, dissolved oxygen, pH, ammonia, and total solids in the digesters).

- These improvements will not increase the capacity of the aerobic digestion system (approximately 1.2 MGD under the most conservative scenario), but will allow for disposal of larger quantities of sludge due to the reduction in nitrogen concentration and loadings.
- o Near future (less than 5 years):
 - It is recommended to add one more complete aerobic digestion system (total volume of 55,000 cu.ft.) for redundancy of the existing process and to increase the capacity to handle an influent plant flow of up to 2.5 MGD. Based on the flow and sludge production projections used in this Report, this plant flow is projected to be reached around year 2026.
 - Replacement of the existing gravity belt thickener (GBT) and ancillary equipment (sludge pumps) currently installed in the sludge handling building.
 - Purchase of new tanker truck to replace the existing vehicle. The Operations Staff has expressed concerns about the physical condition of the existing unit and the need to replace it as soon as possible.
 - Acquisition of 65 acres of land (minimum) to get to 265 acres, which would match the hydraulic and treatment capacity of the two aerobic digestion systems.
- **Phase 2 (starting year 2022):** Increase the capacity from 2.5 MGD to 3.7 MGD.
 - o Addition of a third aerobic digestion system of the same capacity as the existing unit (approximately 55,000 cu.ft. more). The total aerobic digestion capacity of the three units would increase to 165,000 cu.ft., capable of handling an influent flow of 3.7 MGD. This flow is projected to be reached around year 2035.
 - o Acquisition of 120 acres of land to get a total of 385 acres, which would match the capacity of the three aerobic digestion systems.
 - o New sludge handling building equipped with one new 2-meter wide GBT and ancillary equipment.
- **Phase 3 (starting year 2032):** Increase the capacity from 3.7 MGD to 4.7 MGD.
 - o Addition of a fourth aerobic digestion system of the same capacity as the existing unit (approximately 55,000 cu.ft. more). The total aerobic digestion capacity of the four

digesters would be 220,000 cu.ft., capable of handling a plant flow of 4.7 MGD. This flow is projected to be reached around year 2041.

- o Acquisition of 100 acres of land to get a total of 485 acres, which would match the capacity of the four aerobic digestion systems.

Figure 6-3 shows a timeline of sludge treatment capacity requirements and phased project implementation to achieve 100% surface disposal of sludge at the end of the planning period.

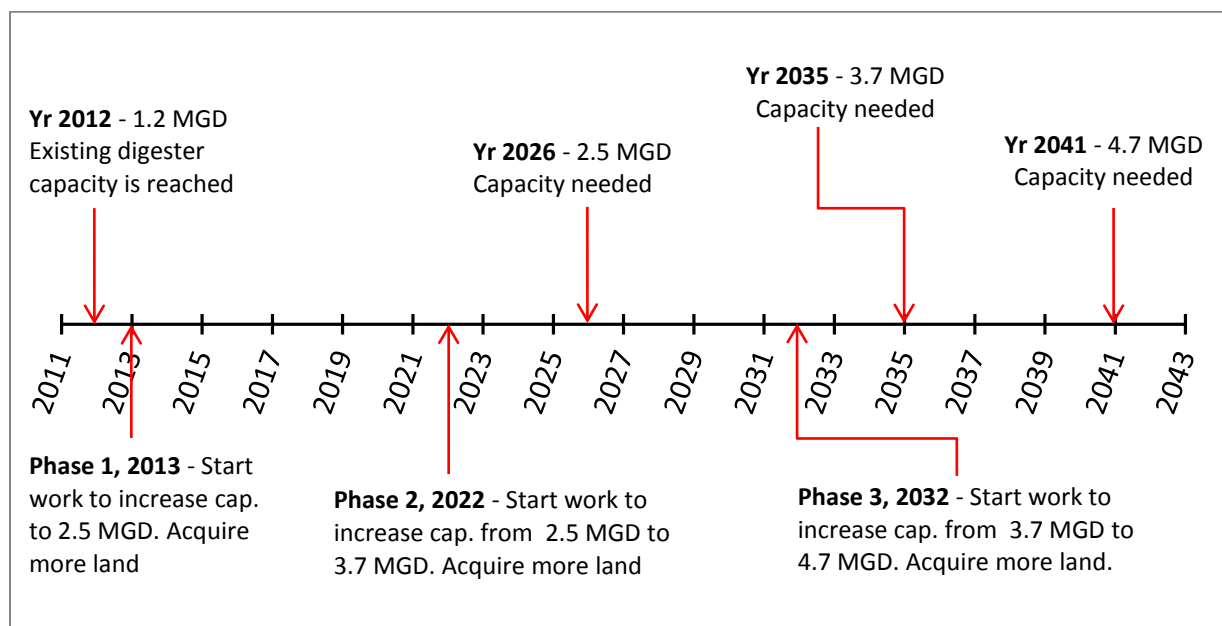


FIGURE 6-3
TIMELINE FOR IMPLEMENTATION OF SLUDGE DISPOSAL
OPTION A – 100% SURFACE DISPOSAL

Option B – 100% Landfill Disposal

To implement a 100% landfill disposal of sludge for ultimate plant capacity of 4.7 MGD (year 2041), the following infrastructure and equipment would be required:

- **Equipment needed:** New sludge dewatering building equipped with dewatering equipment with capacity to process the sludge produced by 4.7 MGD plant capacity. One 2-meter wide BFP operated for 40 hours per week can handle the solids generated by an influent flow of 2.4 MGD. Therefore, at the end of the planning period two BFPs would be needed.

The proposed phasing for implementation of the 100% landfill disposal of sludge is:

- **Phase 1 (immediate and near future):** Improvements to existing sludge handling system, including the improvements to the digesters to continue with operation of the sludge thickening and surface disposal while the facilities to implement landfill disposal are designed and constructed.
 - **Equipment needed:**
 - **Phase 1A:** Previously described for Phase 1 of the surface disposal alternative. Additional digester will not be needed because landfill disposal would be implemented. After rehabilitation of the existing digester and implementation of the dewatering facilities, these basins would be used as sludge holding tanks prior to dewatering.
 - **Phase 1B:** Design and construction of new sludge dewatering building. Equipment: 2-meter wide BFP and ancillary equipment (polymer feed system, pumps, and conveyor). The new 2-meter wide BFP operated at its maximum capacity can handle the flows generated by an influent flow of 2.4 MGD. This flow is projected to be generated by year 2025.
- **Phase 2 (starting year 2021):** Increase the capacity of the sludge dewatering facilities from 2.4 MGD to 4.7 MGD.
 - **Equipment needed:** one additional 2-meter wide BFP and ancillary equipment (polymer The two 2-meter wide BFPs installed and operated at their maximum capacity can handle the flows generated by an influent flow of 4.7 MGD. This flow is projected to be reached by year 2041.

Figure 6-4 shows a timeline of sludge treatment capacity requirements and phased project implementation to achieve 100% landfill disposal of sludge at the end of the planning period.

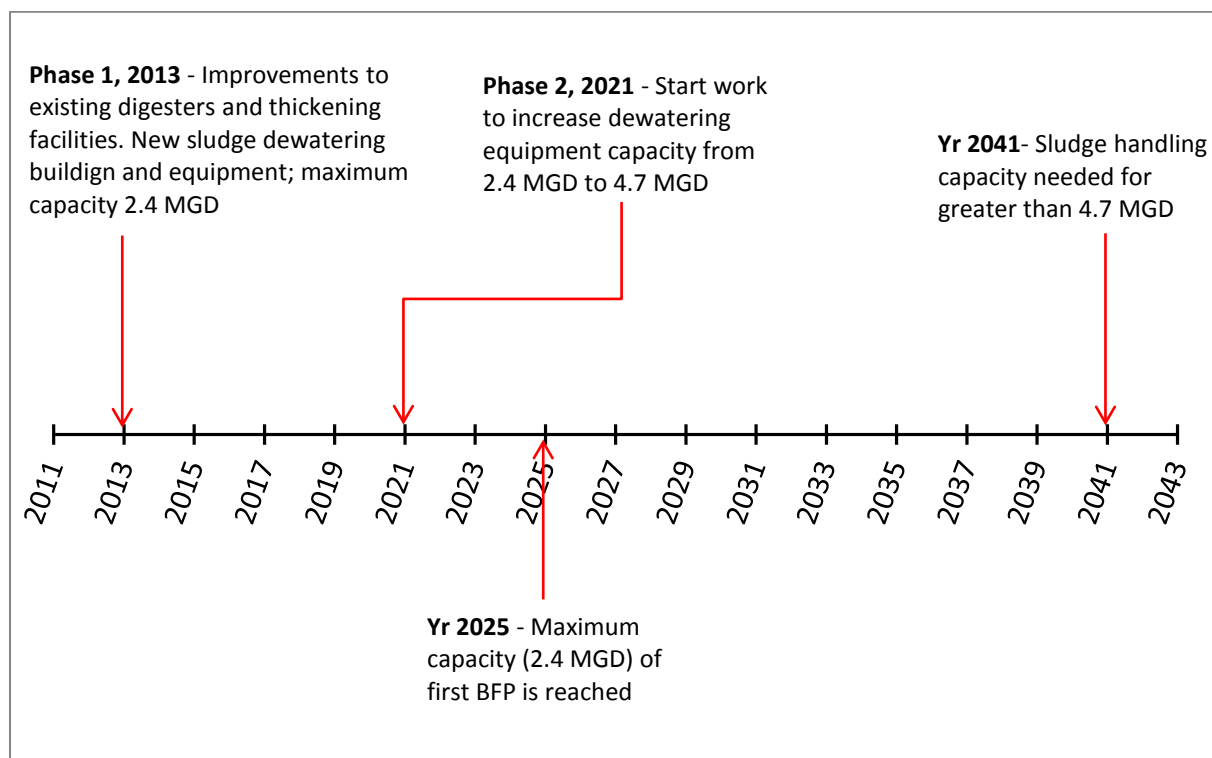


FIGURE 6-4
TIMELINE FOR IMPLEMENTATION OF SLUDGE DISPOSAL
OPTION B – 100% LANDFILL DISPOSAL

Option C – Combined Surface Disposal and Landfill Disposal

Because of the anticipated difficulties to find and purchase enough land to achieve 100% surface disposal of sludge and because landfill tipping fees to achieve 100% landfill disposal may be high and variable with time, another option to be evaluated for sludge disposal from the Village of Los Lunas WWTP is a combination of both methods.

The proposed phasing for implementation of a combination of surface disposal and landfill disposal of sludge is described in the following paragraphs.

- **Phase 1 (2013-immediate future):** Continue with 100% surface disposal to the existing site.
 - The steps involved on this phase were previously presented in Phase 1 of Option A – 100% Surface Disposal. The main component of this phase is implementation of improvements to the existing aerobic digesters to achieve nitrogen removal.
 - Landfill Disposal (as soon as possible): The steps involved in this phase also include the same previously presented in Phase 1 of Option B – 100% Landfill Disposal. This includes design and construction of a new sludge dewatering building initially equipped with one 2-meter wide BFP for sludge dewatering.

- **Phase 2 (less than 5 years):** Expansion of the aerobic digestion process and sludge thickening capacity.
 - Surface Disposal: The steps involved in this phase include the addition of one more aerobic digestion system to increase the treatment capacity to up to 2.5 MGD; and acquisition of a minimum of 65 acres of land for sludge disposal which, combined with the existing 200 acres, would match the capacity of two aerobic digesters.
 - Purchase of one additional 2-meter wide GBT to be installed next to the BFP in the sludge handling building constructed in Phase 1 previously described.

- **Phase 3 (In conjunction with MBR-2 project):** Increase the capacity of the sludge thickening facilities.
 - Replacement of existing 2-meter wide GBT and installation in the existing sludge handling building.

Figure 6-5 shows a timeline for implementation of Option C – Combined Surface Disposal and Landfill Disposal.

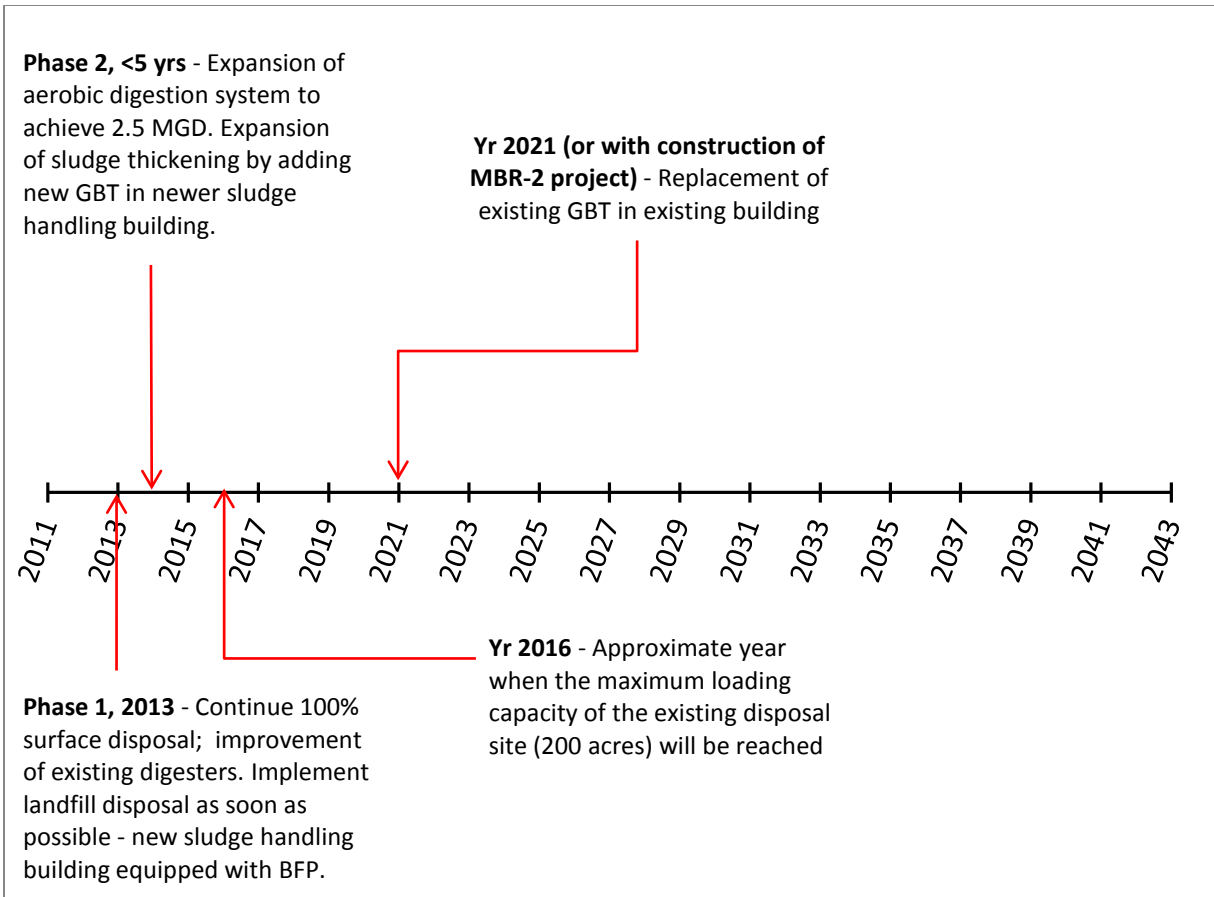


FIGURE 6-5
TIMELINE FOR IMPLEMENTATION OF SLUDGE DISPOSAL
OPTION C – COMBINED SURFACE DISPOSAL AND LANDFILL DISPOSAL

6.3 Evaluation of Alternatives

The criteria that will be taken into consideration for evaluation and comparison of treatment alternatives and equipment include: capability to comply with regulations and meet permit requirements, ease of expansion, site efficiency and land requirements, operation and maintenance requirements, public acceptance, and cost.

For the liquid treatment and general improvements projects, which include the new administration/laboratory building and the new effluent discharge line, there is no need to make a comparison because all of these projects are needed for capacity expansion and improvement of

existing facilities. However, cost estimates will be presented for these improvements in this Section.

There are three feasible sludge treatment and disposal alternatives being considered for implementation and a comparison among them in terms of cost and non-cost factors is provided. For comparison purposes, each process is given a score from 1 to 5 points, with one (1) point being the least favorable and five (5) points being most favorable. The alternative with the highest score will be recommended for implementation.

6.3.1 Regulatory Compliance

Option A – 100% Surface Disposal: This option requires reporting under the NPDES permit and the GWDP permit, as well as a additional oversight to ensure the aerobic digestion process produces a Class B product. However, this is a process familiar to the Operations Staff, so maintaining continued compliance is feasible. This alternative receives a score of 4 points.

Option B – 100% Landfill Disposal: This option requires reporting under the NPDES permit and the solid waste disposal plan (SWDP). Oversight for treatment and process control is reduced compared to surface disposal. This alternative receives a score of 5 points.

Option C – Combined Surface Disposal and Landfill Disposal: This option requires the greatest level of reporting (NPDES permit, GWDP permit, SWDP) and similar oversight to Option A. This alternative receives a score of 3 points.

6.3.2 Expandability

Option A – 100% Surface Disposal: Although this option can be expanded and phased, it also requires the greatest number of projects and facilities to be constructed. This alternative receives a score of 1 point.

Option B – 100% Landfill Disposal: This option requires the least number of phases but is minimally expandable as most equipment has to be installed upfront. This alternative receives a score of 4 points.

Option C – Combined Surface Disposal and Landfill Disposal: This option falls between Option A and Option B regarding expandability and construction in phases, and therefore receives a score of 3 points.

6.3.3 Site Efficiency and Constructability

Option A – 100% Surface Disposal: This option has the greatest number of facilities and takes up a sizeable footprint. It is the least site-efficient of the options and receives a score of 1 point.

Option B – 100% Landfill Disposal: This option takes up the least amount of space on the WWTP property due to fewer structures but still requires a generous footprint. This alternative receives a score of 4 points.

Option C – Combined Surface Disposal and Landfill Disposal: This option requires less space than Option A but more space than Option B. This alternative receives a score of 3 points.

6.3.4 Operation and Maintenance

Option A – 100% Surface Disposal: Disposing of all sludge through surface application will require a substantial amount of time and manpower for all of the sludge hauling trips and sludge spreading operations. Additionally, there will be a significant amount of equipment to maintain with the four digesters and associated systems. This process is very familiar to the current operations staff which is an advantage. However, if a digester upset occurs or if the Class B requirements are not met, the Village will have difficulty in getting rid of the sludge. This alternative receives a score of 2 points.

Option B – 100% Landfill Disposal: Disposing of all sludge at the landfill is the most operationally simplistic of the three options. However, maintenance requirements will be very high to ensure all systems remain fully functional. There is less flexibility for this option than the others due to a limited amount of onsite sludge storage facilities and a single disposal location. Additionally, there are specific requirements for the transport of this sludge to the landfill, and if the Village contracts with a hauler, there are increased risks for ensuring reliability of service. Due to the lack of flexibility with this alternative, it receives a score of 2 points.

Option C – Combined Surface Disposal and Landfill Disposal: Providing for multiple disposal options allows for increase operational flexibility. The operation and maintenance requirements will be greater than they are currently due to more equipment/facilities, but the systems are quite similar to what the staff is already used to operating. Additionally, the dewatering facilities will provide much needed backup to the digestion process should a system upset occur and non-Class B sludge need to be removed and disposed. This alternative receives a score of 5 points.

6.3.5 Public Acceptance

Option A – 100% Surface Disposal: This option adds a number of additional process basins to the WWTP site, increasing potential for odors. Additionally, the significant amount of tractor/tanker traffic for hauling to the land application site will impact the immediate residents and the community as a whole. This alternative receives a score of 2 points.

Option B – 100% Landfill Disposal: During normal operations, hauling cake sludge from the WWTP to the landfill will have minimal impact to the surrounding residents and the Village roadways. However, if any issues arise with the dewatering equipment, hauling contractor, hauling vehicles, or the landfill, odors may become a problem from storing the partially-treated cake sludge at the WWTP site. This alternative receives a score of 2 points.

Option C – Combined Surface Disposal and Landfill Disposal: The benefit of having two sludge disposal options is that the WWTP Operations Staff can ensure that sludge is consistently

removed from the WWTP site, thereby reducing potential odor impacts to the surrounding community. The balance of hauling both liquid and cake products will also result in minimal traffic impacts. This alternative receives a score of 5 points.

6.3.6 Cost

A planning period of 30 years was selected for this PER to fully master plan the WWTP site; however, it is difficult to project costs much beyond a typical 20-year planning period. For this reason, the cost estimates being generated will carry all facilities through a design capacity of 3.6 MGD, or two fully equipped MBR WWTPs.

Conceptual cost estimates were prepared separately for the liquid treatment, Administration and Laboratory Building, replacement of the effluent disposal line, and for the solids handling facilities.

Since the Village has been unable to identify a specific large parcel of land for purchase, the cost of land for future sludge disposal will be assumed to be \$2,000 per acre, but it may be higher or lower subject to property location and current market prices. All of the other improvements will be implemented within the Village's existing property; therefore, right-of-way expenses are not anticipated.

6.3.6.1 Liquid Treatment Facilities

The cost estimates for the liquid treatment facilities have been split into several standalone projects. This will allow for construction and implementation as dictated by flow increases and funding availability.

The most immediate need is to increase the capacity of the existing membrane bioreactor (MBR-1) plant. The hydraulic capacity can be doubled by adding the upper layer of membrane cassettes to the existing basins. Table 6-5 presents the Engineer's opinion of cost for this project.

TABLE 6-5
ENGINEER'S OPINION OF COST FOR CAPACITY EXPANSION
OF THE EXISTING MBR PLANT (MBR-1)

Item	Estimated Cost
Capacity Expansion of Existing MBR Plant (Addition of upper cassettes)	\$ 1,254,900
Equipment Installation	\$ 251,000
Electrical Work	\$ 37,600
Miscellaneous Equipment and Installation Work	\$ 82,400
Subtotal	\$ 1,625,900
Undefined Elements, General Conditions, Mobilization	\$ 227,600
Subtotal (rounded off)	\$ 1,854,000
Construction Contingencies @ 2%	\$ 37,000
Subtotal	\$ 1,891,000
Allowance for Legal Services	\$ 10,000
Subtotal	\$ 1,901,000
NMGRT @ 7.5625%	\$ 144,000
Total Construction Cost	\$ 2,045,000
<u>Professional Engineering Services</u>	
Basic design services and allowance for special services, including construction observation services (4 months).	\$ 185,600
NMGRT @ 7.0000%	\$ 13,000
Total Professional Engineering Services	\$ 198,600
TOTAL PROJECT COST	\$ 2,243,600

The construction cost is estimated at \$2,045,000. Non-construction costs are estimated at \$198,600. The estimated total project for expansion from 0.9 to 1.8 MGD of the existing MBR plant, including New Mexico Gross Receipt Tax (NMGR), is \$2,243,600 in today's dollars. A detailed cost estimate is provided in Appendix K of this Report.

The next phase of improvements for the liquid treatment process is the construction of a new MBR plant (MBR-2) with ultimate capacity for up to 1.8 MGD. However, as with the existing plant (MBR-1), this project can be phased. Thus, MBR-2 would be initially equipped for up to 0.9 MGD, but expandable to 1.8 MGD. The existing entrance works for MBR-1 can handle the flow of both facilities by adding a new fine screen. A difference between the existing MBR plant and MBR-2 is that instead of using a closed-vessel ultraviolet (UV) disinfection system, MBR-2 will have an open-channel UV system. Table 6-6 presents the Engineer's opinion of cost for a

new MBR facility and improvements of the existing entrance works. The construction cost is estimated at \$15,106,000. Total non-construction costs are estimated at \$1,805,000. The estimated total project cost, including NMGR T, is \$16,911,000 in today's dollars. A detailed cost estimate is provided in Appendix L.

TABLE 6-6
ENGINEER'S OPINION OF COST FOR ONE NEW MBR PLANT (MBR-2)
AND IMPROVEMENTS TO THE EXISTING ENTRANCE WORKS

Item	Estimated Cost
Improvements and Expansion of Existing Entrance Works	\$ 328,000
New MBR Facilities and Building	\$ 10,646,000
Site Improvements	\$ 566,000
Yard Piping Improvements	\$ 337,000
Electrical Work	\$ 1,697,000
Electrical Service Allowance	\$ 85,000
Testing Laboratory Allowance	\$ 70,000
Relocation of Existing Utilities Allowance	\$ 30,000
Subtotal	\$ 13,759,000
Construction Contingencies @ 2.0%	\$ 275,000
Subtotal	\$ 14,034,000
Allowance for Legal Services	\$ 10,000
Subtotal	\$ 14,044,000
NMGRT @ 7.5625%	\$ 1,062,000
Total Construction Cost	\$ 15,106,000
<u>Professional Engineering Services</u> Basic design services and allowance for other services, including soils investigation, aerial photography and mapping, surveying services, specialty inspection, operation and maintenance manual, start up, and video taping of training to operators.	\$ 1,435,000
Construction observation, full time (18-months)	\$ 252,000
Subtotal	\$ 1,687,000
NMGRT @ 7.0000%	\$ 118,000
Total Professional Engineering Services	\$ 1,805,000
TOTAL PROJECT COST	\$ 16,911,000

Following the construction of MBR-2, the next phase of improvements and expansion of the liquid treatment would be the addition of the upper layer of membrane cassettes to the existing basins in MBR-2. This project would be similar to what was previously described for MBR-1

and shown in Table 6-5. Table 6-7 presents the Engineer's opinion of cost for capacity expansion by addition of upper cassettes to MBR-2. The construction cost is estimated at \$2,045,000 and the non-construction costs are estimated at \$198,600. The estimated total project in today's dollars, including NMGR, is \$2,243,600. A detailed cost estimate is provided in Appendix K of this Report.

TABLE 6-7
ENGINEER'S OPINION OF COST
FOR CAPACITY EXPANSION OF MBR-2 PLANT

Item	Estimated Cost
Capacity Expansion of Existing MBR Plant (Addition of upper cassettes)	\$ 1,254,900
Equipment Installation	\$ 251,000
Electrical Work	\$ 37,600
Miscellaneous Equipment and Installation Work	\$ 82,400
Subtotal	\$ 1,625,900
Undefined Elements, General Conditions, Mobilization	\$ 227,600
Subtotal (rounded off)	\$ 1,854,000
Construction Contingencies @ 2%	\$ 37,000
Subtotal	\$ 1,891,000
Allowance for Legal Services	\$ 10,000
Subtotal	\$ 1,901,000
NMGR @ 7.5625%	\$ 144,000
Total Construction Cost	\$ 2,045,000
<u>Professional Engineering Services</u>	
Basic design services and allowance for special services, including construction observation services (4 months).	\$ 185,600
NMGR @ 7.0000%	\$ 13,000
Total Professional Engineering Services	\$ 198,600
TOTAL PROJECT COST	\$ 2,243,600

Finally, a third MBR (MBR-3) with a capacity of approximately 1.1 MGD or retrofitting of MBR-1 and MBR-2 with higher capacity membranes to achieve 4.7 MGD of total capacity would be needed. As it is unknown which of these alternatives will be implemented, and this project will not occur for many years, the construction and non-construction costs have not been estimated for this phase of liquid treatment capacity expansion.

6.3.6.2 Administration and Laboratory Building

A conceptual cost estimate for a new Administration and Laboratory Building is presented in Table 6-8. This could be a standalone project or implemented in combination with any of the liquid treatment or sludge management projects. The construction cost for the new Administration and Laboratory Building, including some laboratory equipment, is estimated at \$1,708,000. Non-construction costs are estimated at \$272,900. The estimated total project in today's dollars is \$1,980,900, including NMGR. A detailed cost estimate is provided in Appendix M.

TABLE 6-8
ENGINEER'S OPINION OF COST
FOR NEW ADMINISTRATION AND LABORATORY BUILDING

Item	Estimated Cost
Administration and Laboratory Building (Incl. some laboratory equipment)	\$ 1,537,000
Testing Laboratory Allowance	\$ 10,000
Subtotal	\$ 1,547,000
Construction Contingencies @ 2.0%	\$ 31,000
Subtotal	\$ 1,578,000
Allowance for Legal Services	\$ 10,000
	\$ 1,588,000
NMGR @ 7.5625%	\$ 120,000
Total Construction Cost	\$ 1,708,000
<u>Professional Engineering Services</u>	
Basic design services and allowance for special services (soils investigation and surveying services).	\$ 171,000
Construction observation services, full time (6-months)	\$ 84,000
Subtotal	\$ 255,000
NMGR @ 7.0000%	\$ 17,900
Total Professional Engineering Services	\$ 272,900
TOTAL PROJECT COST	\$ 1,980,900

6.3.6.3 Effluent Discharge Line

A conceptual cost estimate for a new 24-inch line to discharge effluent into the river is presented in Table 6-9. This could be a standalone project or implemented in combination with any of the near-term projects. The total construction cost for this project is estimated at \$398,000.

Non-construction costs are estimated at \$130,500. The estimated total project in today's dollars, including NMGR, is \$528,500. A detailed cost estimate is provided in Appendix N of this Report.

TABLE 6-9
ENGINEER'S OPINION OF COST FOR NEW EFFLUENT DISCHARGE LINE

Item	Estimated Cost
Effluent Discharge Line Replacement	\$ 343,000
Testing Laboratory Allowance	\$ 10,000
Subtotal	\$ 353,000
Construction Contingencies @ 2.0%	\$ 7,000
Subtotal	\$ 360,000
Allowance for Legal Services	\$ 10,000
Subtotal	\$ 370,000
NMGR @ 7.5625%	\$ 28,000
Total Construction Cost	\$ 398,000
Professional Engineering Services	
Basic design services and allowance for special services (soils investigation, aerial photography and mapping, surveying services).	\$ 66,000
Construction observation services, full time (4-months)	\$ 56,000
Subtotal	\$ 122,000
NMGR @ 7.0000%	\$ 8,500
Total Professional Engineering Services	\$ 130,500
TOTAL PROJECT COST	\$ 528,500

6.3.6.4 Sludge Management Facilities

The cost estimates for the sludge management facilities include three sludge disposal options: Option A – 100% surface disposal, Option B – 100% landfill disposal, and Option C – combined

surface disposal and landfill disposal. Purchase of trucks for sludge hauling (either to the surface disposal site or to the landfill) is not included in the cost estimates.

Option A – 100% Surface Disposal

For implementation of this alternative, two large projects are needed: 1) Rehabilitation of the existing sludge handling system, which consists of thickening and aerobic digestion prior to sludge disposal, and 2) Capacity expansion of the aerobic digesters.

Table 6-10 presents the Engineer's opinion of project cost for improvements of the existing aerobic digesters and for construction of the new sludge handling building and blowers building dedicated to the digesters. The new sludge handling building would be equipped with a new gravity belt thickener to match the capacity of the aerobic digesters in the future. Renovations of the existing aerobic digesters are intended to achieve nitrogen removal to continue using the existing sludge surface disposal site. Replacement of the existing GBT and blowers that supply oxygen to the existing digesters are also included. The total construction cost for this project is estimated at \$5,121,000, as shown in Table 7-6. Non-construction costs, which include professional engineering services and construction observations services, are estimated at \$872,000. There is also a need for 185 acres of land for this option, and at \$2,000 per acre, this totals \$370,000. The total project cost is estimated at \$6,363,000 in today's dollars. A detailed cost estimate is provided in Appendix O of this Report.

As previously mentioned, to dispose of all of the sludge through surface disposal, expansion of the existing aerobic digesters capacity is needed. Table 6-11 presents the cost for one new complete aerobic digestion system, which would have the same capacity as the existing system. The construction cost for this project is estimated at \$2,965,000. Non-construction costs, which include professional engineering services and construction observation services, are estimated at \$551,000. The total project cost is \$3,516,000 in today's dollars. A detailed cost estimate is provided in Appendix P of this Report.

TABLE 6-10

**ENGINEER'S OPINION OF COST FOR IMPROVEMENTS OF EXISTING
AEROBIC DIGESTERS AND NEW SLUDGE HANDLING BUILDING**

Item	Estimated Cost
Rehabilitation and Modifications to Existing Digesters	\$ 1,039,000
Replacement of Gravity Belt Thickener Installed in Existing Bldg.	\$ 526,000
New Sludge Handling and Blower Building	\$ 1,582,000
New Plant Washwater Pump Building	\$ 117,000
Digested Sludge Pump Building	\$ 231,000
WAS Junction Valve Building	\$ 42,000
Site Improvements	\$ 187,000
Yard Piping	\$ 163,000
Electrical Work	\$ 561,000
Demolition of Existing Sludge Drying Beds	\$ 40,000
Relocation of Existing Utilities	\$ 30,000
Electrical Service Allowance	\$ 80,000
Testing Laboratory Allowance	\$ 60,000
Subtotal	\$ 4,658,000
Construction Contingencies @ 2.0%	\$ 93,000
Subtotal	\$ 4,751,000
Allowance for Legal Services	\$ 10,000
Subtotal	\$ 4,761,000
NMGRT @ 7.5625%	\$ 360,000
Total Construction Cost	\$ 5,121,000
<u>Professional Engineering Services</u>	
Basic design services and allowance for other services, including soils investigation, aerial photography and mapping, surveying services, specialty inspection, operation and maintenance manual, start up, and video taping of training to operators.	\$ 563,000
Construction observation services, full time (18-months)	\$ 252,000
Subtotal	\$ 815,000
NMGRT @ 7.0000%	\$ 57,000
Total Professional Engineering Services	\$ 872,000
Land Cost – 185 acres @ \$2,000/acre	\$ 370,000
TOTAL PROJECT COST	\$ 6,363,000

TABLE 6-11

**ENGINEER'S OPINION OF COST
FOR ONE NEW AEROBIC DIGESTION SYSTEM**

Item	Estimated Cost
Aerobic Digester Structure and Equipment	\$ 2,075,000
Yard Piping Improvements	\$ 228,000
Electrical Work	\$ 230,000
Site Improvements	\$ 115,000
Testing Laboratory Allowance	\$ 45,000
Subtotal	\$ 2,693,000
Construction Contingencies @ 2.0%	\$ 54,000
Subtotal	\$ 2,747,000
Allowance for Legal Services	\$ 10,000
	\$ 2,757,000
NMGRT @ 7.5625%	\$ 208,000
Total Construction Cost	\$ 2,965,000
<u>Professional Engineering Services</u>	
Basic design services and allowance for special services including soils investigation, operation and maintenance manual, startup, and video taping of training to operators.	\$ 347,000
Construction observation services, full time (12-months)	\$ 168,000
Subtotal	\$ 515,000
NMGRT @ 7.0000%	\$ 36,000
Total Professional Engineering Services	\$ 551,000
TOTAL PROJECT COST	\$ 3,516,000

For implementation of Option A – 100% Surface Disposal, the following projects are necessary:

- Improvements of existing aerobic digesters and new sludge handling building: \$ 6,363,000.
- Two aerobic digestion systems, each at \$3,516,000 for a total of \$ 7,032,000.

Therefore, the total cost for this sludge disposal alternative is \$13,395,000.

Option B – 100% Landfill Disposal

For implementation of this alternative, it would be necessary to construct a new sludge handling building, which would be equipped with two BFPs to dewater sludge. In addition, the existing digesters would have to be rehabilitated and the existing GBT would have to be replaced as they will be needed during the next few years while the new facilities are designed and constructed. Furthermore, the aerobic digestion basins would be used in the future as sludge holding basins prior to dewatering. Table 6-12 presents the cost estimate for implementation of the 100% landfill disposal alternative.

The construction cost for this project is estimated at \$ 6,998,000 and the non-construction costs, which include professional engineering services and construction observation services, are estimated at \$981,000. The total project cost, including NMGR, is \$7,979,000 in today's dollars. A detailed cost estimate is provided in Appendix Q of this Report.

TABLE 6-12
ENGINEER'S OPINION OF COST FOR IMPLEMENTATION
OF A 100% LANDFILL DISPOSAL ALTERNATIVE

Item	Estimated Cost
Rehabilitation and Modifications to Existing Digesters	\$ 1,039,000
Replacement of Gravity Belt Thickener Installed in Existing Bldg.	\$ 526,000
New Sludge Handling and Blower Building	\$ 3,008,000
New Plant Washwater Pump Building	\$ 117,000
Digested Sludge Pump Building	\$ 231,000
WAS Junction Valve Building	\$ 42,000
Site Improvements	\$ 258,000
Yard Piping	\$ 163,000
Electrical Work	\$ 775,000
Demolition of Existing Sludge Drying Beds	\$ 40,000
Relocation of Existing Utilities	\$ 30,000
Electrical Service Allowance	\$ 80,000
Testing Laboratory Allowance	\$ 60,000
Subtotal	\$ 6,369,000
Construction Contingencies @ 2.0%	\$ 127,000
Subtotal	\$ 6,496,000
Allowance for Legal Services	\$ 10,000
Subtotal	\$ 6,506,000
NMGRT @ 7.5625%	\$ 492,000
Total Construction Cost	\$ 6,998,000
Professional Engineering Services	
Basic design services and allowance for other services, including soils investigation, aerial photography and mapping, surveying services, specialty inspection, operation and maintenance manual, start up, and video taping of training to operators.	\$ 665,000
Construction observation services, full time (18-months)	\$ 252,000
Subtotal	\$ 917,000
NMGRT @ 7.0000%	\$ 64,000
Total Professional Engineering Services	\$ 981,000
TOTAL PROJECT COST	\$ 7,979,000

Option C – Combined Surface Disposal and Landfill Disposal

This alternative consists of utilizing the existing surface disposal site and aerobic digesters and expanding their capacity to achieve approximately 50% of surface disposal and the remaining

50% at the landfill, for a plant capacity of 3.6 MGD. Additional capacity would be needed for flows exceeding this amount.

For implementation of this alternative, it would be necessary to construct a new sludge handling building, which would be equipped with one BFP to dewater sludge prior to landfill disposal and one new GBT to feed a new digester. In addition, the existing digesters would have to be rehabilitated and the existing GBT would have to be replaced. Table 6-13 presents the cost estimate for implementation of the combined surface and landfill disposal alternative. The construction cost for this project is estimated at \$ 7,011,000, and the non-construction costs, which include professional engineering services and construction observation services, are estimated at \$982,000. There is also a need for 65 acres of land for this option, and at \$2,000 per acre, this totals \$130,000. The total project cost, including NMGRT, is \$8,123,000 in today's dollars. A detailed cost estimate is provided in Appendix R of this Report.

A new aerobic digester would also be needed to achieve 50% surface disposal. The cost estimate for the new digestion system was previously presented in Table 7-7. The total project cost for one additional aerobic digestion system is estimated at \$3,516,000. Therefore, the total cost for implementation of Option C – Combined Surface Disposal and Landfill Disposal is \$11,639,000.

TABLE 6-13

**ENGINEER'S OPINION OF COST FOR IMPLEMENTATION
OF COMBINED SURFACE AND LANDFILL DISPOSAL ALTERNATIVE**

Item	Estimated Cost
Rehabilitation and Modifications to Existing Digesters	\$ 1,039,000
Replacement of Gravity Belt Thickener Installed in Existing Bldg.	\$ 526,000
New Sludge Handling and Blower Building	\$ 2,777,000
New Plant Washwater Pump Building	\$ 153,000
Digested Sludge Pump Building	\$ 231,000
WAS Junction Valve Building	\$ 83,000
Site Improvements	\$ 259,000
Yard Piping	\$ 326,000
Electrical Work	\$ 776,000
Demolition of Existing Sludge Drying Beds	\$ 40,000
Relocation of Existing Utilities	\$ 30,000
Electrical Service Allowance	\$ 80,000
Testing Laboratory Allowance	\$ 60,000
Subtotal	\$ 6,380,000
Construction Contingencies @ 2.0%	\$ 128,000
Subtotal	\$ 6,508,000
Allowance for Legal Services	\$ 10,000
Subtotal	\$ 6,518,000
NMGRT @ 7.5625%	\$ 493,000
Total Construction Cost	\$ 7,011,000
<u>Professional Engineering Services</u>	
Basic design services and allowance for other services, including soils investigation, aerial photography and mapping, surveying services, specialty inspection, operation and maintenance manual, start up, and video taping of training to operators.	\$ 666,000
Construction observation services, full time (18-months)	\$ 252,000
Subtotal	\$ 918,000
NMGRT @ 7.0000%	\$ 64,000
Total Professional Engineering Services	\$ 982,000
Land Cost – 65 acres @ \$2,000/acre	\$ 130,000
TOTAL PROJECT COST	\$ 8,123,000

6.3.6.5 Summary of Total Projects Cost

Cost estimates were prepared separately for individual liquid treatment and sludge management projects, which could be implemented as standalone projects, or combined with others. Three cost estimates were prepared for the sludge management system, one for each of the alternatives being evaluated. Table 6-14 presents a summary of the projects cost. Detailed cost estimates are provided in Appendices K to R of this Report.

TABLE 6-14
SUMMARY OF PROJECTS COST

Project	Construction Cost	Non-Construction Cost	Total Project Cost
Expansion of Existing MBR Plant (MBR-1)	\$ 2,045,000	\$ 198,600	\$ 2,243,600
New MBR Plant (MBR-2) and Improvements of Existing Entrance Works	\$ 15,106,000	\$ 1,805,000	\$ 16,911,000
Capacity Expansion of MBR-2 Plant	\$ 2,045,000	\$ 198,600	\$ 2,243,600
New Administration and Laboratory Bldg.	\$ 1,708,000	\$ 272,900	\$ 1,980,900
New Effluent Discharge Line	\$ 398,000	\$ 130,500	\$ 528,500
Sludge, Option A – 100% Surface Disposal	\$ 11,051,000	\$ 2,344,000 ^(a)	\$ 13,395,000
Sludge, Option B – 100% Landfill Disposal	\$ 6,998,000	\$ 981,000	\$ 7,979,000
Sludge, Option C – Combined Surface Disposal and Landfill Disposal	\$ 9,976,000	\$ 1,663,000 ^(a)	\$ 11,639,000

^(a) Includes the cost of land

6.3.6.6 Opinion of Operation and Maintenance Cost

The annual Operation and Maintenance (O&M) costs used in this Report are based on some assumptions and operational conditions, which are subject to change. O&M cost estimates include annual cost of power for operation of the liquid treatment process and sludge handling facilities (assumed \$0.10/kW-hr), purchase of polymer for sludge thickening and dewatering, applicable sludge hauling and final disposal expenses (i.e., mileage from WWTP to surface disposal site or landfill, landfill tipping fees, etc.), general maintenance of equipment, and spare parts for equipment. The cost of labor is not included.

Table 6-15 presents a summary of power requirements for the operation of two MBR plants (total capacity of 3.6 MGD). The annual cost of power for operation of the liquid treatment facilities is \$576,000. In addition, an allowance of \$50,000 for general maintenance of equipment, spare parts, and minor repairs has been included. The total annual O&M for the liquid treatment facilities is estimated at \$626,000. The annual maintenance cost for the new effluent discharge line has been assumed at \$5,000. For the operation and maintenance of the new Administration/Laboratory Building, an allowance of \$20,000 per year has been included to account for increased utilities and general maintenance cost for a larger building.

TABLE 6-15
ENGINEER'S OPINION OF POWER REQUIREMENTS AND ANNUAL
COST FOR OPERATION OF LIQUID TREATMENT FACILITIES

Unit Operation/Process	Estimated Power Requirements, kWh/Yr	Estimated Annual Power Cost
Fine Screens	5,240	\$ 524
Screenings Press	7,760	\$ 776
Screenings Conveyor	2,130	\$ 213
Classifier	270	\$ 27
Grit Blowers	48,880	\$ 4,888
Pre-Aeration Blowers	651,700	\$ 65,171
MBR Blowers	3,258,530	\$ 325,853
Transfer Pumps	162,930	\$ 16,293
Mixers for Process Basins	12,410	\$ 1,241
Mixers for Anoxic Basins	65,170	\$ 6,517
Permeate Pumps	782,050	\$ 78,205
Chlorine Injection Pumps	5,040	\$ 504
Ultraviolet Disinfection Unit	482,260	\$ 48,226
Effluent Pumps	273,720	\$ 27,372
Total Liquid Process (rounded)		\$ 576,000

Regarding the sludge management system, the annual O&M has been estimated separately for the surface and landfill sludge disposal alternatives. Table 6-16 shows the power cost associated with the operation of each aerobic digestion system and gravity belt thickener (GBT) needed to implement a surface disposal alternative. The annual power cost for operation of these facilities

is estimated at \$107,000. If more than one digester and GBT are needed, the power costs would be multiplied by the number of units. Similarly, Table 6-17 shows the power cost associated with the dewatering equipment needed to implement a landfill disposal alternative. If more than one belt filter press is needed, the power cost would be multiplied by the number of units. The annual power cost for operation of these equipment and facilities is estimated at \$7,000.

TABLE 6-16

ENGINEER'S OPINION OF POWER REQUIREMENTS AND ANNUAL COST FOR OPERATION OF EQUIPMENT FOR SLUDGE SURFACE DISPOSAL

Unit Operation/Process	Estimated Power Requirements, kWh/Yr	Estimated Annual Power Cost
WAS Pumps	3,490	\$ 349
Gravity Belt Thickener and Ancillary Equipment	11,640	\$ 1,164
Drain Lift Pumps	3,880	\$ 388
Washwater Pumps	15,520	\$ 1,552
Digested Sludge Pumps	8,730	\$ 873
Aerobic Digester Mixers	52,140	\$ 5,214
Aerobic Digester Blowers	977,560	\$ 97,756
Total for Equipment Needed for Surface Disposal (rounded)		\$ 107,000

TABLE 6-17

ENGINEER'S OPINION OF POWER REQUIREMENTS AND ANNUAL COST FOR OPERATION OF EQUIPMENT FOR SLUDGE LANDFILL DISPOSAL

Unit Operation/Process	Estimated Power Requirements, kWh/Yr	Estimated Annual Power Cost
WAS Pumps	3,491	\$ 349
Belt Filter Press and Ancillary Equipment	23,275	\$ 2,328
Drain Lift Pumps	7,758	\$ 776
Washwater Pumps	31,034	\$ 3,103
Total for Equipment Needed for Landfill Disposal (rounded)		\$ 7,000

Table 6-18 shows the individual and total annual O&M costs for implementation of Option A – 100% Surface Disposal. The annual O&M cost is estimated at \$398,000, which includes power, polymer for thickening, and hauling of sludge from the WWTP to the surface disposal site.

Table 6-19 shows the individual and total annual O&M costs for implementation of Option B –

100% Landfill Disposal. The annual O&M cost is estimated at \$400,000, which includes operation of one aerobic digestion system, sludge dewatering facilities, and hauling and landfill tipping fees. Tipping fees are based on current cost provided to the Village for a separate project and are subject to change (\$31 per ton of waste).

TABLE 6-18
ENGINEER’S OPINION OF TOTAL ANNUAL O&M COST
FOR 100% SURFACE DISPOSAL

Item	Annual O&M
Power – Aerobic digesters and ancillary equipment (3 systems)	\$ 321,000
Power – Thickening and ancillary equipment (2 systems)	\$ 6,000
Hauling and surface disposal costs	\$ 39,000
Polymer – Sludge Thickening Process for Surface Disposal	\$ 32,000
Total Annual O&M Cost for 100% Surface Disposal	\$ 398,000

TABLE 6-19
ENGINEER’S OPINION OF TOTAL ANNUAL O&M COST
FOR 100% LANDFILL DISPOSAL

Item	Annual O&M
Power - Aerobic digesters and ancillary equipment (1 system)	\$ 107,000
Power - Dewatering and ancillary equipment (2 systems)	\$ 14,000
Hauling and landfill tipping fees	\$ 192,000
Belt Filter Press Maintenance and Belt Replacement	\$ 13,000
Polymer – Sludge Dewatering Process for Landfill Disposal	\$ 74,000
Total Annual O&M Cost for 100% Landfill Disposal	\$ 400,000

Table 6-20 shows the annual O&M cost for implementation of Option C – Combined Surface Disposal and Landfill Disposal. This alternative includes the operation of two aerobic digestion systems and associated costs, as well as operation of one dewatering machine for sludge disposal at the landfill. The cost also includes hauling of digested sludge to the disposal site and hauling and tipping fees for disposal of the remaining portion of the sludge at the landfill. The annual O&M cost for this alternative is estimated at \$414,000.

TABLE 6-20
ENGINEER'S OPINION OF TOTAL ANNUAL O&M COST
FOR COMBINED SURFACE AND LANDFILL DISPOSAL

Item	Annual O&M
Power - Aerobic digesters and ancillary equipment (2 systems)	\$ 214,000
Power - Thickening and ancillary equipment (2 systems)	\$ 6,000
Hauling and surface disposal costs	\$ 22,000
Polymer – Sludge Thickening Process for Surface Disposal	\$ 16,000
Power - Dewatering and ancillary equipment (1 systems)	\$ 7,000
Hauling and landfill tipping fees	\$ 105,000
Belt Filter Press Maintenance and Belt Replacement	\$ 7,000
Polymer – Sludge Dewatering Process for Landfill Disposal	\$ 37,000
Total Annual O&M Cost for Combined Surface and Landfill Disposal of Sludge	\$ 414,000

6.3.6.7 Present Worth Analysis

The present worth of cost is a combination of capital and operating cost, presented as an overall cost. Using interest rates over a 20-year period, operating costs are translated to an equivalent lump sum that is combined with the capital cost to yield the present worth. An interest rate of 3% will be used to calculate the present worth for the alternatives being evaluated.

The present worth has been calculated based on the total cost of all improvements and the associated O&M cost for a plant capacity of 3.6 MGD, which is expected to be needed by year 2035. Table 6-21 shows the total project cost and annual O&M cost, as well as the present worth for each liquid and sludge treatment project. Of the three sludge treatment and disposal alternatives being compared, the one that resulted in the highest present worth is Option A – 100% Surface Disposal, at \$19,316,200. The alternative with the lowest present worth is Option B – 100% Surface Disposal, at \$13,930,000. Option C, which is a combination of surface and landfill disposal of sludge, resulted in a present worth of \$17,798,300.

TABLE 6-21
PRESENT WORTH FOR LIQUID AND SLUDGE TREATMENT PROJECTS

Project	Total Project Cost	Annual O&M Cost	Present Worth
Expansion of Existing MBR Plant (MBR-1)	\$2,243,600	\$157,000	\$4,579,400
New MBR Plant (MBR-2) and Improvements of Existing Entrance Works	\$16,911,000	\$314,000	\$21,582,500
New Administration and Laboratory Bldg.	\$1,980,600	\$20,000	\$2,278,100
New Effluent Discharge Line	\$528,500	\$5,000	\$602,900
Sludge, Option A - 100% Surface Disposal	\$13,395,000	\$398,000	\$19,316,200
Sludge, Option B - 100% Landfill Disposal	\$7,979,000	\$400,000	\$13,930,000
Sludge, Option C - Combined Surface and Landfill Disposal	\$11,639,000	\$414,000	\$17,798,300

Based on the present worth analysis, following is the scoring for the sludge options:

- **Option A – 100% Surface Disposal:** This alternative receives a score of 2 points.
- **Option B – 100% Landfill Disposal:** This alternative receives a score of 4 points.
- **Option C – Combined Surface Disposal and Landfill Disposal:** This alternative receives a score of 3 points.

6.4 Selection of Alternatives

For the liquid process, the selected alternative is a membrane bioreactors (MBR) process to replace the existing activated sludge treatment plant and to increase the treatment capacity of the system in the future.

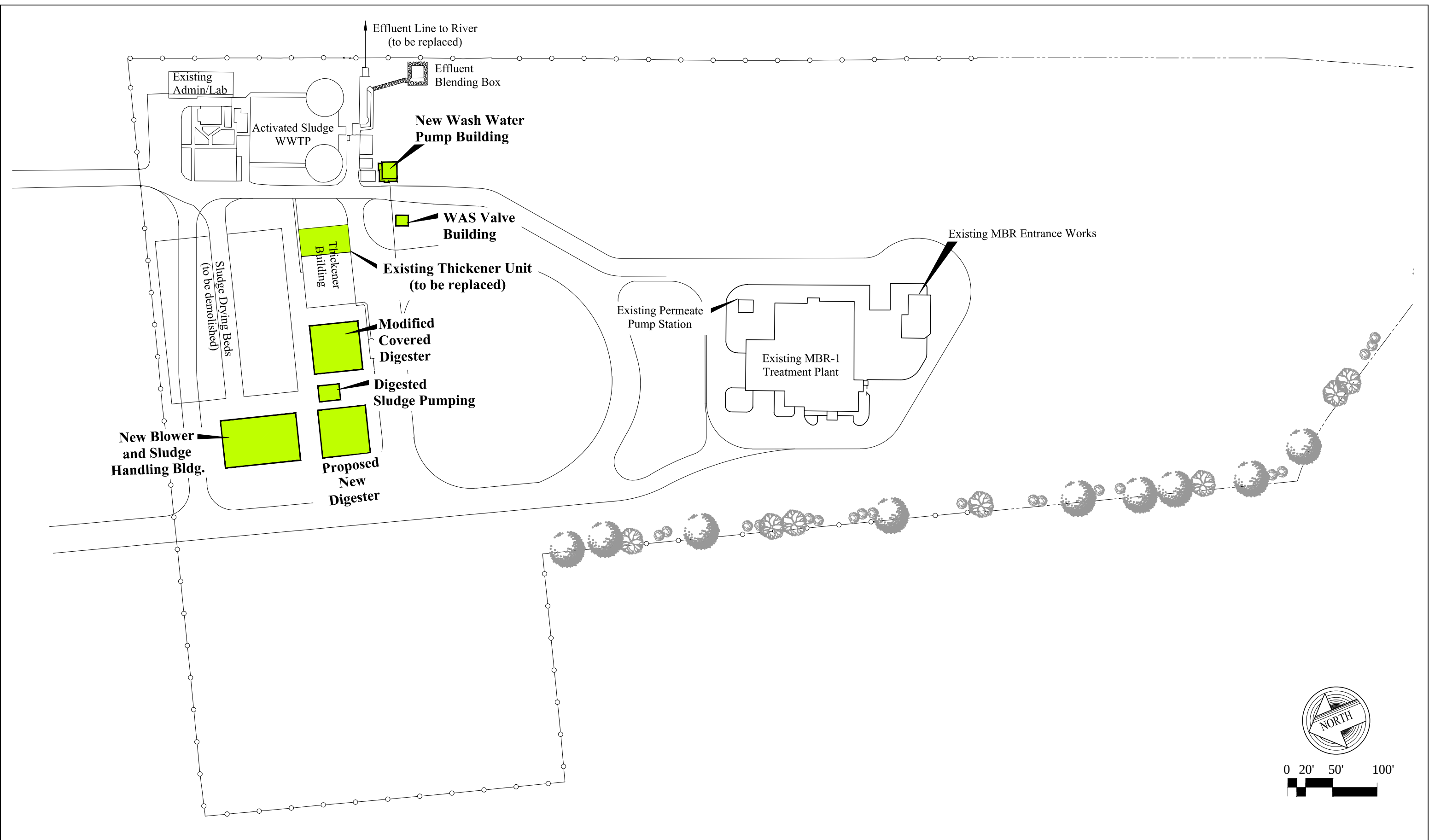
Three options were considered for the solids handling facilities at the WWTP. Table 6-22 shows the ranking of the three alternatives according to the criteria discussed previously.

TABLE 6-22
COMPARISON OF SLUDGE TREATMENT AND DISPOSAL ALTERNATIVES

Evaluation Criteria	Option A	Option B	Option C
Regulatory Compliance	4	5	3
Expandability	1	4	3
Site Efficiency and Constructability	1	4	3
Operation and Maintenance	2	2	5
Public Acceptance	2	2	5
Cost	2	4	3
Total	12	21	22

Of the three sludge treatment and disposal alternatives, the one that resulted with the highest score, thus the recommended alternative for implementation, is Option C – Combined Surface and Landfill Disposal.

Figure 6-6 presents the layout of the existing and future sludge handling facilities, including aerobic digesters, sludge handling building, and blowers building. Decommissioning of the existing sludge drying beds is recommended to be done during the implementation of these improvements.



7.0 PROPOSED PROJECT

The recommended alternative for treatment of the liquid portion is a MBR process. For solids treatment and stabilization, the recommended process is aerobic digestion. Digestion of sludge will allow meeting the requirements for continued disposal at the existing surface disposal site. Prior to digestion, the sludge will be thickened by a GBT, which will reduce the volume of the digesters by removing some water and increasing solids concentration. Surface disposal of digested sludge will continue to be the main final disposal method for biosolids. However, landfill disposal is also recommended as a complementary solids disposal method for implementation in the near future. This combination of disposal methods will significantly increase the flexibility of the sludge handling facilities. Disposal of solids at the landfill will require dewatering, which consists of removing more water from the sludge and increasing the solids concentration to generate a “cake” product. Due to its operational simplicity and effectiveness to remove water, a BFP is the recommended technology for sludge dewatering.

7.1 Proposed Projects and Ranking of Priorities

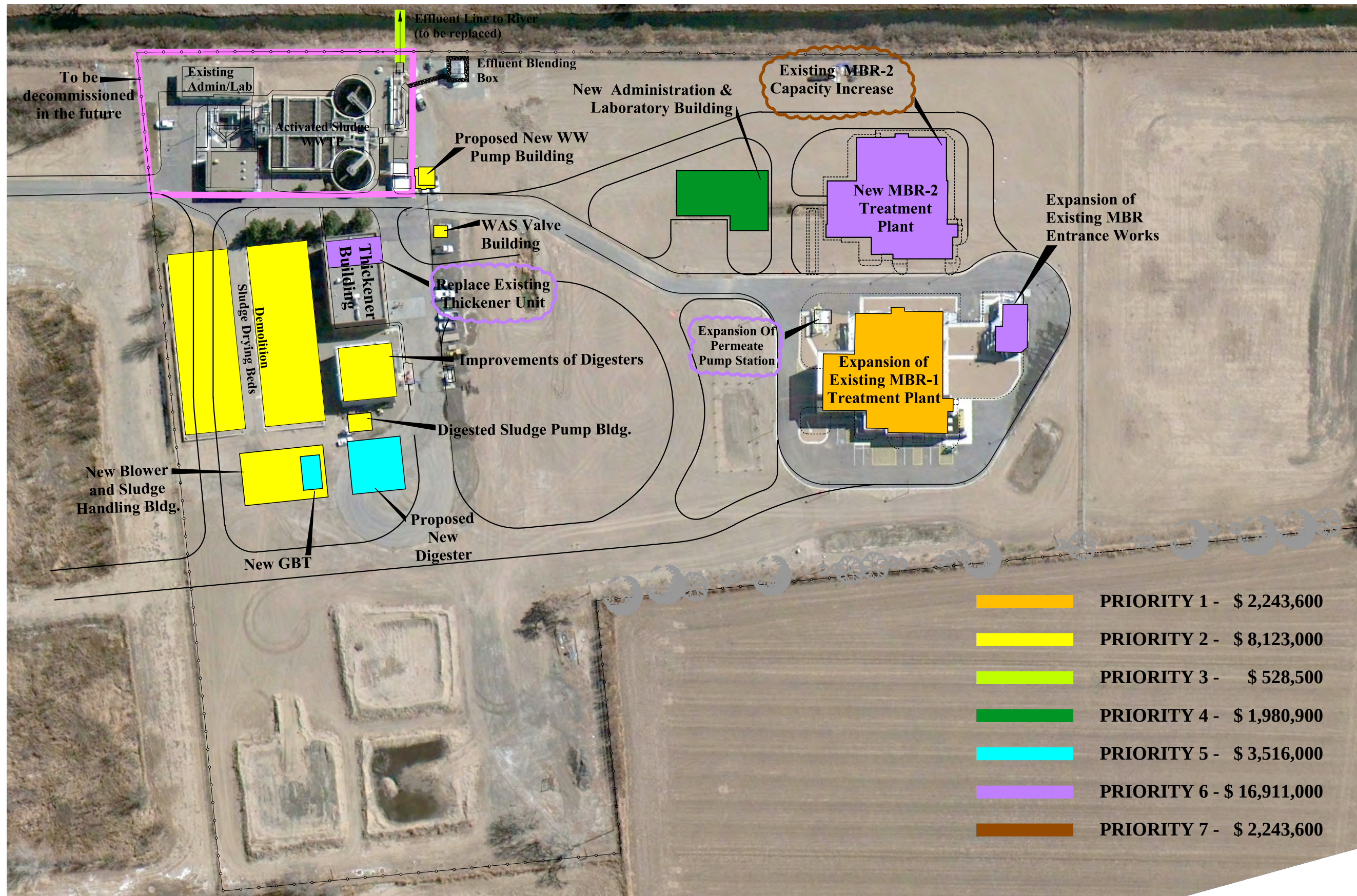
It is important to consider that the planning period used for this project is 30 years; thus, the recommended projects will be implemented in several phases. Additionally, there are several standalone, less costly projects, which can be implemented as funding becomes available. Table 7-1 shows the approximate time when each project would be needed. Based on the urgency of the project (i.e., need for additional capacity, compliance with regulations, etc.), a priority ranking has been established. The two high-priority projects are: 1) Expansion of the existing MBR plant, which is needed for treatment of raw wastewater, and 2) Improvement of the existing aerobic digesters and new sludge handling building, which are needed to comply with sludge treatment and disposal regulations and for operational flexibility as well.

TABLE 7-1**PROPOSED PROJECTS AND PRIORITY RANKING**

Project	Needed By	Priority Ranking
Expansion of Existing MBR Plant (MBR-1)	2013 or as soon as possible	1
Improvement of Existing Aerobic Digesters and New Sludge Handling Bldg.	2013 or as soon as possible	2
New Effluent Discharge Line	Near future	3
New Administration and Laboratory Bldg.	Near future	4
New Aerobic Digestion System	2015 – New digester	5
New MBR Plant (MBR-2) and Improvements of Existing Entrance Works	2015 – if old plant taken offline 2025 – if old plant remains in service	6
Capacity Expansion of MBR-2 Plant	2025	7

Figure 7-1 shows the different projects grouped by priority ranking in different colors.

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DWG NAME: WLF071.dwg



Los Lunas Wastewater Treatment and Sludge Management - PER

MOLZENCORBIN

Figure 7-1
Recommended Improvements

7.2 Project Implementation

The Engineer has recommended projects which allow the improvements to be implemented in phases through the project planning period. The Owner may elect to add or subtract individual improvements from the packaged projects as necessary once it comes time for design/construction. After all of the improvements have been implemented, they will function as an integrated system.

7.2.1 Environmental Assessment and FONSI

For the Village to be eligible for public grant and loan monies, environmental and cultural resources clearances must be obtained. The first step in this process is to obtain an EID. The EID examines the project impacts on land use, floodplains, wetlands, and biological resources, and addresses environmental justice issues. The EID will also examine how the proposed project will affect archeological, cultural, and historic resources. Without an EID and subsequent Finding Of No Significant Impact (FONSI), a PER is considered to be incomplete for funding agency requests. An EID will be included with the PER under separate cover and will address those projects which are expected to occur in the near future. Not all of the projects will be covered in the EID because certain components have a minimal shelf life and would need to be redone at a later date.

7.2.2 Implementation Schedule

An implementation schedule based on the traditional approach for construction (design, bid, construction) was developed for each standalone project, as shown in Table 7-2. However, multiple projects can be implemented at once to reduce duration. The schedule assumes that funding for the different stages of the project would be available.

TABLE 7-2
PROJECTS IMPLEMENTATION SCHEDULE

Project	Phase and Duration (Months)						
	Priority Ranking	Prelim. Design	Final Design	Bidding and Award	Construction – Substantial Completion	Final Completion	Total Project Duration
Expansion of Existing MBR Plant (MBR-1)	1	3	2	3	3	1	12
Improvement of Existing Aerobic Digesters and New Sludge Handling Bldg.	2	6	3	3	16	2	30
New Effluent Discharge Line	3	2	1	3	3	1	10
New Administration and Laboratory Bldg.	4	4	2	3	5	1	15
New Aerobic Digestion System and Sludge Thickening Improvements	6	4	2	3	11	1	21
New MBR Plant (MBR-2) and Improvements of Existing Entrance Works	5	6	3	3	16	2	30
Capacity Expansion of MBR-2 Plant	7	3	2	3	3	1	12

7.2.3 Funding and Loan Amortization

Fewer and fewer funding sources are offering grant components to their financial assistance programs. As such, it is highly likely that the Village will need to borrow the money to complete the proposed projects.

For the top two priority projects, it has been assumed that the Village will pursue funding from the NMED Construction Programs Bureau (CPB) Clean Water State Revolving Loan Fund (CWSRLF). The Village has previously sought funding for the Priority 1 project from the CWSRLF, but the current sewer rate structure for the Village cannot support that additional amount of debt. Loan amortization schedules based on a 3.00% interest rate and a 20-year repayment period are included in Appendix S.

7.2.4 Rate Impact

Determining the sewer rate impact based on all of the recommended improvements is difficult to do because the existing number of sewer connections is small compared to what could be in service in 30 years. Therefore, dividing the cost of the project among the existing number of connections appears to be inadequate due to the expected annexation and population growth. As a result, the sewer rate impact prepared for this Report is based on a cost per 1,000 gallons discharged. In addition, because of the long term for this project, only the first two priority projects, which are the expansion of the existing MBR-1 plant and the improvements and expansion of the sludge management system, will be considered in the calculations.

The debt service on the borrowed amount includes payments to cover the principal and interest (P&I) on the loan(s). The P&I payment is based on a 3.00% interest rate and a 20-year repayment period. The total project cost for the expansion of MBR-1 is \$2,243,600 and for the first phase of the Combined Surface and Landfill Disposal of sludge is \$8,123,000. The total cost for these two projects is \$10,366,600. The annual operation and maintenance (O&M) cost for the proposed projects is estimated at \$157,000 and \$207,000 (assumed to be half of the O&M presented in Table 6-20), respectively. The total annual O&M for both projects is \$364,000.

Figure 7-2 illustrates the impact to the sewer rate for various percentages of grant funding applied to the costs associated with the improvements and capacity expansion of the wastewater treatment facilities and sludge management system for the Village. The worst-case scenario would occur if the Village has to borrow all monies needed for design and construction of all the facilities. Zero-percent grant funding assumes that the system will be paid for through loans.

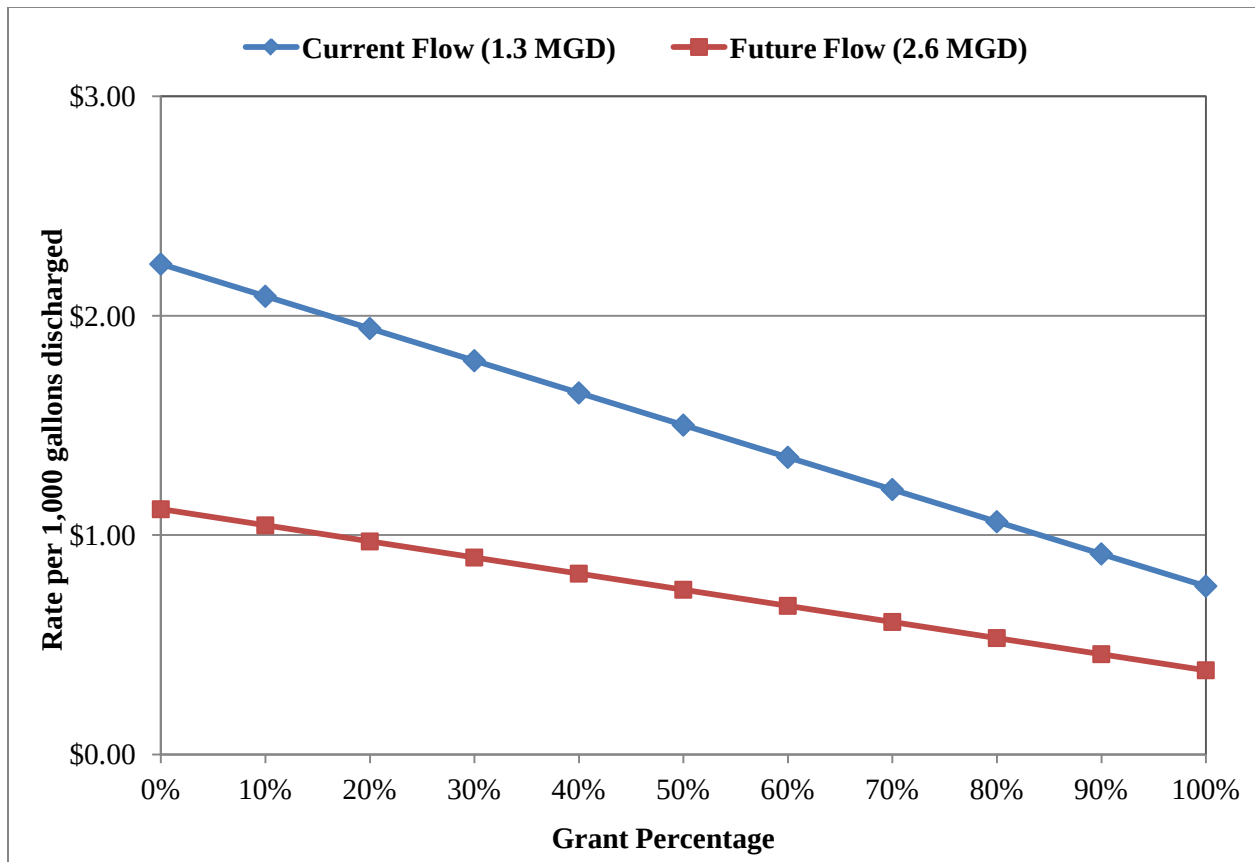


FIGURE 7-2
SEWER RATE IMPACT

The cost per 1,000 gallons of wastewater discharged has been calculated for two flow conditions; one for current flows (1.3 MGD) and one for a future flow of 2.6 MGD, which is the maximum capacity of a fully equipped MBR-1 and the activated sludge WWTP. Under the worst-case scenario, assuming that all the money has to be borrowed, the sewer rate impact would range from \$1.12 to \$2.24 per 1,000 gallons discharge. The higher rate impact is for current flows (lower flow because it is the start of the planning period), but as flows increase, the rate impact would decrease.

Although it falls outside the scope of this Report, the Village should consider conducting a sewer rate study once funding sources for the improvements have been identified. Furthermore, the rate study could identify phased (annual) increases as projects are implemented through the project planning period.

8.0 CONCLUSIONS AND RECOMMENDATIONS

This Section of the Wastewater Treatment and Sludge Management PER for the Village summarizes the contents and results of Sections 1.0 to 7.0 and provides a list of recommendations.

8.1 Conclusions

- **Liquid Process:**

- The selected alternative for the liquid treatment process is membrane bioreactors. This technology will be used for replacement of the existing activated sludge plant and to add treatment capacity in the future.
- Capacity increase of the existing MBR process (MBR-1) from 0.9 million gallons per day (MGD) to 1.8 MGD can be achieved by adding the upper cassettes to the MBR basins. This high-priority project needs to be implemented as soon as funding is available.
- The combined capacity of the expanded MBR-1 plant (1.8 MGD) and the activated sludge plant (0.8 MGD operated at its maximum capacity) would be 2.6 MGD.
- There is continuous deterioration and more frequent failures of the activated sludge process (old plant) components and equipment. Due to the significant cost of the projects needed in the near future, the Operations Staff should make all efforts possible to maintain operation of the activated sludge WWTP to defer decommissioning to a later date.
- A second MBR plant (MBR-2) would increase the capacity of the MBR process from 1.8 MGD to up to 2.7MGD with the installation of the lower cassettes, and ultimately up to 3.6 MGD with the upper cassettes.
- The existing entrance works structure can support MBR facilities with capacity for 3.6 MGD (MBR-1 + MBR-2). However, a new fine screen will have to be added during the expansion from 1.8 MGD to 2.7 MGD.
- It is recommended to replace the existing 16-inch effluent discharge line with a 24-inch line. Because of the permitting process and environmental clearance required for implementation of this project, phasing is not recommended. This project is

recommended to be implemented in the near future, prior to construction of the new MBR plant.

- **Solids Process:**

- **The aerobic digestion system is the most deteriorated component of the sludge treatment and handling process.**
- There is an immediate need to retrofit the existing digesters to achieve nitrogen removal as a means to improve the treatment capacity of the existing sludge process and extend the useful life of the sludge disposal site. However, retrofitting the existing digesters will not increase the hydraulic capacity of the system.
- Based on the most conservative design criteria, the existing digesters have equivalent capacity of 1.2 – 1.3 MGD plant flow; additional volume is needed in the near future.
- It is estimated that after permanent improvements to the existing digesters are implemented to achieve nitrogen removal, the existing surface disposal site can handle the sludge generated by an equivalent plant flow of 1.8 MGD.
- Two aerobic digesters (new system would have the same capacity of the existing one) would be capable of handling a plant flow of about 2.4 MGD.
- **Based on the evaluation of the options for sludge disposal, the recommended alternative is a combination of surface disposal and landfill disposal.** This combination offers the highest degree of operational flexibility to the WWTP, allows for continued use of existing facilities and infrastructure, and also provides more options for phasing and implementation of other projects.
- To implement the combination of sludge disposal methods, sludge must be dewatered prior to disposal at the landfill.
- The recommended technology for sludge thickening, prior to aerobic digestion, is a GBT. For ultimate plant capacity, two GBTs would be needed. The recommended technology for sludge dewatering is a BFP.

- **Administration and Laboratory Building:**
 - The Administration and Laboratory Building will include the following areas and uses: laboratory (with space for wastewater analyses, storage room, and dedicated office space), mechanical area (with water heater and water softener), office space for administrative personnel, training room, break room, and laundry and shower facilities for Operations Staff.
 - Design and construction of the new facilities should start as soon as funding becomes available.
 - Phasing of this project would be difficult because of the immediate need to expand the existing 30-year-old Administration/Laboratory Building.

- **Projects Cost:**
 - **The total cost to implement all the projects necessary to obtain a 3.6 MGD capacity is \$35,546,600 in today’s dollars. However, these improvements can be implemented as several projects, as shown in Table 8-1.**

TABLE 8-1
SUMMARY OF PROJECT COSTS AND PRESENT WORTH

Project	Total Project Cost	Present Worth
Expansion of Existing MBR Plant (MBR-1)	\$2,243,600	\$4,579,400
Sludge, Option C – Combined Surface and Landfill Disposal	\$11,639,000	\$17,798,300
New Effluent Discharge Line	\$528,500	\$602,900
New Administration and Laboratory Bldg.	\$1,980,600	\$2,278,100
New MBR Plant (MBR-2) and Improvements of Existing Entrance Works	\$16,911,000	\$21,582,500

8.2 Recommendations

- The Environmental Information Document (EID) for the proposed projects that will occur in the near future has already been prepared.
- **The Engineer highly recommends that the Village actively pursue funding for the improvements to the wastewater treatment and sludge management system in the near future.** Potential funding sources include:
 1. Clean Water State Revolving Fund (CWSRF)
 2. State Appropriations
 3. Federal Appropriations
 4. Environmental Protection Agency (EPA)
 5. United States Department of Agriculture Rural Utilities Service (USDA RUS)
- **The two highest priorities are:**
 1. Capacity expansion of the existing MBR plant (MBR-1) by adding the upper cassettes.
 2. Improvement of existing aerobic digesters and a new sludge handling building equipped with a belt filter press for implementation of a combined sludge disposal method by surface land application and disposal at the landfill as well.
- **The other three projects recommended for implementation in the near future are:**
 1. Replacement of the effluent discharge line.
 2. New Administration and Laboratory Building.
 3. New aerobic digestion system with 65 acres of additional land for sludge disposal.

Appendix A

NPDES Permit No. NM0020303



Region 6
1445 Ross Avenue
Dallas, Texas 75202-2733

NPDES Permit No. **NM0020303**

AUTHORIZATION TO DISCHARGE UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Clean Water Act, as amended, (33 U.S.C. 1251 et. seq; the "Act"),

Village of Los Lunas
660 Main Street, NW
P.O. Box 1209
Los Lunas, NM 87031

is authorized to discharge from the Los Lunas Wastewater Treatment Plant located at 1960 Heaton Loop S.E., Los Lunas, Valencia County, New Mexico,

to the receiving water named Rio Grande in Segment 20.6.4.105 of the Rio Grande Basin, from a point located approximately

Outfall 001: Latitude 34° 46' 48" North, Longitude 106° 43' 50" West

in accordance with effluent limitations, monitoring requirements and other conditions set forth in Parts I, II, III, and IV hereof.

This permit shall become effective on July 1, 2007

This permit and the authorization to discharge shall expire at midnight, June 30, 2012

Issued on May 31, 2007

Prepared by

Miguel I. Flores

Director
Water Quality Protection Division (6WQ)

Isaac Chen
Environmental Engineer
Permits Section (6WQ-PP)

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PART I

SECTION A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS.

1. Final Effluent limits - 0.9 MGD design flow

During the period beginning on the effective date of this permit and lasting through the expiration date of this permit, the permittee is authorized to discharge from outfall serial number 001. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristics	Discharge Limitations				Monitoring Requirements	
	Mass (lbs/day, unless otherwise specified)		Concentration (mg/l, unless otherwise specified)		Frequency	Sample Type
	30-Day Avg.	7-Day Avg.	30-Day Avg.	7-Day Avg.		
Flow ⁽¹⁾ STORET: 50050	N/A	N/A	N/A	N/A	Daily	Instantaneous
Biochemical Oxygen Demand (BOD ₅) STORET: 00310	225	338	30	45	2/Month	24-hr composite
Total Suspended Solids (TSS) STORET: 00530	225	338	30	45	2/Month	24-hr composite
E. coli ⁽²⁾ STORET: 51040	N/A	N/A	Report ⁽²⁾	Report ⁽²⁾ (Daily Max)	2/Month	Grab
E. coli ⁽³⁾ STORET: 51040	N/A	N/A	126 ⁽³⁾	410 ⁽³⁾ (Daily Max)	2/Month	Grab
pH STORET: 00400	N/A	N/A	6.6 s.u. Minimum	9.0 s.u. Maximum	2/Month	Grab

EFFLUENT CHARACTERISTICS	DISCHARGE MONITORING		MONITORING REQUIREMENTS	
WHOLE EFFLUENT TOXICITY (PCS 22414) (48-Hr NOEC) ⁽⁴⁾	30-DAY AVG	48-HR MINIMUM	MEASUREMENT FREQUENCY	SAMPLE TYPE
	14%	14%		
Daphnia pulex	Report	Report	Once/6 Months	24-hr composite
Pimephales promelas	Report	Report	Once/6 Months	24-hr composite

The facility uses UV light for disinfection. However, when chlorine is used in any process throughout the plant, the effluent limitation for total residual chlorine (TRC) is 19 ug/l. The effluent limitation for TRC is the instantaneous maximum and can not be averaged for reporting purposes. Sample which represents the usage of chlorine shall be taken daily when chlorine or any chemical containing chlorine is used. See Part II.D. for Minimum Quantification Level (MQL).

FOOTNOTES:

- 1 Report monthly average and daily maximum as million gallons per day (MGD) by instantaneous measurement.
- 2 Colonies/100 ml. Beginning from the date of effective of the permit and lasting through the date of one months from the effective of the permit, E. coli shall be monitored and reported.

3. Beginning from the date of 31 day from the effective of the permit and lasting through the expiration of the permit, limitations of E. coli shall be met.
4. See Part II.E., Whole Effluent Toxicity Limits for additional WET monitoring and reporting conditions.

There shall be no discharge of oils, scum, grease and other floating materials that would cause the formation of a visible sheen or visible deposits on the bottom or shoreline, or would damage or impair the normal growth, function or reproduction of human, animal, plant or aquatic life.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the discharge from the final treatment unit prior to the discharge into the receiving stream from the following approximate location:

Outfall 001: Latitude: 34° 46' 48" North, Longitude: 106° 43' 50" West

SECTION B. SCHEDULE OF COMPLIANCE

The permittee shall achieve compliance with the E. coli effluent limitations specified for discharges in accordance with the following schedule:

<u>ACTIVITY</u>	<u>DATE OF COMPLETION</u>
Achieve Final Effluent Limitations	1-months after permit effective date

SECTION C. MONITORING AND REPORTING.**1. Monitoring and Reporting**

- a. The permittee shall effectively monitor the operation and efficiency of all treatment and control facilities and the quantity and quality of the treated discharge.
- b. Monitoring information shall be on Discharge Monitoring Report Form(s) EPA 3320-1 as specified in Part III.D.4 of this permit and shall be submitted quarterly. Each quarterly submittal shall include separate forms for each month of the reporting period.
- c. Reporting periods shall end on the last day of the months March, June, September, and December.
- d. The permittee is required to submit regular quarterly reports as described above postmarked no later than the 28th day of the month following each reporting period.
- e. NO DISCHARGE REPORTING

If there is no discharge at Outfall 001 during the sampling month, place an "X" in the NO DISCHARGE box located in the upper right corner of the Discharge Monitoring Report.

2. If any 7-day average or 30-day average value exceeds the effluent limitations specified in Part I.A, the permittee shall report the excursion in accordance with the requirements of Part III.D.
3. Any 7-day average or 30-day average value reported in the required Discharge Monitoring Report which is in excess of the effluent limitation specified in Part I.A shall constitute evidence of violation of such effluent limitation and of this permit.
4. Other measurements of oxygen demand (e.g., TOC and COD) may be substituted for the five-day Biochemical Oxygen Demand (BOD₅), or for the five-day Carbonaceous Biochemical Oxygen Demand (CBOD₅), as applicable, where the permittee can demonstrate long-term correlation of the method with BOD₅ or CBOD₅ values, as

applicable. Details of the correlation procedures used must be submitted and prior approval granted by the permitting authority for this procedure to be acceptable. Data reported must also include evidence to show that the proper correlation continues to exist after approval.

5. Overflow Reporting:

The permittee shall report all overflows with the Discharge Monitoring Report submittal. These reports shall be summarized and reported in a tabular format. The summaries shall include: the date, time, duration, location, estimated volume, and cause of the overflow; observed environmental impacts from the overflow; action taken to address the overflow; and ultimate discharge location if not contained (e.g., storm sewer system, ditch, tributary).

Overflows which endanger health or the environment shall be orally reported to EPA at (214) 665-6595, and to the NMED Surface Water Quality Bureau at (505) 827-0187 within 24 hours from the time the permittee becomes aware of the circumstance. A written report of overflows which endanger health or the environment shall be provided within five (5) days of the time the permittee becomes aware of the circumstance. The written reports shall be sent to both EPA, and the NMED Surface Water Quality Bureau.

6. Copy of Reports and Application to NMED

The permittee shall send a copy of discharge monitoring reports (DMRs), all other reports required in the permit, as well as a copy of application for permit renewal to New Mexico Environment Department at the mailing address listed in Part III of the permit.

PART II - OTHER CONDITIONS

A. PERMIT REOPENER CLAUSE

1. In accordance with 40 CFR 122.62, the permit may be reopened and modified during the life of the permit if relevant portions of State of New Mexico Water Quality Standards and/or State Water Quality Management Plans are revised, new water quality standards are established and/or remanded and any other policy, or if procedures and implementation guidelines are adopted by the State that change applicable water quality standards and permit implementation.
2. In accordance with 40 CFR Part 122.62, the permit may be reopened and modified if new information is received that was not available at the time of permit issuance that would have justified the application of different permit conditions at the time of permit issuance.
3. If a TMDL is established for the Rio Grande, the permit may be reopened, and new limitations based on the TMDL may be incorporated into the permit.

B. CONTRIBUTING INDUSTRIES

1. The following pollutants may not be introduced into the treatment facility:
 - a. Pollutants which create a fire or explosion hazard in the publicly owned treatment works (POTW), including, but not limited to, wastestreams with a closed cup flashpoint of less than 140 degrees Fahrenheit or 60 degrees Centigrade using the test methods specified in 40 CFR 261.21;
 - b. Pollutants which will cause corrosive structural damage to the POTW, but in no case discharges with pH lower than 5.0, unless the works are specifically designed to accommodate such discharges;
 - c. Solid or viscous pollutants in amounts which will cause obstruction to the flow in the POTW, resulting in Interference;
 - d. Any pollutant, including oxygen demanding pollutants (e.g., BOD), released in a discharge at a flow rate and/or pollutant concentration which will cause Interference with the POTW;
 - e. Heat in amounts which will inhibit biological activity in the POTW resulting in Interference but in no case heat in such quantities that the temperature at the POTW treatment plant exceeds 40 degrees Centigrade (104 degrees Fahrenheit) unless the Approval Authority, upon request of the POTW, approves alternate temperature limits;
 - f. Petroleum oil, non-biodegradable cutting oil, or products of mineral oil origin in amounts that will cause interference or pass through;
 - g. Pollutants which result in the presence of toxic gases, vapors, or fumes within the POTW in a quantity that may cause acute worker health and safety problems; and
 - h. Any trucked or hauled pollutants, except at discharge points designated by the POTW.

2. The permittee shall require any indirect discharger to the treatment works to comply with the reporting requirements of Sections 204(b), 307, and 308 of the Act, including any requirements established under 40 CFR Part 403.
3. The permittee shall provide adequate notice of the following:
 - a. Any new introduction of pollutants into the treatment works from an indirect discharger which would be subject to Sections 301 and 306 of the Act if it were directly discharging those pollutants; and
 - b. Any substantial change in the volume or character of pollutants being introduced into the treatment works by a source introducing pollutants into the treatment works at the time of issuance of the permit.

Any notice shall include information on (i) the quality and quantity of effluent to be introduced into the treatment works, and (ii) any anticipated impact of the change on the quality or quantity of effluent to be discharged from the POTW.

C. POLLUTION PREVENTION REQUIREMENTS

The permittee shall continue a program directed towards optimizing the efficiency and extending the useful life of the facility. The permittee shall consider the following items in the program:

- a. The influent loadings, flow and design capacity;
- b. The effluent quality and plant performance;
- c. The age and expected life of the wastewater treatment facility's equipment;
- d. Bypasses and overflows of the tributary sewerage system and treatment works;
- e. New developments at the facility;
- f. Operator certification and training plans and status;
- g. The financial status of the facility;
- h. Preventative maintenance programs and equipment conditions and;
- i. An overall evaluation of conditions at the facility.

D. MINIMUM QUANTIFICATION LEVEL (MQL)

If any individual analytical test result is less than the minimum quantification level listed below, a value of zero (0) may be used for that individual result for the Discharge Monitoring Report (DMR) calculations and reporting requirements.

<u>Pollutant</u>	<u>MQL (ug/l)</u>
Total Residual Chlorine	100

E. WHOLE EFFLUENT TOXICITY LIMIT (48-HOUR ACUTE NOEC

FRESHWATER)

It is unlawful and a violation of this permit for a permittee or his designated agent, to manipulate test samples in any manner, to delay sample shipment, or to terminate or to cause to terminate a toxicity test. Once initiated, all toxicity tests must be completed unless specific authority has been granted by EPA Region 6 or the State NPDES permitting authority.

1. SCOPE AND METHODOLOGY

- a. The permittee shall test the effluent for toxicity in accordance with the provisions in this section.

APPLICABLE TO FINAL OUTFALL(S): 001

REPORTED ON DMR AS FINAL OUTFALL: {PRIMARY OUTFALL}

CRITICAL DILUTION (%): 14%

EFFLUENT DILUTION SERIES (%): 6%, 8%, 11%, 14%, 19%

COMPOSITE SAMPLE TYPE: Defined at PART I

TEST SPECIES/METHODS: 40 CFR Part 136

Daphnia pulex acute static renewal 48-hour definitive toxicity test using EPA/600/4-90/027F, or the latest update thereof. A minimum of five (5) replicates with eight (8) organisms per replicate must be used in the control and in each effluent dilution of this test.

Pimephales promelas (Fathead minnow) acute static renewal 48-hour definitive toxicity test using EPA/600/4-90/027F, or the latest update thereof. A minimum of five (5) replicates with eight (8) organisms per replicate must be used in the control and in each effluent dilution of this test.

- b. The NOEC (No Observed Lethal Effect Concentration) is defined as the greatest effluent dilution at and below which lethality that is statistically different from the control (0% effluent) at the 95% confidence level does not occur. Acute test failure is defined as a demonstration of a statistically significant lethal effect at test completion to a test species at or below the critical dilution.

- c. The conditions of this item are effective beginning with the effective date of the WET limit. When the testing frequency stated above is less than monthly and the effluent fails the survival endpoint at or below the critical dilution, the permittee shall be considered in violation of this permit limit and the frequency for the affected species will increase to monthly until such time compliance with the Lethal No Observed Effect Concentration (NOEC) effluent limitation is demonstrated for a period of three consecutive months, at which time the permittee may return to the testing frequency stated in PART I of this permit. During the period the permittee is out of compliance, test results shall be reported on the DMR for that reporting period.
- d. This permit may be reopened to require chemical specific effluent limits, additional testing, and/or other appropriate actions to address toxicity.
- e. Test failure is defined as a demonstration of statistically significant lethal effects to a test species at or below the effluent critical dilution.

2. REQUIRED TOXICITY TESTING CONDITIONS

a. Test Acceptance

The permittee shall repeat a test, including the control and all effluent dilutions, if the procedures and quality assurance requirements defined in the test methods or in this permit are not satisfied, including the following additional criteria:

- i. Each toxicity test control (0% effluent) must have a survival equal to or greater than 90%.
- ii. The percent coefficient of variation between replicates shall be 40% or less in the control (0% effluent) for the Daphnia pulex survival test and fathead minnow survival test.
- iii. The percent coefficient of variation between replicates shall be 40% or less in the critical dilution unless significant lethal effects are exhibited for the Daphnia pulex survival test the and/or the fathead minnow survival test.

Test failure may not be construed or reported as invalid due to a coefficient of variation value of greater than 40%. A repeat test shall be conducted within the required reporting period of any test determined to be invalid.

b. Statistical Interpretation

For the Daphnia pulex survival test and the Fathead minnow survival test, the statistical analyses used to determine if there is a statistically significant difference between the control and the critical dilution shall be in accordance with the methods for determining the No Observed Effect Concentration (NOEC) as described in EPA/600/4-90/027F or the most recent update thereof.

If the conditions of Test Acceptability are met in Item 2.a above and the percent survival of the test organism is equal to or greater than 90% in the critical dilution concentration and all lower dilution concentrations, the test shall be considered to be a passing test, and the permittee shall report an NOEC of not less than the critical dilution for the DMR reporting requirements found in Item 3 below.

c. Dilution Water

i. Dilution water used in the toxicity tests will be receiving water collected as close to the point of discharge as possible but unaffected by the discharge. The permittee shall substitute synthetic dilution water of similar pH, hardness, and alkalinity to the closest downstream perennial water where the receiving stream is classified as intermittent or where the receiving stream has no flow due to zero flow conditions.

ii. If the receiving water is unsatisfactory as a result of instream toxicity (fails to fulfill the test acceptance criteria of Item 2.a), the permittee may substitute synthetic dilution water for the receiving water in all subsequent tests provided the unacceptable receiving water test met the following stipulations:

(A) a synthetic dilution water control which fulfills the test acceptance requirements of Item 2.a was run concurrently with the receiving water control;

(B) the test indicating receiving water toxicity has been carried out to completion (i.e., 48 hours);

(C) the permittee includes all test results indicating receiving water toxicity with the full report and information required by Item 3.a below; and

(D) the synthetic dilution water shall have a pH, hardness, and alkalinity similar to that of the receiving water or closest downstream perennial water not adversely affected by the discharge, provided the magnitude of these parameters will not cause toxicity in the synthetic dilution water.

d. Samples and Composites

i. The permittee shall collect two flow-weighted composite samples from the outfall(s) listed at Item 1.a above.

ii. The permittee shall collect a second composite sample for use during the 24-hour renewal of each dilution concentration for both tests. The permittee must collect the composite samples so that the maximum holding time for any effluent sample shall not exceed 36 hours. The permittee must have initiated the toxicity test within 36 hours after the collection of the last portion of the first composite sample. Samples shall be chilled to 4 degrees Centigrade during collection, shipping, and/or storage.

- iii. The permittee must collect the composite samples such that the effluent samples are representative of any periodic episode of chlorination, biocide usage or other potentially toxic substance discharged on an intermittent basis.
- iv. If the flow from the outfall(s) being tested ceases during the collection of effluent samples, the requirements for the minimum number of effluent samples, the minimum number of effluent portions and the sample holding time are waived during that sampling period. However, the permittee must collect an effluent composite sample volume during the period of discharge that is sufficient to complete the required toxicity tests with daily renewal of effluent. When possible, the effluent samples used for the toxicity tests shall be collected on separate days. The effluent composite sample collection duration and the static renewal protocol associated with the abbreviated sample collection must be documented in the full report required in Item 3 of this section.
- v. MULTIPLE OUTFALLS: If the provisions of this section are applicable to multiple outfalls, the permittee shall combine the composite effluent samples in proportion to the average flow from the outfalls listed in Item 1.a above for the day the sample was collected. The permittee shall perform the toxicity test on the flow-weighted composite of the outfall samples.

3. REPORTING

- a. The permittee shall prepare a full report of the results of all tests conducted pursuant to this Part in accordance with the Report Preparation Section of EPA/600/4-90/027F, for every valid or invalid toxicity test initiated, whether carried to completion or not. The permittee shall retain each full report pursuant to the provisions of PART III.C.3 of this permit. The permittee shall submit full reports upon the specific request of the Agency. For any test which fails, is considered invalid or which is terminated early for any reason, the full report must be submitted for agency review.
- b. The permittee shall report the Whole Effluent Lethality values for the 30-Day Average Minimum and the 48-Hr. Minimum under Parameter No. 22414 on the DMR for that reporting period in accordance with PART III.D.4 of this permit.

If more than one valid test for a species was performed during the reporting period, the test NOECs will be averaged arithmetically and reported as the DAILY AVERAGE MINIMUM NOEC for that reporting period.

If more than one species is tested during the reporting period, the permittee shall report the lowest 30-Day Average Minimum NOEC and the lowest 48-Hr. Minimum NOEC for Whole Effluent Lethality.

A valid test for each species must be reported on the DMR during each reporting period specified in PART I of this permit. Only ONE set of biomonitoring data for each species is to be recorded on the DMR for each reporting period. The data submitted should reflect the LOWEST Survival results for each species during the reporting period. All invalid tests, repeat tests (for invalid tests), and retests (for tests previously failed) performed during the reporting period must be attached to the DMR for EPA review.

c. The permittee shall submit the results of the valid toxicity test on the DMR for that reporting period in accordance with PART III.D.4 of this permit, as follows below. Submit retest information clearly marked as such with the following month's DMR. Only results of valid tests are to be reported on the DMR.

i. Pimephales promelas (Fathead minnow)

(A) If the No Observed Effect Concentration (NOEC) for survival is less than the critical dilution, enter a "1"; otherwise, enter a "0" for Parameter No. TEM6C.

(B) Report the NOEC value for survival, Parameter No. TOM6C.

1. Report the highest (critical dilution or control) Coefficient of Variation, Parameter No. TQM6C.

ii. Daphnia pulex

(A) If the NOEC for survival is less than the critical dilution, enter a "1"; otherwise, enter a "0" for Parameter No. TEM3D.

(B) Report the NOEC value for survival, Parameter No. TOM3D.

(C) Report the highest (critical dilution or control) Coefficient of Variation, Parameter No. TQM3D.

PART III - STANDARD CONDITIONS FOR NPDES PERMITSA. GENERAL CONDITIONS1. INTRODUCTION

In accordance with the provisions of 40 CFR Part 122.41, et. seq., this permit incorporates by reference ALL conditions and requirements applicable to NPDES Permits set forth in the Clean Water Act, as amended, (hereinafter known as the "Act") as well as ALL applicable regulations.

2. DUTY TO COMPLY

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application.

3. TOXIC POLLUTANTS

a. Notwithstanding Part III.A.5, if any toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is promulgated under Section 307(a) of the Act for a toxic pollutant which is present in the discharge and that standard or prohibition is more stringent than any limitation on the pollutant in this permit, this permit shall be modified or revoked and reissued to conform to the toxic effluent standard or prohibition.

b. The permittee shall comply with effluent standards or prohibitions established under Section 307(a) of the Act for toxic pollutants within the time provided in the regulations that established those standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement.

4. DUTY TO REAPPLY

If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit. The application shall be submitted at least 180 days before the expiration date of this permit. The Director may grant permission to submit an application less than 180 days in advance but no later than the permit expiration date. Continuation of expiring permits shall be governed by regulations promulgated at 40 CFR Part 122.6 and any subsequent amendments.

5. PERMIT FLEXIBILITY

This permit may be modified, revoked and reissued, or terminated for cause in accordance with 40 CFR 122.62-64. The filing of a request for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

6. PROPERTY RIGHTS

This permit does not convey any property rights of any sort, or any exclusive privilege.

7. DUTY TO PROVIDE INFORMATION

The permittee shall furnish to the Director, within a reasonable time, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Director, upon request, copies of records required to be kept by this permit.

8. CRIMINAL AND CIVIL LIABILITY

Except as provided in permit conditions on "Bypassing" and "Upsets", nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance. Any false or materially misleading representation or concealment of information required to be reported by the provisions of the permit, the Act, or applicable regulations, which avoids or effectively defeats the regulatory purpose of the Permit may subject the Permittee to criminal enforcement pursuant to 18 U.S.C. Section 1001.

9. OIL AND HAZARDOUS SUBSTANCE LIABILITY

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under Section 311 of the Act.

10. STATE LAWS

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or regulation under authority preserved by Section 510 of the Act.

11. SEVERABILITY

The provisions of this permit are severable, and if any provision of this permit or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

B. PROPER OPERATION AND MAINTENANCE

1. NEED TO HALT OR REDUCE NOT A DEFENSE

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit. The permittee is responsible for maintaining adequate safeguards to prevent the discharge of untreated or inadequately treated wastes during electrical power failure either by means of alternate power sources, standby generators or retention of inadequately treated effluent.

2. DUTY TO MITIGATE

The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

3. PROPER OPERATION AND MAINTENANCE

- a. The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by permittee as efficiently as possible and in a manner which will minimize upsets and discharges of excessive pollutants and will achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of this permit.
- b. The permittee shall provide an adequate operating staff which is duly qualified to carry out operation, maintenance and testing functions required to insure compliance with the conditions of this permit.

4. BYPASS OF TREATMENT FACILITIES

a. BYPASS NOT EXCEEDING LIMITATIONS

The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of Parts III.B.4.b. and 4.c.

b. NOTICE

(1) ANTICIPATED BYPASS

If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least ten days before the date of the bypass.

(2) UNANTICIPATED BYPASS

The permittee shall, within 24 hours, submit notice of an unanticipated bypass as required in Part III.D.7.

c. PROHIBITION OF BYPASS

(1) Bypass is prohibited, and the Director may take enforcement action against a permittee for bypass, unless:

(a) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

(b) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to

prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and,

(c) The permittee submitted notices as required by Part III.B.4.b.

(2) The Director may allow an anticipated bypass after considering its adverse effects, if the Director determines that it will meet the three conditions listed at Part III.B.4.c(1).

5. UPSET CONDITIONS

a. EFFECT OF AN UPSET

An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of Part III.B.5.b. are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

b. CONDITIONS NECESSARY FOR A DEMONSTRATION OF UPSET

A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

(1) An upset occurred and that the permittee can identify the cause(s) of the upset;

(2) The permitted facility was at the time being properly operated;

(3) The permittee submitted notice of the upset as required by Part III.D.7; and,

(4) The permittee complied with any remedial measures required by Part III.B.2.

c. BURDEN OF PROOF

In any enforcement proceeding, the permittee seeking to establish the occurrence of an upset has the burden of proof.

6. REMOVED SUBSTANCES

Unless otherwise authorized, solids, sewage sludges, filter backwash, or other pollutants removed in the course of treatment or wastewater control shall be disposed of in a manner such as to prevent any pollutant from such materials from entering navigable waters.

7. PERCENT REMOVAL (PUBLICLY OWNED TREATMENT WORKS)

For publicly owned treatment works, the 30-day average (or Monthly Average) percent removal for Biochemical Oxygen Demand and Total Suspended Solids shall not be less than 85 percent unless otherwise authorized by the permitting authority in accordance with 40 CFR 133.103.

C. MONITORING AND RECORDS

1. INSPECTION AND ENTRY

The permittee shall allow the Director, or an authorized representative, upon the presentation of credentials and other documents as may be required by the law to:

a. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices or operations regulated or required under this permit; and

d. Sample or monitor at reasonable times, for the purpose of assuring permit compliance or as otherwise authorized by the Act, any substances or parameters at any location.

2. REPRESENTATIVE SAMPLING

Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

3. RETENTION OF RECORDS

The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of the sample, measurement, report, or application. This period may be extended by request of the Director at any time.

4. RECORD CONTENTS

Records of monitoring information shall include:

- a. The date, exact place, and time of sampling or measurements;
- b. The individual(s) who performed the sampling or measurements;
- c. The date(s) and time(s) analyses were performed;
- d. The individual(s) who performed the analyses;
- e. The analytical techniques or methods used; and
- f. The results of such analyses.

5. MONITORING PROCEDURES

- a. Monitoring must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in this permit or approved by the Regional Administrator.
- b. The permittee shall calibrate and perform maintenance procedures on all monitoring and analytical instruments at intervals frequent enough to insure accuracy of measurements and shall maintain appropriate records of such activities.
- c. An adequate analytical quality control program, including the analyses of sufficient standards, spikes, and duplicate samples to insure the accuracy of all required analytical results shall be maintained by the permittee or designated commercial laboratory.

6. FLOW MEASUREMENTS

Appropriate flow measurement devices and methods consistent with accepted scientific practices shall be selected and used to ensure the accuracy and reliability of measurements of the volume of monitored discharges. The devices shall be installed, calibrated, and maintained to insure that the accuracy of the measurements is consistent with the accepted capability of that type of device. Devices selected shall be capable of measuring flows with a maximum deviation of less than 10% from true discharge rates throughout the range of expected discharge volumes.

D. REPORTING REQUIREMENTS

1. PLANNED CHANGES

a. INDUSTRIAL PERMITS

The permittee shall give notice to the Director as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when:

- (1) The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR Part 122.29(b); or,
- (2) The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements listed at Part III.D.10.a.

b. MUNICIPAL PERMITS

Any change in the facility discharge (including the introduction of any new source or significant discharge or significant changes in the quantity or quality of existing discharges of pollutants) must be reported to the permitting authority. In no case are any new connections, increased flows, or significant changes in influent quality permitted that will cause violation of the effluent limitations specified herein.

2. ANTICIPATED NONCOMPLIANCE

The permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity which

may result in noncompliance with permit requirements.

3. TRANSFERS

This permit is not transferable to any person except after notice to the Director. The Director may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the Act.

4. DISCHARGE MONITORING REPORTS AND OTHER REPORTS

Monitoring results must be reported on Discharge Monitoring Report (DMR) Form EPA No. 3320-1 in accordance with the "General Instructions" provided on the form. The permittee shall submit the original DMR signed and certified as required by Part III.D.11 and all other reports required by Part III.D. to the EPA at the address below. DMR's and all other reports shall be submitted to EPA at the following address:

EPA:

Compliance Assurance and Enforcement Division
Water Enforcement Branch (6EN-W)
U.S. Environmental Protection Agency, Region 6
1445 Ross Avenue
Dallas, TX 75202-2733

New Mexico:

Program Manager
Surface Water Quality Bureau
New Mexico Environment Department
P.O. Box 26110
1190 Saint Francis Drive
Santa Fe, NM 87502

A copy of Whole Effluent Toxicity Testing results shall also be sent to

U.S. Fish and Wildlife Service
New Mexico Ecological Services
2105 Osuna NE
Albuquerque, NM 87113
Attn: Field Supervisor

5. ADDITIONAL MONITORING BY THE PERMITTEE

If the permittee monitors any pollutant more frequently than required by this permit, using test procedures approved under 40 CFR Part 136 or as specified in this permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the Discharge Monitoring Report (DMR). Such increased monitoring frequency shall also be indicated on the DMR.

6. AVERAGING OF MEASUREMENTS

Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified by the Director in the permit.

7. TWENTY-FOUR HOUR REPORTING

a. The permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances. A written submission shall be provided within 5 days of the time the permittee becomes aware of the circumstances. The report shall contain the following information:

- (1) A description of the noncompliance and its cause;
- (2) The period of noncompliance including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and,
- (3) Steps being taken to reduce, eliminate, and prevent recurrence of the noncomplying discharge.

b. The following shall be included as information which must be reported within 24 hours:

- (1) Any unanticipated bypass which exceeds any effluent limitation in the permit;
- (2) Any upset which exceeds any effluent limitation in the permit; and,
- (3) Violation of a maximum daily discharge limitation for any of the pollutants listed by the Director in Part II (industrial permits only) of the permit to be reported within 24 hours.

c. The Director may waive the written report on a case-by-case basis if the oral report has been received within 24 hours.

8. OTHER NONCOMPLIANCE

The permittee shall report all instances of noncompliance not reported under Parts III.D.4 and D.7 and Part I.B (for industrial permits only) at the time monitoring reports are submitted. The reports shall contain the information listed at Part III.D.7.

9. OTHER INFORMATION

Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Director, it shall promptly submit such facts or information.

10. CHANGES IN DISCHARGES OF TOXIC SUBSTANCES

All existing manufacturing, commercial, mining, and silvacultural permittees shall notify the Director as soon as it knows or has reason to believe:

a. That any activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic pollutant listed at 40 CFR Part 122, Appendix D, Tables II and III (excluding Total Phenols) which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

- (1) One hundred micrograms per liter (100 µg/L);
- (2) Two hundred micrograms per liter (200 µg/L) for acrolein and acrylonitrile; five hundred micrograms per liter (500 µg/L) for 2,4-dinitro-phenol and for 2-methyl-4,6-dinitrophenol; and one milligram per liter (1 mg/L) for antimony;
- (3) Five (5) times the maximum concentration value reported for that pollutant in the permit application; or
- (4) The level established by the Director.

b. That any activity has occurred or will occur which would result in any discharge, on a nonroutine or infrequent basis, of a toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

- (1) Five hundred micrograms per liter (500 µg/L);
- (2) One milligram per liter (1 mg/L) for antimony;
- (3) Ten (10) times the maximum concentration value reported for that pollutant in the permit application; or
- (4) The level established by the Director.

11. SIGNATORY REQUIREMENTS

All applications, reports, or information submitted to the Director shall be signed and certified.

a. ALL PERMIT APPLICATIONS shall be signed as follows:

(1) FOR A CORPORATION - by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means:

- (a) A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision making functions for the corporation; or,
- (b) The manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete

and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

(2) FOR A PARTNERSHIP OR SOLE PROPRIETORSHIP - by a general partner or the proprietor, respectively.

(3) FOR A MUNICIPALITY, STATE, FEDERAL, OR OTHER PUBLIC AGENCY - by either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a Federal agency includes:

(a) The chief executive officer of the agency, or

(b) A senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency.

b. ALL REPORTS required by the permit and other information requested by the Director shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

(1) The authorization is made in writing by a person described above;

(2) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, or position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. A duly authorized representative may thus be either a named individual or an individual occupying a named position; and,

(3) The written authorization is submitted to the Director.

c. CERTIFICATION

Any person signing a document under this section shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

12. AVAILABILITY OF REPORTS

Except for applications, effluent data, permits, and other data specified in 40 CFR 122.7, any information submitted pursuant to this permit may be claimed as confidential by the submitter. If no claim is made at the time of submission, information may be made available to the public without further notice.

E. PENALTIES FOR VIOLATIONS OF PERMIT CONDITIONS

1. CRIMINAL

a. NEGLIGENT VIOLATIONS

The Act provides that any person who negligently violates permit conditions implementing Section 301, 302, 306, 307, 308, 318, or 405 of the Act is subject to a fine of not less than \$2,500 nor more than \$25,000 per day of violation, or by imprisonment for not more than 1 year, or both.

b. KNOWING VIOLATIONS

The Act provides that any person who knowingly violates permit conditions implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Act is subject to a fine of not less than \$5,000 nor more than \$50,000 per day of violation, or by imprisonment for not more than 3 years, or both.

c. KNOWING ENDANGERMENT

The Act provides that any person who knowingly violates permit conditions implementing Sections 301, 302, 303, 306, 307, 308, 318, or 405 of the Act and who knows at that time that he is placing another person in imminent danger of death or serious bodily injury is subject to a fine of not more than \$250,000, or by imprisonment for not more than 15 years, or both.

d. FALSE STATEMENTS

The Act provides that any person who knowingly makes any false material statement, representation, or certification in any application, record, report, plan, or other document filed or required to be maintained under the Act or who knowingly falsifies, tampers with, or renders inaccurate, any monitoring device or method required to be maintained under the Act, shall upon conviction, be punished by a fine of not more than \$10,000, or by imprisonment for not more than 2 years, or by both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment shall be by a fine of not more than \$20,000 per day of violation, or by imprisonment of not more than 4 years, or by both. (See Section 309.c.4 of the Clean Water Act)

2. CIVIL PENALTIES

The Act provides that any person who violates a permit condition implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Act is subject to a civil penalty not to exceed \$27,500 per day for each violation.

3. ADMINISTRATIVE PENALTIES

The Act provides that any person who violates a permit condition implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Act is subject to an administrative penalty, as follows:

a. CLASS I PENALTY

Not to exceed \$11,000 per violation nor shall the maximum amount exceed \$27,500.

b. CLASS II PENALTY

Not to exceed \$11,000 per day for each day during which the violation continues nor shall the maximum amount exceed \$137,500.

F. DEFINITIONS

All definitions contained in Section 502 of the Act shall apply to this permit and are incorporated herein by reference. Unless otherwise specified in this permit, additional definitions of words or phrases used in this permit are as follows:

1. ACT means the Clean Water Act (33 U.S.C. 1251 et. seq.), as amended.
2. ADMINISTRATOR means the Administrator of the U.S. Environmental Protection Agency.
3. APPLICABLE EFFLUENT STANDARDS AND LIMITATIONS means all state and Federal effluent standards and limitations to which a discharge is subject under the Act, including, but not limited to, effluent limitations, standards or performance, toxic effluent standards and prohibitions, and pretreatment standards.
4. APPLICABLE WATER QUALITY STANDARDS means all water quality standards to which a discharge is subject under the Act.
5. BYPASS means the intentional diversion of waste streams from any portion of a treatment facility.
6. DAILY DISCHARGE means the discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in terms of mass, the "daily discharge" is calculated as the total mass of the pollutant discharged over the sampling day. For pollutants with limitations expressed in other units of measurement, the "daily discharge" is calculated as the average measurement of the pollutant over the sampling day. "Daily discharge" determination of concentration made using a composite sample shall be the concentration of the composite sample. When grab samples are used, the "daily discharge" determination of concentration shall be arithmetic average (weighted by flow value) of all samples collected during that sampling day.
7. DAILY MAXIMUM discharge limitation means the highest allowable "daily discharge" during the calendar month.
8. DIRECTOR means the U.S. Environmental Protection Agency Regional Administrator or an authorized representative.
9. ENVIRONMENTAL PROTECTION AGENCY means the U.S. Environmental Protection Agency.

10. GRAB SAMPLE means an individual sample collected in less than 15 minutes.
11. INDUSTRIAL USER means a nondomestic discharger, as identified in 40 CFR 403, introducing pollutants to a publicly owned treatment works.
12. MONTHLY AVERAGE (also known as DAILY AVERAGE) discharge limitations means the highest allowable average of "daily discharge(s)" over a calendar month, calculated as the sum of all "daily discharge(s)" measured during a calendar month divided by the number of "daily discharge(s)" measured during that month. When the permit establishes daily average concentration effluent limitations or conditions, the daily average concentration means the arithmetic average (weighted by flow) of all "daily discharge(s)" of concentration determined during the calendar month where C = daily concentration, F = daily flow, and n = number of daily samples; daily average discharge =

$$C_1F_1 + C_2F_2 + \dots + C_nF_n$$

$$F_1 + F_2 + \dots + F_n$$

13. NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 318, 402, and 405 of the Act.
14. SEVERE PROPERTY DAMAGE means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.
15. SEWAGE SLUDGE means the solids, residues, and precipitates separated from or created in sewage by the unit processes of a publicly owned treatment works. Sewage as used in this definition means any wastes, including wastes from humans, households, commercial establishments, industries, and storm water runoff, that are discharged to or otherwise enter a publicly owned treatment works.
16. TREATMENT WORKS means any devices and systems used in the storage, treatment, recycling and reclamation of municipal sewage and industrial wastes of a liquid nature to implement Section 201 of the Act, or necessary to recycle or reuse water at the most economical cost over the estimated life of the works, including intercepting sewers, sewage collection systems, pumping, power and other equipment, and their appurtenances, extension, improvement, remodeling, additions, and alterations thereof.
17. UPSET means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.
18. FOR FECAL COLIFORM BACTERIA, a sample consists of one effluent grab portion collected during a 24-hour period at peak loads.
19. The term "MGD" shall mean million gallons per day.
20. The term "mg/L" shall mean milligrams per liter or parts per million (ppm).
21. The term "µg/L" shall mean micrograms per liter or parts per billion (ppb).
22. MUNICIPAL TERMS
- 7-DAY AVERAGE or WEEKLY AVERAGE, other than for fecal coliform bacteria, is the arithmetic mean of the daily values for all effluent samples collected during a calendar week, calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week. The 7-day average for fecal coliform bacteria is the geometric mean of the values for all effluent samples collected during a calendar week.
 - 30-DAY AVERAGE or MONTHLY AVERAGE, other than for fecal coliform bacteria, is the arithmetic mean of the

daily values for all effluent samples collected during a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month. The 30-day average for fecal coliform bacteria is the geometric mean of the values for all effluent samples collected during a calendar month.

- c. 24-HOUR COMPOSITE SAMPLE consists of a minimum of 12 effluent portions collected at equal time intervals over the 24-hour period and combined proportional to flow or a sample collected at frequent intervals proportional to flow over the 24-hour period.
- d. 12-HOUR COMPOSITE SAMPLE consists of 12 effluent portions collected no closer together than one hour and composited according to flow. The daily sampling intervals shall include the highest flow periods.
- e. 6-HOUR COMPOSITE SAMPLE consists of six effluent portions collected no closer together than one hour (with the first portion collected no earlier than 10:00 a.m.) and composited according to flow.
- f. 3-HOUR COMPOSITE SAMPLE consists of three effluent portions collected no closer together than one hour (with the first portion collected no earlier than 10:00 a.m.) and composited according to flow.

SEWAGE SLUDGE REQUIREMENTS

INSTRUCTIONS TO PERMITTEES

Select only those Elements and Sections which apply to your sludge reuse or disposal practice.

The sludge conditions do not apply to wastewater treatment lagoons where sludge is not wasted for final reuse/disposal. If the sludge is not removed, the permittee shall indicate on the DMR "No Discharge".

Although reporting is not required at this time, this permit may be modified or revoked and reissued to require an annual DMR.

ELEMENT 1 - LAND APPLICATION

- SECTION I: Page 2 - Requirements Applying to All Sewage Sludge Land Application
- SECTION II: Page 5 - Requirements Specific to Bulk Sewage Sludge for Application to the Land Meeting Class A or B Pathogen Reduction and the Cumulative Loading Rates in Table 2, or Class B Pathogen Reduction and the Pollutant Concentrations in Table 3
- SECTION III: Page 8 - Requirements Specific to Bulk Sewage Sludge Meeting Pollutant Concentrations in Table 3 and Class A Pathogen Reduction Requirements
- SECTION IV: Page 9 - Requirements Specific to Sludge Sold or Given Away in a Bag or Other Container for Application to the Land that does not Meet the Pollutant Concentrations in Table 3

ELEMENT 2 - SURFACE DISPOSAL

- SECTION I: Page 10 - Requirements Applying to All Sewage Sludge Surface Disposal
- SECTION II: Page 14 - Requirements Specific to Surface Disposal Sites Without a Liner and Leachate Collection System
- SECTION III: Page 15 - Requirements Specific to Surface Disposal Sites With a Liner and Leachate Collection System

ELEMENT 3 - MUNICIPAL SOLID WASTE LANDFILL DISPOSAL

- SECTION I: Page 16 - Requirements Applying to All Municipal Solid Waste Landfill Disposal Activities

ELEMENT 1 - LAND APPLICATIONSECTION I. REQUIREMENTS APPLYING TO ALL SEWAGE SLUDGE LAND APPLICATIONA. General Requirements

1. The permittee shall handle and dispose of sewage sludge in accordance with Section 405 of the Clean Water Act and all other applicable Federal regulations to protect public health and the environment from any reasonably anticipated adverse effects due to any toxic pollutants which may be present in the sludge.
2. If requirements for sludge management practices or pollutant criteria become more stringent than the sludge pollutant limits or acceptable management practices in this permit, or control a pollutant not listed in this permit, this permit may be modified or revoked and reissued to conform to the requirements promulgated at Section 405(d)(2) of the Clean Water Act. If new limits for Molybdenum are promulgated prior to permit expiration, then those limits shall become directly enforceable.
3. In all cases, if the person (permit holder) who prepares the sewage sludge supplies the sewage sludge to another person for land application use or to the owner or lease holder of the land, the permit holder shall provide necessary information to the parties who receive the sludge to assure compliance with these regulations.
4. The permittee shall give prior notice to EPA (Chief, Permits Branch, Water Management Division, Mail Code 6W-P, EPA Region 6, 1445 Ross Avenue, Dallas, Texas 75202) of any planned changes in the sewage sludge disposal practice, in accordance with 40 CFR Part 122.41(l)(1)(iii). These changes may justify the application of permit conditions that are different from or absent in the existing permit. Change in the sludge use or disposal practice may be cause for modification of the permit in accordance with 40 CFR Part 122.62(a)(1).

B. Testing Requirements

1. Sewage sludge shall not be applied to the land if the concentration of the pollutants exceed the pollutant concentration criteria in Table 1. The frequency of testing for pollutants in Table 1 is found in Element 1, Section I.C.

TABLE 1

<u>Pollutant</u>	<u>Ceiling Concentration</u> <u>(milligrams per kilogram)*</u>
Arsenic	75
Cadmium	85
Chromium	3000
Copper	4300
Lead	840
Mercury	57
Molybdenum	75
Nickel	420
PCBs	49
Selenium	100
Zinc	7500

* Dry weight basis

2. Pathogen Control

All sewage sludge that is applied to agricultural land, forest, a public contact site, or a reclamation site shall be treated by either the Class A or Class B pathogen requirements. Sewage sludge that is applied to a lawn or home garden shall be treated by the Class A pathogen requirements. Sewage sludge that is sold or given away in a bag shall be treated by Class A pathogen requirements.

- a. Six alternatives are available to demonstrate compliance with Class A sewage sludge. All 6 options require either the density of fecal coliform in the sewage sludge be less than 1000 Most Probable Number (MPN) per gram of total solids (dry weight basis), or the density of Salmonella sp. bacteria in the sewage sludge be less than three MPN per four grams of total solids (dry weight basis) at the time the sewage sludge is used or disposed; at the time the sewage sludge is prepared for sale or given away in a bag or other container for application to the land. Below are the additional requirements necessary to meet the definition of a Class A sludge. Alternatives 5 and 6 are not authorized to demonstrate compliance with Class A sewage sludge in Texas permits.

Alternative 1 - The temperature of the sewage sludge that is used or disposed shall be maintained at a specific value for a period of time. See 503.32(a)(3)(ii) for specific information.

Alternative 2 - The pH of the sewage sludge that is used or disposed shall be raised to above 12 and shall remain above 12 for 72 hours.

The temperature of the sewage sludge shall be above 52 degrees Celsius for 12 hours or longer during the period that the pH of the sewage sludge is above 12.

At the end of the 72 hour period during which the pH of the sewage sludge is above 12, the sewage sludge shall be air dried to achieve a percent solids in the sewage sludge greater than 50 percent.

Alternative 3 - The sewage sludge shall be analyzed for enteric viruses prior to pathogen treatment. The limit for enteric viruses is one Plaque-forming Unit per four grams of total solids (dry weight basis) either before or following pathogen treatment. See 503.32(a)(5)(ii) for specific information. The sewage sludge shall be analyzed for viable helminth ova prior to pathogen treatment. The limit for viable helminth ova is less than one per four grams of total solids (dry weight basis) either before or following pathogen treatment. See 503.32(a)(5)(iii) for specific information.

Alternative 4 - The density of enteric viruses in the sewage sludge shall be less than one Plaque-forming Unit per four grams of total solids (dry weight basis) at the time the sewage sludge is used or disposed or at the time the sludge is prepared for sale or give away in a bag or other container for application to the land.

The density of viable helminth ova in the sewage sludge shall be less than one per four grams of total solids (dry weight basis) at the time the sewage sludge is used or disposed or at the time the sewage sludge is prepared for sale or give away in a bag or other container for application to the land.

Alternative 5 - Sewage sludge shall be treated by one of the Processes to Further Reduce Pathogens (PFRP) described in 503 Appendix B. PFRPs include composting, heat drying, heat treatment, and thermophilic aerobic digestion.

Alternative 6 - Sewage sludge shall be treated by a process that is equivalent to a Process to Further Reduce Pathogens, if individually approved by the Pathogen Equivalency Committee representing the EPA.

- b. Three alternatives are available to demonstrate compliance with Class B sewage sludge. Alternatives 2 and 3 are not authorized to demonstrate compliance with Class B sewage sludge in Texas permits.

Alternative 1 - (i) Seven random samples of the sewage sludge shall be collected for one monitoring episode at the time the sewage sludge is used or disposed.

(ii) The geometric mean of the density of fecal coliform in the samples collected shall be less than either 2,000,000 MPN per gram of total solids (dry weight basis) or 2,000,000 Colony Forming Units per gram of total solids (dry weight basis).

Alternative 2 - Sewage sludge shall be treated in one of the Processes to significantly Reduce Pathogens described in 503 Appendix B.

Alternative 3 - Sewage sludge shall be treated in a process that is equivalent to a PSRP, if individually approved by the Pathogen Equivalency Committee representing the EPA.

In addition, the following site restrictions must be met if Class B sludge is land applied:

- i. Food crops with harvested parts that touch the sewage sludge/soil mixture and are totally above the land surface shall not be harvested for 14 months after application of sewage sludge.
- ii. Food crops with harvested parts below the surface of the land shall not be harvested for 20 months after application of sewage sludge when the sewage sludge remains on the land surface for 4 months or longer prior to incorporation into the soil.
- iii. Food crops with harvested parts below the surface of the land shall not be harvested for 38 months after application of sewage sludge when the sewage sludge remains on the land surface for less than 4 months prior to incorporation into the soil.
- iv. Food crops, feed crops, and fiber crops shall not be harvested for 30 days after application of sewage sludge.
- v. Animals shall not be allowed to graze on the land for 30 days after application of sewage sludge.
- vi. Turf grown on land where sewage sludge is applied shall not be harvested for 1 year after application of the sewage sludge when the harvested turf is placed on either land with a high potential for public exposure or a lawn, unless otherwise specified by the permitting authority.
- vii. Public access to land with a high potential for public exposure shall be restricted for 1 year after application of sewage sludge.
- viii. Public access to land with a low potential for public exposure shall be restricted for 30 days after application of sewage sludge.

3. Vector Attraction Reduction Requirements

All bulk sewage sludge that is applied to agricultural land, forest, a public contact site, or a reclamation site shall be treated by one of the following alternatives 1 through 10 for Vector Attraction Reduction. If bulk sewage sludge is applied to a home garden, or bagged sewage sludge is applied to the land, only alternative 1 through alternative 8 shall be used.

Alternative 1 - The mass of volatile solids in the sewage sludge shall be reduced by a minimum of 38 percent.

Alternative 2 - If Alternative 1 cannot be met for an anaerobically digested sludge, demonstration can be made by digesting a portion of the previously digested sludge anaerobically in the laboratory in a bench-scale unit for 40 additional days at a temperature between 30 and 37

degrees Celsius. Volatile solids must be reduced by less than 17 percent to demonstrate compliance.

- Alternative 3 - If Alternative 1 cannot be met for an aerobically digested sludge, demonstration can be made by digesting a portion of the previously digested sludge with 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. Volatile solids must be reduced by less than 15 percent to demonstrate compliance.
- Alternative 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.
- Alternative 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.
- Alternative 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.
- Alternative 7 - The percent solids of sewage sludge that does not contain unstabilized solids generated in a primary wastewater treatment process shall be equal to or greater than 75 percent based on the moisture content and total solids prior to mixing with other materials. Unstabilized solids are defined as organic materials in sewage sludge that have not been treated in either an aerobic or anaerobic treatment process.
- Alternative 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. Unstabilized solids are defined as organic materials in sewage sludge that have not been treated in either an aerobic or anaerobic treatment process.
- Alternative 9 -
- (i) Sewage sludge shall be injected below the surface of the land.
 - (ii) No significant amount of the sewage sludge shall be present on the land surface within one hour after the sewage sludge is injected.
 - (iii) When 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 treatment process.
- Alternative 10 -
- (i) 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.
 - (ii) 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.

C. Monitoring Requirements

All other pollutants shall be monitored at the frequency shown below:

Amount of sewage sludge*
(metric tons per 365 day period)

Frequency

$0 \leq \text{Sludge} < 290$

Once/Year

290 ≤ Sludge < 1,500	Once/Quarter
1,500 ≤ Sludge < 15,000	Once/Two Months
15,000 ≤ Sludge	Once/Month

- * Either the amount of bulk sewage sludge applied to the land or the amount of sewage sludge received by a person who prepares sewage sludge that is sold or given away in a bag or other container for application to the land (dry weight basis).

Representative samples of sewage sludge shall be collected and analyzed in accordance with the methods referenced in 40 CFR 503.8(b).

SECTION II. REQUIREMENTS SPECIFIC TO BULK SEWAGE SLUDGE FOR APPLICATION TO THE LAND MEETING CLASS A or B PATHOGEN REDUCTION AND THE CUMULATIVE LOADING RATES IN TABLE 2, OR CLASS B PATHOGEN REDUCTION AND THE POLLUTANT CONCENTRATIONS IN TABLE 3

For those permittees meeting Class A or B pathogen reduction requirements and that meet the cumulative loading rates in Table 2 below, or the Class B pathogen reduction requirements and contain concentrations of pollutants below those listed in Table 3 found in Element I, Section III, the following conditions apply:

1. Pollutant Limits

Table 2 Cumulative Pollutant Loading Rate	
<u>Pollutant</u>	<u>(kilograms per hectare)</u>
Arsenic	41
Cadmium	39
Chromium	3000
Copper	1500
Lead	300
Mercury	17
Molybdenum	Monitor
Nickel	420
Selenium	100
Zinc	2800

2. Pathogen Control

All bulk sewage sludge that is applied to agricultural land, forest, a public contact site, a reclamation site, or lawn or home garden shall be treated by either Class A or Class B pathogen reduction requirements as defined above in Element 1, Section I.B.3.

3. Management Practices

- a. Bulk sewage sludge shall not be applied to agricultural land, forest, a public contact site, or a reclamation site that is flooded, frozen, or snow-covered so that the bulk sewage sludge enters a wetland or other waters of the U.S., as defined in 40 CFR 122.2, except as provided in a permit issued pursuant to section 404 of the CWA.
- b. Bulk sewage sludge shall not be applied within 10 meters of a water of the U.S.
- c. Bulk sewage sludge shall be applied at or below the agronomic rate in accordance with recommendations from the following references:

- i. STANDARDS 1992, Standards, Engineering Practices and Data, 39th Edition (1992) American Society of Agricultural Engineers, 2950 Niles Road, St. Joseph, MI 49085-9659.
 - ii. National Engineering Handbook Part 651, Agricultural Waste Management Field Handbook (1992), P.O. Box 2890, Washington, D.C. 20013.
 - iii. Recommendations of local extension services or Soil Conservation Services.
 - iv. Recommendations of a major University's Agronomic Department.
 - d. An information sheet shall be provided to the person who receives bulk sewage sludge sold or given away. The information sheet shall contain the following information:
 - i. The name and address of the person who prepared the sewage sludge that is sold or given away in a bag or other container for application to the land.
 - ii. A statement that application of the sewage sludge to the land is prohibited except in accordance with the instructions on the label or information sheet.
 - iii. The annual whole sludge application rate for the sewage sludge that does not cause any of the cumulative pollutant loading rates in Table 2 above to be exceeded, unless the pollutant concentrations in Table 3 found in Element I, Section III below are met.
4. Notification requirements
- a. If bulk sewage sludge is applied to land in a State other than the State in which the sludge is prepared, written notice shall be provided prior to the initial land application to the permitting authority for the State in which the bulk sewage sludge is proposed to be applied. The notice shall include:
 - i. The location, by either street address or latitude and longitude, of each land application site.
 - ii. The approximate time period bulk sewage sludge will be applied to the site.
 - iii. The name, address, telephone number, and National Pollutant Discharge Elimination System permit number (if appropriate) for the person who prepares the bulk sewage sludge.
 - iv. The name, address, telephone number, and National Pollutant Discharge Elimination System permit number (if appropriate) for the person who will apply the bulk sewage sludge.
 - b. The permittee shall give 60 days prior notice to the Director of any change planned in the sewage sludge practice. Any change shall include any planned physical alterations or additions to the permitted treatment works, changes in the permittee's sludge use or disposal practice, and also alterations, additions, or deletions of disposal sites. These changes may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional disposal sites not reported during the permit application process or absent in the existing permit. Change in the sludge use or disposal practice may be cause for modification of the permit in accordance with 40 CFR 122.62(a)(1).
 - c. The permittee shall provide the location of all existing sludge disposal/use sites to the State Historical Commission within 90 days of the effective date of this permit. In addition, the permittee shall provide the location of any new disposal/use site to the State Historical Commission prior to use of the site.

The permittee shall within 30 days after notification by the State Historical Commission that a specific sludge disposal/use area will adversely effect a National Historic Site, cease use of such area.

5. Recordkeeping Requirements - The sludge documents will be retained on site at the same location as other NPDES records.

The person who prepares bulk sewage sludge or a sewage sludge material shall develop the following information and shall retain the information for five years. If the permittee supplies the sludge to another person who land applies the sludge, the permittee shall notify the land applier of the requirements for recordkeeping found in 40 CFR 503.17 for persons who land apply.

- a. The concentration (mg/Kg) in the sludge of each pollutant listed in Table 3 found in Element I, Section III and the applicable pollutant concentration criteria (mg/Kg), or the applicable cumulative pollutant loading rate and the applicable cumulative pollutant loading rate limit (kg/ha) listed in Table 2 above.
- b. A description of how the pathogen reduction requirements are met (including site restrictions for Class B sludges, if applicable).
- c. A description of how the vector attraction reduction requirements are met.
- d. A description of how the management practices listed above in Section II.3 are being met.
- e. The recommended agronomic loading rate from the references listed in Section II.3.c. above, as well as the actual agronomic loading rate shall be retained.
- f. A description of how the site restrictions in 40 CFR Part 503.32(b)(5) are met for each site on which Class B bulk sewage sludge is applied.
- g. The following certification statement:

"I certify, under penalty of law, that the management practices in §503.14 have been met for each site on which bulk sewage sludge is applied. This determination has been made under my direction and supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate the information used to determine that the management practices have been met. I am aware that there are significant penalties for false certification including fine and imprisonment."

- h. A certification statement that all applicable requirements (specifically listed) have been met, and that the permittee understands that there are significant penalties for false certification including fine and imprisonment. See 40 CFR 503.17(a)(4)(i)(B) or 40 CFR Part 503.17(a)(5)(i)(B) as applicable to the permittees sludge treatment activities.
- i. The permittee shall maintain information that describes future geographical areas where sludge may be land applied.
- j. The permittee shall maintain information identifying site selection criteria regarding land application sites not identified at the time of permit application submission.
- k. The permittee shall maintain information regarding how future land application sites will be managed.

The person who prepares bulk sewage sludge or a sewage sludge material shall develop the following information and shall retain the information indefinitely. If the permittee supplies the sludge to another person who land applies the sludge, the permittee shall notify the land applier of the requirements for recordkeeping found in 40 CFR 503.17 for persons who land apply.

- a. The location, by either street address or latitude and longitude, of each site on which sludge is applied.
- b. The number of hectares in each site on which bulk sludge is applied.
- c. The date and time sludge is applied to each site.

- d. The cumulative amount of each pollutant in kilograms/hectare listed in Table 2 applied to each site.
- e. The total amount of sludge applied to each site in metric tons.
- f. The following certification statement:

"I certify, under penalty of law, that the requirements to obtain information in §503.12(e)(2) have been met for each site on which bulk sewage sludge is applied. This determination has been made under my direction and supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate the information used to determine that the requirements to obtain information have been met. I am aware that there are significant penalties for false certification including fine and imprisonment."

- g. A description of how the requirements to obtain information in §503.12(e)(2) are met.

6. Reporting Requirements - None.

SECTION III. REQUIREMENTS SPECIFIC TO BULK OR BAGGED SEWAGE SLUDGE MEETING POLLUTANT CONCENTRATIONS IN TABLE 3 AND CLASS A PATHOGEN REDUCTION REQUIREMENTS

For those permittees with sludge that contains concentrations of pollutants below those pollutant limits listed in Table 3 for bulk or bagged (containerized) sewage sludge and also meet the Class A pathogen reduction requirements, the following conditions apply (Note: All bagged sewage sludge must be treated by Class A pathogen reduction requirements.):

- 1. Pollutant limits - The concentration of the pollutants in the municipal sewage sludge is at or below the values listed.

Table 3
Monthly Average Concentration
(milligrams per kilogram)*

<u>Pollutant</u>	
Arsenic	41
Cadmium	39
Chromium	1200
Copper	1500
Lead	300
Mercury	17
Molybdenum	Monitor
Nickel	420
Selenium	36
Zinc	2800

* Dry weight basis

- 2. Pathogen Control

All bulk sewage sludge that is applied to agricultural land, forest, a public contact site, a reclamation site, or lawn or home garden shall be treated by the Class A pathogen reduction requirements as defined above in Element I, Section I.B.3. All bagged sewage sludge must be treated by Class A pathogen reduction requirements.

- 3. Management Practices - None.
- 4. Notification Requirements - None.
- 5. Recordkeeping Requirements - The permittee shall develop the following information and shall retain the information for five years. The sludge documents will be retained on site at the same location as other NPDES records.

- a. The concentration (mg/Kg) in the sludge of each pollutant listed in Table 3 and the applicable pollutant concentration criteria listed in Table 3.
 - b. A certification statement that all applicable requirements (specifically listed) have been met, and that the permittee understands that there are significant penalties for false certification including fine and imprisonment. See 503.17(a)(1)(ii) or 503.17(a)(3)(i)(B), whichever applies to the permittees sludge treatment activities.
 - c. A description of how the Class A pathogen reduction requirements are met.
 - d. A description of how the vector attraction reduction requirements are met.
6. Reporting Requirements - None.

SECTION IV. REQUIREMENTS SPECIFIC TO SLUDGE SOLD OR GIVEN AWAY IN A BAG OR OTHER CONTAINER FOR APPLICATION TO THE LAND THAT DOES NOT MEET THE MINIMUM POLLUTANT CONCENTRATIONS

1. Pollutant Limits

Table 4

<u>Pollutant</u>	<u>Annual Pollutant Loading Rate</u> <u>(kilograms per hectare per 365 day period)</u>
Arsenic	2
Cadmium	1.9
Chromium	150
Copper	75
Lead	15
Mercury	0.85
Molybdenum	Monitor
Nickel	21
Selenium	5
Zinc	140

2. Pathogen Control

All sewage sludge that is sold or given away in a bag or other container for application to the land shall be treated by the Class A pathogen requirements as defined above in Section I.B.3.a. above.

3. Management Practices

Either a label shall be affixed to the bag or other container in which sewage sludge that is sold or given away for application to the land, or an information sheet shall be provided to the person who receives sewage sludge sold or given away in an other container for application to the land. The label or information sheet shall contain the following information:

- a. The name and address of the person who prepared the sewage sludge that is sold or given away in a bag or other container for application to the land.
 - b. A statement that application of the sewage sludge to the land is prohibited except in accordance with the instructions on the label or information sheet.
 - c. The annual whole sludge application rate for the sewage sludge that will not cause any of the annual pollutant loading rates in Table 4 above to be exceeded.
4. Notification Requirements - None.
5. Recordkeeping Requirements - The sludge documents will be retained on site at the same location as other NPDES records.

The person who prepares sewage sludge or a sewage sludge material shall develop the following information and shall retain the information for five years.

- a. The concentration in the sludge of each pollutant listed above in found in Element I, Section I, Table 1.
- b. The following certification statement found in §503.17(a)(6)(iii).

"I certify, under penalty of law, that the management practice in §503.14(e), the Class A pathogen requirement in §503.32(a), and the vector attraction reduction requirement in (insert vector attraction reduction option) have been met. This determination has been made under my direction and supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate the information used to determine that the management practice, pathogen requirements, and vector attraction reduction requirements have been met. I am aware that there are significant penalties for false certification including the possibility of fine and imprisonment."

- c. A description of how the Class A pathogen reduction requirements are met.
 - d. A description of how the vector attraction reduction requirements are met.
 - e. The annual whole sludge application rate for the sewage sludge that does not cause the annual pollutant loading rates in Table 4 to be exceeded. See Appendix A to Part 503 - Procedure to Determine the Annual Whole Sludge Application Rate for a Sewage Sludge.
6. Reporting Requirements - None.

ELEMENT 2- SURFACE DISPOSAL

SECTION I. REQUIREMENTS APPLYING TO ALL SEWAGE SLUDGE SURFACE DISPOSAL

A. General Requirements

1. The permittee shall handle and dispose of sewage sludge in accordance with Section 405 of the Clean Water Act and all other applicable Federal regulations to protect public health and the environment from any reasonably anticipated adverse effects due to any toxic pollutants which may be present.
2. If requirements for sludge management practices or pollutant criteria become more stringent than the sludge pollutant limits or acceptable management practices in this permit, or control a pollutant not listed in this permit, this permit may be modified or revoked and reissued to conform to the requirements promulgated at Section 405(d)(2) of the Clean Water Act.
3. In all cases, if the person (permit holder) who prepares the sewage sludge supplies the sewage sludge to another person (owner or operator of a sewage sludge unit) for disposal in a surface disposal site, the permit holder shall provide all necessary information to the parties who receive the sludge to assure compliance with these regulations.
4. The permittee shall give prior notice to EPA (Chief, Permits Branch, Water Management Division, Mail Code 6W-P, EPA Region 6, 1445 Ross Avenue, Dallas, Texas 75202) of any planned changes in the sewage sludge disposal practice, in accordance with 40 CFR Part 122.41(l)(1)(iii). These changes may justify the application of permit conditions that are different from or absent in the existing permit. Change in the sludge use or disposal practice may be cause for modification of the permit in accordance with 40 CFR Part 122.62(a)(1).
5. The permittee or owner/operator shall submit a written closure and post closure plan to the permitting authority 180 days prior to the closure date. The plan shall include the following information:

- (a) A discussion of how the leachate collection system will be operated and maintained for three years after the surface disposal site closes if it has a liner and leachate collection system.
- (b) A description of the system used to monitor continuously for methane gas in the air in any structures within the surface disposal site. The methane gas concentration shall not exceed 25% of the lower explosive limit for methane gas for three years after the sewage sludge unit closes. A description of the system used to monitor for methane gas in the air at the property line of the site shall be included. The methane gas concentration at the surface disposal site property line shall not exceed the lower explosive limit for methane gas for three years after the sewage sludge unit closes.
- (c) A discussion of how public access to the surface disposal site will be restricted for three years after it closes.

B. Management Practices

1. An active sewage sludge unit located within 60 meters of a fault that has displacement in Holocene time shall close by March 22, 1994.
2. An active sewage sludge unit located in an unstable area shall close by March 22, 1994.
3. An active sewage sludge unit located in a wetland shall close by March 22, 1994.
4. Surface disposal shall not restrict the flow of the base 100-year flood.
5. The run-off collection system for an active sewage sludge unit shall have the capacity to handle run-off from a 25-year, 24-hour storm event.
6. A food crop, feed crop, or a fiber crop shall not be grown on a surface disposal site.
7. Animals shall not be grazed on a surface disposal site.
8. Public access shall be restricted on the active surface disposal site and for three years after the site closes.
9. Placement of sewage sludge shall not contaminate an aquifer. This shall be demonstrated through one of the following:
 - (a) Results of a ground-water monitoring program developed by a qualified ground-water scientist.
 - (b) A certification by a qualified ground-water scientist may be used to demonstrate that sewage sludge placed on an active sewage sludge unit does not contaminate an aquifer.
10. When a cover is placed on an active surface disposal site, the concentration of methane gas in air in any structure within the surface disposal site shall not exceed 25 percent of the lower explosive limit for methane gas during the period that the sewage sludge unit is active. The concentration of methane gas in air at the property line of the surface disposal site shall not exceed the lower explosive limit for methane gas during the period that the sewage sludge unit is active. Monitoring shall be continuous.

C. Testing Requirements

1. Sewage sludge shall be tested at the frequency show below in Element 2, Section I.D. for PCBs. Any sludge exceeding a concentration of 50 mg/Kg shall not be surface disposed.
2. Pathogen Control

All sewage sludge that is disposed of in a surface disposal site shall be treated by either the Class A or Class B pathogen requirements unless sewage sludge is placed on an active surface disposal site, and is covered with soil or other material at the end of each operating day.

(a) Six alternatives are available to demonstrate compliance with Class A sewage sludge. All 6 alternatives require either the density of fecal coliform in the sewage sludge be less than 1000 MPN per gram of total solids (dry weight basis), or the density of Salmonella sp. bacteria in the sewage sludge be less than three Most Probable Number per four grams of total solids (dry weight basis) at the time the sewage sludge is used or disposed; at the time the sewage sludge is prepared for sale or given away in a bag or other container for application to the land. Below are the additional requirements necessary to meet the definition of a Class A sludge. Alternatives 5 and 6 are not authorized to demonstrate compliance with Class A sewage sludge in Texas permits.

Alternative 1 - The temperature of the sewage sludge that is used or disposed shall be maintained at a specific value for a period of time. See 503.32(a)(3)(ii) for specific information.

Alternative 2 - The pH of the sewage sludge that is used or disposed shall be raised to above 12 and shall remain above 12 for 72 hours.

The temperature of the sewage sludge shall be above 52 degrees Celsius for 12 hours or longer during the period that the pH of the sewage sludge is above 12.

At the end of the 72 hour period during which the pH of the sewage sludge is above 12, the sewage sludge shall be air dried to achieve a percent solids in the sewage sludge greater than 50 percent.

Alternative 3 - The sewage sludge shall be analyzed for enteric viruses prior to pathogen treatment. The limit for enteric viruses is one Plaque-forming Unit per four grams of total solids (dry weight basis) either before or following pathogen treatment. See 503.32(a)(5)(ii) for specific information. The sewage sludge shall be analyzed for viable helminth ova prior to pathogen treatment. The limit for viable helminth ova is less than one per four grams of total solids (dry weight basis) either before or following pathogen treatment. See 503.32(a)(5)(iii) for specific information.

Alternative 4 - The density of enteric viruses in the sewage sludge shall be less than one Plaque-forming Unit per four grams of total solids (dry weight basis) at the time the sewage sludge is used or disposed or at the time the sludge is prepared for sale or give away in a bag or other container for application to the land.

The density of viable helminth ova in the sewage sludge shall be less than one per four grams of total solids (dry weight basis) at the time the sewage sludge is used or disposed or at the time the sewage sludge is prepared for sale or give away in a bag or other container for application to the land.

Alternative 5 - Sewage sludge shall be treated by one of the Processes to Further Reduce Pathogens (PFRP) described in 503 Appendix B. PFRPs include composting, heat drying, heat treatment, and thermophilic aerobic digestion.

Alternative 6 - Sewage sludge shall be treated by a process that is equivalent to a Process to Further Reduce Pathogens, if individually approved by the Pathogen Equivalency Committee representing the EPA.

(b) Four alternatives are available to demonstrate compliance with Class B sewage sludge. Alternatives 2, 3, and 4 are not authorized to demonstrate compliance with Class B sewage sludge in Texas permits.

Alternative 1 - (i) Seven random samples of the sewage sludge shall be collected for one monitoring episode at the time the sewage sludge is used or disposed.

(ii) The geometric mean of the density of fecal coliform in the samples collected shall be less than either 2,000,000 Most Probable Number per gram of total solids (dry weight basis) or 2,000,000 Colony Forming Units per gram of total solids (dry weight basis).

Alternative 2 - Sewage sludge shall be treated in one of the Processes to significantly Reduce Pathogens described in 503 Appendix B.

Alternative 3 - Sewage sludge shall be treated in a process that is equivalent to a PSRP, if individually approved by the Pathogen Equivalency Committee representing the EPA.

Alternative 4 - Sewage sludge placed on an active surface disposal site is covered with soil or other material at the end of each operating day.

3. Vector Attraction Reduction Requirements

All sewage sludge that is disposed of in a surface disposal site shall be treated by one of the following alternatives 1 through 11 for Vector Attraction Reduction.

Alternative 1 - The mass of volatile solids in the sewage sludge shall be reduced by a minimum of 38 percent.

Alternative 2 - If Alternative 1 cannot be met for an anaerobically digested sludge, demonstration can be made by digesting a portion of the previously digested sludge anaerobically in the laboratory in a bench-scale unit for 40 additional days at a temperature between 30 and 37 degrees Celsius. Volatile solids must be reduced by less than 17 percent to demonstrate compliance.

Alternative 3 - If Alternative 1 cannot be met for an aerobically digested sludge, demonstration can be made by digesting a portion of the previously digested sludge with 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. Volatile solids must be reduced by less than 15 percent to demonstrate compliance.

Alternative 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.

Alternative 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.

Alternative 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.

Alternative 7 - The percent solids of sewage sludge that does not contain unstabilized solids generated in a primary wastewater treatment process shall be equal to or greater than 75 percent based on the moisture content and total solids prior to mixing with other materials. Unstabilized solids are defined as organic materials in sewage sludge that have not been treated in either an aerobic or an anaerobic treatment process.

Alternative 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. Unstabilized solids are defined as organic materials in sewage sludge that have not been treated in either an aerobic or an anaerobic treatment process.

Alternative 9 - (i) Sewage sludge shall be injected below the surface of the land.

(ii) No significant amount of the sewage sludge shall be present on the land surface within one hour after the sewage sludge is injected.

- (iii) When 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 treatment process.

Alternative 10 - (i) 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.

- (ii) 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.

Alternative 11 - Sewage sludge placed on an active sewage sludge unit shall be covered with soil or other material at the end of each operating day.

4. Methane Gas Control Within a Structure On Site

When cover is placed on an active surface disposal site, the methane gas concentration in the air in any structure shall not exceed 25% of the lower explosive limit (LEL) for methane gas during the period that the disposal site is active.

5. Methane Gas Control at Property Line

The concentration of methane gas in air at the property line of the surface disposal site shall not exceed the LEL for methane gas during the period that the disposal site is active.

D. Monitoring Requirements

Methane Gas in covered structures on site - Continuous

Methane Gas at property line - Continuous

All other pollutants shall be monitored at the frequency shown below:

<u>Amount of sewage sludge*</u> <u>(metric tons per 365 day period)</u>	<u>Frequency</u>
$0 \leq \text{Sludge} < 290$	Once/Year
$290 \leq \text{Sludge} < 1,500$	Once/Quarter
$1,500 \leq \text{Sludge} < 15,000$	Once/Two Months
$15,000 \leq \text{Sludge}$	Once/Month

* Amount of sewage sludge placed on an active sewage sludge unit (dry weight basis).

Representative samples of sewage sludge shall be collected and analyzed in accordance with the methods referenced in 40 CFR 503.8(b).

SECTION II. REQUIREMENTS SPECIFIC TO SURFACE DISPOSAL SITES WITHOUT A LINER AND LEACHATE COLLECTION SYSTEM.

1. Pollutant limits - Sewage sludge shall not be applied to a surface disposal site if the concentration of the listed pollutants exceed the corresponding values based on the surface disposal site boundary to the property line distance:

TABLE 5

Unit boundary to property line <u>distance (meters)</u>	Arsenic <u>(mg/kg)</u>	<u>Pollutant Concentrations*</u>			PCB's
		Chromium <u>(mg/kg)</u>	Nickel <u>(mg/kg)</u>	<u>(mg/kg)</u>	
0 to less than 25	30	200	210	49	
25 to less than 50	34	220	240	49	
50 to less than 75	39	260	270	49	
75 to less than 100	46	300	320	49	
100 to less than 125	53	360	390	49	
125 to less than 150	62	450	420	49	
≥ 150	73	600	420	49	

* Dry weight basis

2. Management practices - Listed in Section I.B. above.

3. Notification requirements

- a. The permittee shall assure that the owner of the surface disposal site provide written notification to the subsequent site owners that sewage sludge was placed on the land.
- b. The permittee shall provide the location of all existing sludge disposal/use sites to the State Historical Commission within 90 days of the effective date of this permit. In addition, the permittee shall provide the location of any new disposal/use site to the State Historical Commission prior to use of the site.

The permittee shall within 30 days after notification by the State Historical Commission that a specific sludge disposal/use area will adversely affect a National Historic Site, cease use of such area.

4. Recordkeeping requirements - The permittee shall develop the following information and shall retain the information for five years. The sludge documents will be retained on site at the same location as other NPDES records.

- a. The distance of the surface disposal site from the property line and the concentration (mg/Kg) in the sludge of each pollutant listed above in Table 5, as well as the applicable pollutant concentration criteria listed in Table 5.
- b. A certification statement that all applicable requirements (specifically listed) have been met, and that the permittee understands that there are significant penalties for false certification including fine and imprisonment. See 503.27(a)(1)(ii) or 503.27(a)(2)(ii) as applicable to the permittees sludge disposal activities.
- c. A description of how either the Class A or Class B pathogen reduction requirements are met, or whether sewage sludge placed on a surface disposal site is covered with soil or other material at the end of each operating day.
- d. A description of how the vector attraction reduction requirements are met.
- e. Results of a groundwater monitoring program developed by a qualified ground-water scientist, or a certification by a qualified groundwater scientist may be used to demonstrate that sewage sludge placed on an active sewage sludge unit does not contaminate an aquifer. A qualified groundwater scientist is an individual with a baccalaureate or post graduate degree in the natural sciences or

engineering who has sufficient training and experience in groundwater hydrology and related fields, as may be demonstrated by State registration, professional certification or completion of accredited university programs, to make sound professional judgements regarding groundwater monitoring, pollutant fate and transport, and corrective action.

5. Reporting Requirements - None.

SECTION III. REQUIREMENTS SPECIFIC TO SURFACE DISPOSAL SITES WITH A LINER AND LEACHATE COLLECTION SYSTEM.

1. Pollutant limits - None.
2. Management Practices - Listed in Section I.B. above.
3. Notification requirements
 - a. The permittee shall assure that the owner of the surface disposal site provide written notification to the subsequent owner of the site that sewage sludge was placed on the land.
 - b. The permittee shall provide the location of all existing sludge disposal/use sites to the State Historical Commission within 90 days of the effective date of this permit. In addition, the permittee shall provide the location of any new disposal/use site to the State Historical Commission prior to use of the site.

The permittee shall within 30 days after notification by the State Historical Commission that a specific sludge disposal/use area will adversely affect a National Historic Site, cease use of such area.

4. Recordkeeping requirements - The permittee shall develop the following information and shall retain the information for five years. The sludge documents will be retained on site at the same location as other NPDES records.
 - a. The following certification statement found in 503.27(a)(1)(ii).

"I certify, under penalty of law, that the pathogen requirements (define option used) and the vector attraction reduction requirements in (define option used) have been met. This determination has been made under my direction and supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate the information used to determine the (pathogen requirements and vector attraction reduction requirements, if appropriate) have been met. I am aware that there are significant penalties for false certification including the possibility of fine and imprisonment.
 - b. A description of how either the Class A or Class B pathogen reduction requirements are met or whether sewage sludge placed on a surface disposal site is covered with soil or other material at the end of each operating day.
 - c. A description of how the vector attraction reduction requirements are met.
 - d. Results of a ground-water monitoring program developed by a qualified ground-water scientist, or

A certification by a qualified ground-water scientist may be used to demonstrate that sewage sludge placed on an active sewage sludge unit does not contaminate an aquifer.

5. Reporting Requirements - None.

ELEMENT 3 - MUNICIPAL SOLID WASTE LANDFILL DISPOSAL

SECTION I. REQUIREMENTS APPLYING TO ALL SEWAGE SLUDGE DISPOSED IN A MUNICIPAL SOLID WASTE LANDFILL

1. The permittee shall handle and dispose of sewage sludge in accordance with Section 405 of the Clean Water Act and all other applicable Federal regulations to protect public health and the environment from any reasonably anticipated adverse effects due to any toxic pollutants that may be present. The permittee shall ensure that the sewage sludge meets the requirements in 40 CFR 258 concerning the quality of the sludge disposed in a municipal solid waste landfill.
2. If requirements for sludge management practices or pollutant criteria become more stringent than the sludge pollutant limits or acceptable management practices in this permit, or control a pollutant not listed in this permit, this permit may be modified or revoked and reissued to conform to the requirements promulgated at Section 405(d)(2) of the Clean Water Act.
3. If the permittee generates sewage sludge and supplies that sewage sludge to the owner or operator of a MSWLF for disposal, the permittee shall provide to the owner or operator of the MSWLF appropriate information needed to be in compliance with the provisions of this permit.
4. The permittee shall give prior notice to EPA (Chief, Permits Branch, Water Management Division, Mail Code 6W-P, EPA Region 6, 1445 Ross Avenue, Dallas, Texas 75202) of any planned changes in the sewage sludge disposal practice, in accordance with 40 CFR Part 122.41(l)(1)(iii). These changes may justify the application of permit conditions that are different from or absent in the existing permit. Change in the sludge use or disposal practice may be cause for modification of the permit in accordance with 40 CFR Part 122.62(a)(1).
5. The permittee shall provide the location of all existing sludge disposal/use sites to the State Historical Commission within 90 days of the effective date of this permit. In addition, the permittee shall provide the location of any new disposal/use site to the State Historical Commission prior to use of the site.

The permittee shall within 30 days after notification by the State Historical Commission that a specific sludge disposal/use area will adversely affect a National Historic Site, cease use of such area.

6. Recordkeeping requirements - The permittee shall develop the following information and shall retain the information for five years. The sludge documents will be retained on site at the same location as other NPDES records.
 - a. The description and results of the tests performed, required by the owner/operator of the MSWLF to demonstrate compliance with the 40 CFR 258 regulations.
 - b. A certification that sewage sludge meets the requirements in 40 CFR 258 concerning the quality of the sludge disposed in a municipal solid waste landfill unit.
7. Reporting requirements - None.

NPDES PERMIT NO. NM0020303

FACT SHEET

FOR THE DRAFT NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
PERMIT TO DISCHARGE TO WATERS OF THE UNITED STATES

APPLICANT

Village of Los Lunas
660 Main Street, NW
P.O. Box 1209
Los Lunas, NM 87031

ISSUING OFFICE

U.S. Environmental Protection Agency
Region 6
1445 Ross Avenue
Dallas, Texas 75202-2733

PREPARED BY

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DATE PREPARED

November 8, 2012

PERMIT ACTION

Proposed revocation and reissuance of the current permit issued with an effective date of July 1, 2007 and an expiration date of June 30, 2012.

RECEIVING WATER – BASIN

Rio Grande – Rio Grande Basin

DOCUMENT ABBREVIATIONS

In the document that follows, various abbreviations are used. They are as follows:

4Q3	Lowest four-day average flow rate expected to occur once every three-years
BAT	Best available technology economically achievable
BCT	Best conventional pollutant control technology
BPT	Best practicable control technology currently available
BMP	Best management plan
BOD ₅	Biochemical oxygen demand (five-day)
BPJ	Best professional judgment
C/100 mL	Colonies (#) per 100 Milliliters
CBOD	Carbonaceous biochemical oxygen demand (five-day unless noted otherwise)
CD	Critical dilution
CFR	Code of Federal Regulations
cfs	Cubic feet per second
COD	Chemical oxygen demand
COE	United States Corp of Engineers
CWA	Clean Water Act
DMR	Discharge monitoring report
ELG	Effluent limitation guidelines
EPA	United States Environmental Protection Agency
ESA	Endangered Species Act
FCB	Fecal coliform bacteria
F&WS	United States Fish and Wildlife Service
MDL	Method detection limit
mg/L	Milligrams per Liter
µg/L	Micrograms per Liter
MGD	Million gallons per day
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NMIP	New Mexico NPDES Permit Implementation Procedures
NMWQS	New Mexico State Standards for Interstate and Intrastate Surface Waters
NPDES	National Pollutant Discharge Elimination System
MQL	Minimum quantification level
O&G	Oil and grease
POTW	Publically Owned Treatment Works
RP	Reasonable potential
SIC	Standard industrial classification
s.u.	Standard units (for parameter pH)
SWQB	Surface Water Quality Bureau
TMDL	Total maximum daily load
TRC	Total residual chlorine
TSS	Total suspended solids
UAA	Use attainability analysis
USFWS	United States Fish & Wildlife Service
USGS	United States Geological Service
WLA	Wasteload allocation
WET	Whole effluent toxicity
WQCC	New Mexico Water Quality Control Commission
WQMP	Water Quality Management Plan
WWTP	Wastewater treatment plant

I. CHANGES FROM THE PREVIOUS PERMIT

Changes from the permit previously issued May 31, 2007, with an effective date of July 1, 2007, and an expiration date of June 30, 2012, are:

- A. Mass limits for BOD₅ and TSS increased due to the increased design flow for the facility.
- B. Percent removal requirements for BOD₅ and TSS were added.
- C. A limit of ≥ 5.0 mg/L (24-hour average) for dissolved oxygen (D.O.) was added.
- D. Quarterly monitoring for ammonia was added.
- E. The monitoring frequencies were increased for the following pollutants: pH, BOD₅, TSS, and *E. coli*.
- F. The monitoring frequencies for effluent testing required by the permit renewal application (Form 2A) were specified.
- G. Pretreatment language was added.
- H. *E. coli* limits were added.

II. DISCHARGE LOCATION

As described in the application, the facility is a POTW located at 1960 Heaton LP, S.E., Los Lunas, Valencia County, New Mexico.

The discharge from the POTW is to the Rio Grande in Waterbody Segment No. 20.6.4.105 of the Rio Grande Basin. The single outfall of the facility is located at:

Latitude 34° 46' 48" North, Longitude 106° 43' 50" West

AERIAL VIEW OF FACILITY AND DISCHARGE LOCATION



III. APPLICANT ACTIVITY

Under the SIC Code 4952, the facility is a POTW treating domestic wastewater. No industrial wastewater is conveyed to the facility.

The facility has a design flow of 2.7 MGD serving a total population of 14,835 people.

The design capacity has increased (from 0.9 MGD to 2.7 MGD) since the previous permit issuance with the addition of the Membrane Bioreactor (MBR) system. The MBR consists of an entrance works, two anoxic zones (north and south), two pre-aeration basins (north and south), and four MBR basins (N1, N2, S1, S2) with an ultraviolet (UV) disinfection system. The effluent exits the MBR and flows along a pipe that then enters a blending box to be blended with effluent from the activated sludge plant prior to discharge in a 16" pipe to the Rio Grande. The activated sludge plant consists of an entrance works with grit tank, two aeration basins (east, west), two secondary clarifiers, and UV disinfection. UV disinfection is used as a method for pathogen control at this facility.

Sludge is thickened on a gravity belt thickener and then pumped to an aerobic digester. Final sludge disposal is land application.

IV. EFFLUENT CHARACTERISTICS

The facility submitted EPA Permit Application Form 2A, received February 9, 2012, which provides a quantitative description of the discharge shown below. The *E. coli* data was not included as part of the application form, so values were obtained from the Online Tracking Information System (based on data from April 2010 – March 2012).

POLLUTANT TABLE – 1

<u>PARAMETER</u>	<u>Max. Daily</u> (mg/L, unless noted)	<u>Avg. Daily</u> (mg/L, unless noted)
Flow, MGD	1.77 MGD	1.05 MGD
Temperature, winter	15.50 °C	16.30 °C
Temperature, summer	29.60	28.30
pH, minimum	6.92 s.u.	--
pH, maximum	8.01 s.u.	--
BOD ₅	22.0	4.29
FCB	2,987.0 (C/100 mL)	60.55 (C/100 mL)
<i>E. coli</i> bacteria	231.56 (C/100 mL)	35.11 (C/100 mL)
TSS	128.0	7.91
Ammonia (as N)	0.00	0.00
TRC	0.18	0.04
D.O.	6.50	5.05
Total Kjeldahl Nitrogen (TKN)	1.25	1.0
Nitrate plus Nitrite Nitrogen	16.0	14.0
Oil & Grease	0.00	0.00
Phosphorus	2.50	1.97
Total Dissolved Solids (TDS)	578.0	575.0

The facility has to sample and report all priority pollutants identified in Part D, Expanded Effluent Testing Data of EPA Permit Application Form 2A. All the pollutants were sampled and those pollutants that were detected at concentrations exceeding the MQL are listed below:

POLLUTANT TABLE – 2 – Expanded Pollutant List

<u>PARAMETER</u> (Pollutants greater than MQL)	<u>Max. Daily</u> (mg/L, unless noted)	<u>Avg. Daily</u> (mg/L, unless noted)
Arsenic	0.012	0.01047
Chromium	0.0013	0.000993
Copper	0.0075	*less than MQL
Lead	0.0017	0.00057
Mercury	0.00730 µg/L	*less than MQL
Nickel	0.0022	0.0021
Zinc	0.061	0.059
Hardness (as CaCO ₃)	72	69.67
Carbon Tetrachloride	0.24 µg/L	0.08 µg/L

Chloroethane	1.9 µg/L	1.83 µg/L
1,2-Dichloroethane	1.5 µg/L	1.0 µg/L
Methyl Bromide	0.46 µg/L	0.153 µg/L
Methyl Chloride	1.3 µg/L	1.23 µg/L
Methylene Chloride	1.3 µg/L	1.23 µg/L
1,1,2-Trichloroethane	0.81 µg/L	0.27 µg/L
Trichlorethylene	0.21 µg/L	0.07 µg/L

A summary of the last 24 months of available pollutant data, from April 2010 through March 2012, taken from Discharge Monitoring Reports (DMRs) is shown in **Appendix B** of the Fact Sheet. The facility did not report any data for the months of April – June 2010 and October – December 2011. For the last 24 months of available data, the DMR data show exceedances of the daily maximum *E. coli* values during the months of April and September 2011. The average *E. coli* limit was exceeded in September 2011.

V. REGULATORY AUTHORITY/PERMIT ACTION

In November 1972, Congress passed the Federal Water Pollution Control Act establishing the NPDES permit program to control water pollution. These amendments established technology-based or end-of-pipe control mechanisms and an interim goal to achieve “water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water,” more commonly known as the “swimmable, fishable” goal. Further amendments in 1977 of the CWA gave EPA the authority to implement pollution control programs, such as setting wastewater standards for industry, and established the basic structure for regulating pollutant discharges into the waters of the United States. In addition, the amendments made it unlawful for any person to discharge any pollutant from a point source into navigable waters, unless a permit was obtained under its provisions. Regulations governing the EPA administered NPDES permit program are generally found at 40 CFR §122 (program requirements & permit conditions), §124 (procedures for decision making), §125 (technology-based standards) and §136 (analytical procedures). Other parts of 40 CFR provide guidance for specific activities and may be used in this document as required.

The facility submitted a complete permit application February 9, 2012. It is proposed that the permit be reissued for a 5-year term following regulations promulgated at 40 CFR §122.46(a). The existing permit is administratively continued until this permit is issued.

VI. DRAFT PERMIT RATIONALE AND PROPOSED PERMIT CONDITIONS

A. OVERVIEW of TECHNOLOGY-BASED VERSUS WATER QUALITY STANDARDS-BASED EFFLUENT LIMITATIONS AND CONDITIONS

Regulations contained in 40 CFR §122.44 require that NPDES permit limits are developed that meet the more stringent of either technology-based effluent limitation guidelines, numerical and/or narrative water quality standard-based effluent limits, or the previous permit.

Technology-based effluent limitations are established in the proposed draft permit for BOD and TSS. Water quality-based effluent limitations are established in the proposed draft permit for pH, *E. coli* bacteria, D.O., and TRC.

B. TECHNOLOGY-BASED EFFLUENT LIMITATIONS/CONDITIONS

Regulations promulgated at 40 CFR §122.44 (a) require technology-based effluent limitations to be placed in NPDES permits based on ELGs where applicable, on BPJ in the absence of guidelines, or on a combination of the two. In the absence of promulgated guidelines for the discharge, permit conditions may be established using BPJ procedures. EPA establishes limitations based on the following technology-based controls: BPT, BCT, and BAT. These levels of treatment are:

BPT (Best Practicable Control Technology Currently Available) – The first level of technology-based standards generally based on the average of the best existing performance facilities within an industrial category or subcategory.

BCT (Best Conventional Pollutant Control Technology) – Technology-based standard for the discharge from existing industrial point sources of conventional pollutants including BOD, TSS, fecal coliform, pH, and O&G.

BAT (Best Available Control Technology Economically Achievable) – The most appropriate means available on a national basis for controlling the direct discharge of toxic and non-conventional pollutants to navigable waters. BAT effluent limits represent the best existing performance of treatment technologies that are economically achievable within an industrial point source category or subcategory.

The facility is a POTW treating sanitary wastewater. POTW's have technology-based ELG's established at 40 CFR Part 133, Secondary Treatment Regulation. Pollutants with ELG's established in this Chapter are BOD₅, TSS and pH. BOD₅ limits of 30 mg/L for the 30-day average, 45 mg/L for the 7-day average, and no less than 30-day average 85 percent removal (minimum) are found at 40 CFR §133.102(a). TSS limits are also 30 mg/L for the 30-day average, 45 mg/L for the 7-day average, and no less than 30-day average 85 percent removal (minimum), and are found at 40 CFR §133.102(b). The percent removal requirements for BOD₅ and TSS are new permit limits which were not included in the previous permit. The percent removal is calculated as follows:

$$\{[(\text{influent concentration} - \text{effluent concentration}) / \text{influent concentration}] \times 100\}$$

ELG's for pH are between 6.0 – 9.0 s.u. and are found at 40 CFR §133.102(c). Regulations at 40 CFR §122.45(f)(1) require all pollutants limited in permits to have limits expressed in terms of mass such as pounds per day (with exceptions noted in 40 CFR §§122.45(f)(1)(i)-(iii)). When determining mass limits for POTW's, the plant's design flow is used to establish the mass load. Mass limits are determined by the following mathematical relationship:

$$\text{Loading in lbs/day} = \text{pollutant concentration in mg/L} * 8.345 \text{ lbs/gal} * \text{design flow in MGD}$$

The previous permit established mass loading amounts based on the design flow of 0.9 MGD. The design flow has since been increased to 2.7 MGD for this proposed permit term. An anti-degradation review was conducted by NMED's Surface Water Quality Bureau. The findings indicated that the increased design flow would present "de minimus" impacts to the receiving water body for BOD₅ and TSS. Thus, the facility may utilize the increased flow for its new loading limits. The calculations of mass limits are as follows:

30-day average TSS/BOD₅ loading = 30 mg/L * 8.345 lbs/gal * 2.7 MGD

30-day average TSS/BOD₅ loading = 676 lbs/day

Based on 40 CFR §122.45(f), all pollutants limited in permits shall have limitations expressed in terms of mass. Limits are established in the draft permit for the 7-day average limits for BOD and TSS as follows:

7-day average TSS/BOD₅ loading = 45 mg/L * 8.345 lbs/gal * 2.7 MGD

7-day average TSS/BOD₅ loading = 1,014 lbs/day

Technology-Based Effluent Limits – based on 2.7 MGD flow

PARAMETER	DISCHARGE LIMITATIONS			
	30-Day Avg.	7-Day Avg.	30-Day Avg.	7-Day Avg.
	(lbs/day)		(mg/L, unless noted)	
Flow	***	***	Measure MGD	Measure MGD
BOD ₅	676	1,014	30	45
TSS	676	1,014	30	45
Percent Removal (minimum), BOD ₅ and TSS	85% BOD ₅ & TSS (30-day average)			
pH	6.0 – 9.0 standard units			

C. WATER QUALITY BASED LIMITATIONS

1. General Comments

Water quality based requirements are necessary where effluent limits more stringent than technology-based limits are necessary to maintain or achieve federal or state water quality limits. Under §301(b)(1)(C) of the CWA, discharges are subject to effluent limitations based on federal or state WQS. Effluent limitations and/or conditions established in the draft permit are in compliance with applicable State WQS and applicable State water quality management plans to assure that surface WQS of the receiving waters are protected and maintained, or attained.

2. Implementation

NPDES permits contain technology-based effluent limitations reflecting the best controls available. Where these technology-based permit limits do not protect water quality or the designated uses, additional water quality-based effluent limitations and/or conditions are included in the NPDES permits. State narrative and numerical water quality standards are used in conjunction with EPA criteria and other available toxicity information to determine the adequacy of technology-based permit limits and the need for additional water quality-based controls.

3. State Water Quality Standards

The general and specific stream standards are provided in “New Mexico State Standards for Interstate and Intrastate Surface Waters,” (NM WQS), 20.6.4 NMAC, as amended through January 14, 2011. The

designated uses of the receiving water are irrigation, marginal warmwater aquatic life, livestock watering, public water supply, wildlife habitat, and primary contact.

4. Permit Action - Water Quality-Based Limits

Regulations promulgated at 40 CFR §122.44(d) require limits in addition to, or more stringent than effluent limitation guidelines (technology based). State WQS that are more stringent than effluent limitation guidelines are as follows:

a. BACTERIA

The applicable criteria for *E. coli* bacteria, based on the primary contact designated use for the receiving water body (see NMAC 20.6.4.900.D), are a monthly geometric mean of 126 cfu/100 mL and a single sample of 410 cfu/100 mL.

During the last permit term, a TMDL was written for the Middle Rio Grande, and a WLA was assigned to Los Lunas WWTP. In order to remain consistent with the assumptions of the TMDL, new mass-based limits have been assigned to the facility. For further discussion of the TMDL and limit calculations, see Section D below.

b. pH

The applicable criterion for pH, based on the primary contact designated use for the receiving water body (see NMAC 20.6.4.900.D) as well as the aquatic life marginal warmwater designated use (see NMAC 20.6.4.900.H(6)), is 6.6 to 9.0 s.u. This is more restrictive than the technology based limits for pH.

c. TOXICS

i. General Comments

CWA §301(b) requires that effluent limitations for point sources include any limitations necessary to meet water quality standards. Federal regulations found at 40 CFR §122.44 (d) state that if a discharge poses the reasonable potential to cause an in-stream excursion above a water quality criteria, the permit must contain an effluent limit for that pollutant.

All applicable facilities are required to fill out appropriate sections of the Form 2A and 2S, to apply for an NPDES permit or reissuance of an NPDES permit. The new form is applicable not only to POTWs, but also to facilities that are similar to POTWs, but which do not meet the regulatory definition of “publicly owned treatment works” (like private domestics, or similar facilities on Federal property). The forms were designed and promulgated to “make it easier for permit applicants to provide the necessary information with their applications and minimize the need for additional follow-up requests from permitting authorities,” per the summary statement in the preamble to the Rule. These forms became effective December 1, 1999, after publication of the final rule on August 4, 1999, Volume 64, Number 149, pages 42433 through 42527 of the FRL.

The facility is designated a major POTW for permitting purposes and must supply the expanded pollutant testing list described in EPA Application Form 2A as presented above in Part IV of this Fact Sheet.

Based on the pollutant data provided by the facility and shown in Part IV of this Fact Sheet, a water quality screen has been run to determine if discharged pollutant concentrations demonstrate RP to exceed WQS for the various designated uses. If RP exists, the screen would also calculate the appropriate permit limit needed to be protective of such designated uses. The screen is based on the NMIP as of March 15, 2012. The receiving stream hardness value, 125.1 mg/L, represents the average of values obtained from a STORET water quality station (32RGRAND394.8, "Rio Grande at Hwy. 6") about 1.5 miles upstream of the facility discharge, and it was used in the screen for any hardness-dependent WQS. The water quality screen is shown in **Appendix A** of the Fact Sheet.

As shown in **Appendix A** of the Fact Sheet, none of the pollutants demonstrate RP to violate WQS consistent with the designated uses for the receiving water.

ii. Critical Conditions

Critical conditions are used to establish certain permit limitations and conditions. The State of New Mexico Water Quality Standards allow a mixing zone for establishing pollutant limits in discharges. The state establishes a critical low flow designated as 4Q3, which is the minimum average four consecutive day flow that occurs with a frequency of once in three years. The Surface Water Quality Bureau of NMED provided EPA with the 4Q3 value for the Rio Grande.

For permitting purposes of certain parameters such as WET, the critical dilution of the effluent to the receiving stream is determined. The critical dilution, CD, is calculated as:

$CD = Q_e / (F * Q_a + Q_e)$, where:

Q_e = facility flow = 2.7 MGD

Q_a = critical low flow of the receiving waters = 54.33 cfs = 35.12 MGD
*conversion factor: 1.547 cfs/MGD

F = fraction of stream allowed for mixing = 1.0

$CD = 2.7 \text{ MGD} / [(1.0) * (35.12 \text{ MGD}) + 2.7 \text{ MGD}]$
= 0.0714
= **7.1%**

iii. Total Residual Chlorine (TRC)

The facility uses UV to control bacteria. The previous permit, however, set a 19 µg/L TRC limit when chlorine is used in any process throughout the plant. The same requirement will be maintained in this draft permit. Regulations at 40 CFR Part 136 define "instantaneous grab" as analyzed within 15 minutes of collection. The effluent limitation for TRC is the instantaneous maximum and cannot be averaged for reporting purposes. Sampling and reporting is required when chlorine is used for either bacteria control and/or when chlorine is used to treat filamentous algae and/or used to disinfect process treatment equipment at the facility.

D. TMDL REQUIREMENTS

In April 2010, EPA approved a NMED TMDL for the Middle Rio Grande Watershed for bacteria. The TMDL was developed to address *E. coli* impairments in four assessment units, including the receiving

water for Los Lunas WWTP's discharge. According to the TMDL document, there are probable nonpoint and point sources of *E. coli* bacteria throughout the basin. The TMDL assigned an *E. coli* wasteload allocation (WLA) of 4.3×10^9 cfu/day to the facility. This calculation was based on the previous permit's stated design capacity flow of 0.9 MGD, and applied the monthly geometric mean criteria of 126 cfu/100mL.

Based on the facility's updated design flow of 2.7 MGD, the new WLA would be 1.29×10^{10} cfu/day. To accommodate for this increase of 8.60×10^9 cfu/day to the WLA, the LA will be reduced from 9.00×10^{12} cfu/day to 8.99×10^{12} cfu/day. These changes to the WLA for Los Lunas WWTP and the LA will not affect the overall TMDL. NMED's Surface Water Quality Bureau was consulted in the development of these limits, and supports these reallocations as an application of Section IV(B)(1) of New Mexico's Water Quality Management Plan (WQMP). Thus, the WLA of **1.29×10^{10} cfu/day** is incorporated into the draft permit as a mass-based limit for the 30-day average, in addition to the concentration-based limits that were carried forward from the previous permit. To calculate the load based on the facility's actual discharge flow, the formula is:

$$\text{load [cfu/day]} = E. coli \text{ conc. [cfu/100mL]} * \text{flow [MGD]} * 3.79 \times 10^7 \text{ [conversion factor]}$$

The segment to which the POTW discharges is also impaired for temperature. However, temperature is not a pollutant of concern for POTWs, thus monitoring and/or permit limits are not recommended at this time.

E. WHOLE EFFLUENT TOXICITY LIMITATIONS

Procedures for implementing WET terms and conditions in NPDES permits are contained in the March 15, 2012 NMIP. Table 11 of Section V of the NMIP outlines the type of WET testing for different types of discharges. Analysis of past WET data to determine RP is shown in **Appendix C** of the Fact Sheet.

OUTFALL 001

In Section VI.C.4.d.ii above, "Critical Conditions", it was shown that the critical dilution (CD) for the facility is 7.1%. According to the NMIP, if it is determined that a facility is to receive chronic biomonitoring requirements at a critical dilution of 10% or less, then an acute to chronic ratio of 10:1 may be used in order to allow acute biomonitoring in lieu of chronic.

$$\text{Acute critical dilution} = 7.1\% * 10 = \mathbf{71\%}$$

Based on the nature of the discharge – a POTW with a design flow of more than 1.0 MGD, the perennial nature of the receiving water, and the critical dilution of 71% – the NMIP directs the WET test to be a 48 hour acute test using *Daphnia pulex* and *Pimephales promelas* at a once per quarter frequency consistent with the NMIP. The proposed permit requires five (5) dilutions in addition to the control (0% effluent) to be used in the toxicity tests based on a 0.75 dilution series. These additional effluent concentrations shall be 30%, 40%, 53%, 71%, and 95%.

If all WET tests pass during the first year, the permittee may request a monitoring frequency reduction for either or both test species for the following 2-5 years of the permit. The invertebrate species (*Daphnia pulex*) testing frequency may be reduced to once per six (6) months. The vertebrate species (*Pimephales promelas*) testing frequency may be reduced to once per year. If any tests fail during that time, the frequency will revert back to the once per quarter frequency for the remainder of the permit

term. Both species shall resume quarterly monitoring at a once per three months frequency on the last day of the permit.

The previous permit established WET biomonitoring with a CD = 14%. The CD has changed based on changes in both the design flow and 4Q3 flow, which are used to calculate the CD. The previous permit had a design flow of 0.9 MGD, while this permit has a design flow of 2.7 MGD. Also, the 4Q3 has decreased from 62.4 MGD to 35.12 MGD. DMR reports reveal nine (9) passing tests for both the *Daphnia pulex* and *Pimephales promelas* species during the last permit term. The EPA Reasonable Potential (RP) Analyzer for Outfall 001 (**Appendix C**) indicates that RP exists for *Daphnia pulex* and *Pimephales promelas*. Since RP for an excursion of the narrative criterion to protect the aquatic life against toxicity does not actually exist because lethal (acute test) toxic events were not demonstrated, WET limits will not be established in the proposed permit for the invertebrate or vertebrate species for Outfall 001. EPA concludes that this effluent does not cause or contribute to an exceedance of the State water quality standards. Therefore WET limits will not be established in the proposed permit.

During the period beginning the effective date of the permit and lasting through the expiration date of the permit, the permittee is authorized to discharge from Outfall 001 to the Rio Grande at segment 20.6.4.105. Discharges shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTIC	DISCHARGE MONITORING	
	<u>30-DAY AVG MINIMUM</u>	<u>48-Hr. MINIMUM</u>
Whole Effluent Toxicity Testing (48 Hr. Static Renewal) (*1)		
<i>Daphnia pulex</i>	REPORT	REPORT
<i>Pimephales promelas</i>	REPORT	REPORT

EFFLUENT CHARACTERISTIC	MONITORING REQUIREMENTS	
	<u>FREQUENCY</u>	<u>TYPE</u>
Whole Effluent Toxicity Testing (48 Hr. Static Renewal) (*1)		
<i>Daphnia pulex</i>	1/Quarter	24-Hr. Composite
<i>Pimephales promelas</i>	1/Quarter	24-Hr. Composite

FOOTNOTES

- (*1) Monitoring and reporting requirements begin on the effective date of this permit. See Part II, Whole Effluent Toxicity Testing Requirements for additional WET monitoring and reporting conditions.

F. MONITORING FREQUENCY FOR LIMITED PARAMETERS AND APPLICATION RENEWAL

Regulations require permits to establish monitoring requirements to yield data representative of the monitored activity, 40 CFR §122.48(b), and to assure compliance with permit limitations, 40 CFR §122.44(i)(1). Sample frequency is based on the March 15, 2012, Procedures for Implementing NPDES Permits in New Mexico (NMIP). Based on the design flow of the facility, 2.7 MGD, the NMIP recommends that limited parameters have either daily or weekly monitoring frequencies, depending on the parameter measured. Flow shall be monitored daily using an instantaneous form of measurement. *E. coli* bacteria and D.O. shall be monitored once per week using grab samples. pH shall be monitored daily using grab samples. The other parameters – BOD₅ and TSS – are monitored once per week using 24-hour composite samples. When chlorine is used in any process throughout the plant, total residual chlorine (TRC) shall be sampled daily using instantaneous grab samples. Regulations at 40 CFR Part 136 define instantaneous grab as being analyzed within 15 minutes of collection. Ammonia shall be monitored on a quarterly basis. When WET biomonitoring takes place, ammonia should be monitored at the same time and place that WET samples are collected for that quarter. If WET biomonitoring frequencies are reduced during the permit cycle, ammonia shall continue to be monitored on a quarterly basis.

In addition to the parameters identified in this fact sheet, EPA designated major POTW's are required to sample and report other parameters listed in tables of the EPA Form 2A and WET testing for its permit renewal. The minimum pollutant testing for NPDES permit renewals specified in Form 2A requires three samples for each of the parameters being tested. Current practice is to obtain the three samples over a short time frame, sometimes within two weeks during the permit renewal testing process. In order to obtain a meaningful snapshot of pollutant testing for permit renewal purposes, the draft permit shall require that the testing for Tables A.12, B.6, and Part D of EPA Form 2A, or its equivalent if modified in the future, during the second, third and fourth years after the permit effective date. In addition, one yearly test must be during the warm summer months; defined as the period from June 1 through August 31, and another yearly test shall be sampled during cold weather; defined as the period from December 1 through February 28. The remaining yearly test may be taken during any time in that year. This testing shall coincide with any required WET testing event for that year. The permittee shall report the results as a separate attachment in tabular form sent to the Permits and Technical Assistance Section Chief of the Water Quality Protection Division within 60 days of receipt of the lab analysis and shall also be reported on the NPDES permit renewal application Form 2A or its equivalent/replacement.

VII. FACILITY OPERATIONAL PRACTICES

A. SEWAGE SLUDGE

The permittee shall use only those sewage sludge disposal or reuse practices that comply with the federal regulations established in 40 CFR Part 503 "Standards for the Use or Disposal of Sewage Sludge." The specific requirements in the permit apply as a result of the design flow of the facility, the type of waste discharged to the collection system, and the sewage sludge disposal or reuse practice utilized by the treatment works. The permittee shall submit an Annual Sludge Status report in accordance with NPDES Permit NM0020303, Parts I and Parts IV.

B. WASTE WATER POLLUTION PREVENTION REQUIREMENTS

The permittee shall institute programs directed towards pollution prevention. The permittee will institute programs to improve the operating efficiency and extend the useful life of the treatment system.

C. INDUSTRIAL WASTEWATER CONTRIBUTIONS

The treatment plant indicated in Part F of its application (EPA Form 3510-2A) that it does not have any non-categorical Significant Industrial Users (SIU) or any Categorical Industrial Users (CIU).

D. OPERATION AND REPORTING

The applicant is required to: operate the treatment facility at maximum efficiency at all times; monitor the facility's discharge on a regular basis; and report the results monthly. The monitoring results will be available to the public.

VIII. 303(d) LIST

In New Mexico's 2012-2014 CWA §303(d) / 305(b) Integrated List, the Rio Grande is listed as being impaired for *E. coli* and temperature. A TMDL for *E. coli* was developed in 2010, and in Part VI.C.5 of the Fact Sheet, permit conditions were identified as being based on the approved TMDL to address the *E. coli* impairment. A temperature TMDL is scheduled to be developed in 2013. The standard reopener language in the permit allows additional permit conditions if warranted by future changes and/or new TMDLs. No additional pollutants are listed for this waterbody.

IX. ANTIDEGRADATION

The NMAC, Section 20.6.4.8 "Antidegradation Policy and Implementation Plan" sets forth the requirements to protect designated uses through implementation of the State water quality standards. The limitations and monitoring requirements set forth in the proposed permit are developed from the State water quality standards and are protective of those designated uses. Furthermore, the policy sets forth the intent to protect the existing quality of those waters, whose quality exceeds their designated use. The permit requirements and the limits are protective of the assimilative capacity of the receiving waters, which is protective of the designated uses of that water, NMAC Section 20.6.4.8.A.2.

The design flow for this facility has increased from 0.9 MGD to 2.7 MGD. Mass limits for BOD₅ and TSS have increased due to this increased design flow. This is in accordance with an anti-degradation review conducted by NMED SWQB, which found that the increased design flow would present "de minimus" impacts to the receiving water body.

X. ANTIBACKSLIDING

The proposed permit is consistent with the requirements to meet antibacksliding provisions of the CWA, Section 402(o) and 40 CFR §122.44(l)(i)(A), which state in part that interim or final effluent limitations must be as stringent as those in the previous permit, unless material and substantial alterations or

additions to the permitted facility occurred after permit issuance which justify the application of a less stringent effluent limitation. The proposed permit maintains limitations that are at least as stringent as or more stringent than the previous permit.

XI. ENDANGERED SPECIES CONSIDERATIONS

According to the most recent county listing available at USFWS, Southwest Region 2 website, <http://www.fws.gov/endangered/>, four species in Valencia County are listed as endangered or threatened. The Southwestern willow flycatcher (*Empidonax traillii*) and Rio Grande silvery minnow (*Hybognathus amarus*) are listed as endangered. The Mexican spotted owl (*Strix occidentalis lucida*) and Pecos sunflower (*Helianthus paradoxus*) are listed as threatened.

The Environmental Protection Agency (EPA) conducted a consultation with U.S. Fish and Wildlife Service (FWS) on the effects of permit renewal for Los Lunas wastewater treatment plant (WWTP) in 2001. EPA determined that the permit reissuance would have “no effect” on the Southwestern willow flycatcher, bald eagle, black footed ferret, Mexican spotted owl, whooping crane, and Pecos sunflower. EPA also determined that the permit reissuance action “may affect, but is not likely to adversely affect” the Rio Grande silvery minnow and its critical habitat. The FWS concurred with EPA’s determination in a letter dated June 28, 2001 (Cons. # 2-22-01-I-197), that the reissuance of the permit for Los Lunas WWTP “may affect, but is not likely to adversely affect” the Rio Grande silvery minnow and its critical habitat, and would have “no effect” on the Southwestern willow flycatcher.

Since the evaluation made by EPA and FWS in 2001, EPA has determined that the environmental baseline has changed due to the facility’s increase in design flow from 0.9 MGD to 2.7 MGD. In order to protect the species of concern, the Rio Grande silvery minnow, additional limits and monitoring were added to the draft permit. Because the discharge from Los Lunas WWTP provides a substantial amount of the flow needed to support the aquatic habitat for the Rio Grande silvery minnow, it is necessary to ensure that the in-stream D.O. concentration is maintained at an appropriate level for supporting aquatic life. Based on the marginal warmwater aquatic life designated use for the receiving water body (segment 20.6.4.105), the applicable criterion for D.O. is ≥ 5.0 mg/L. Thus, a D.O. limit of ≥ 5.0 mg/L (24-hour average) was incorporated into the draft permit. Based on data submitted in the facility’s application (Form 2A), both the average daily and maximum daily discharge are ≥ 5.0 mg/L, based on 16 samples. Thus, the permit will not include a compliance period for meeting these new limits.

According to effluent testing data supplied by the facility in their application (Form 2A), both the maximum daily and average daily ammonia concentrations are 0.00 ppm, based on a total of 5 samples. To further ensure that ammonia is not a pollutant of concern for this facility with the increased design flow, quarterly monitoring for ammonia has been incorporated into this draft permit.

EPA conducted an informal consultation with FWS in a letter dated November 9, 2012 requesting concurrence under Section 7 of the Endangered Species Act of 1973 that this permit issuance “may affect, but is not likely to adversely affect” the Rio Grande silvery minnow or its designated habitat. In a letter from FWS to EPA dated November 27, 2012, FWS concurred with EPA’s findings.

XII. HISTORICAL and ARCHEOLOGICAL PRESERVATION CONSIDERATIONS

The reissuance of the permit should have no impact on historical and/or archeological sites since construction activities are not planned for during the reissued permit cycle.

XIII. PERMIT REOPENER

The permit may be reopened and modified during the life of the permit if State Water Quality Standards are promulgated or revised. In addition, if the State amends a TMDL, this permit may be reopened to establish effluent limitations for the parameter(s) to be consistent with that TMDL. Modification of the permit is subject to the provisions of 40 CFR §124.5.

XIV. VARIANCE REQUESTS

No variance requests have been received.

XV. CERTIFICATION

The permit is in the process of certification by the State Agency following regulations promulgated at 40 CFR §124.53. A draft permit and draft public notice will be sent to the District Engineer, Corps of Engineers; to the Regional Director of the U.S. Fish and Wildlife Service and to the National Marine Fisheries Service prior to the publication of that notice.

XVI. FINAL DETERMINATION

The public notice describes the procedures for the formulation of final determinations.

XVII. ADMINISTRATIVE RECORD

The following information was used to develop the proposed permit:

A. APPLICATION(s)

EPA Application Form 2A received February 9, 2012.

B. 40 CFR CITATIONS

Citations to 40 CFR are as of November 8, 2012. Sections 122, 124, 125, 133, 136

C. STATE OF NEW MEXICO REFERENCES

New Mexico State Standards for Interstate and Intrastate Surface Water, 20.6.4 NMAC, as amended through January 14, 2011.

Procedures for Implementing National Pollutant Discharge Elimination System Permits in New Mexico, March 15, 2012.

Statewide Water Quality Management Plan and Continuing Planning Process, as approved by EPA on December 23, 2011.

State of New Mexico 303(d) List for Assessed Stream and River Reaches, 2012-2014.

Total Maximum Daily Load for Middle Rio Grande Watershed, April 13, 2010.

Appendix B

US-EPA Approved Total Maximum Daily Load (TMDL) for the Middle Rio Grande Watershed (Selected Pages)

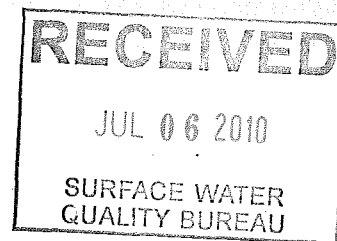


UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

JUN 30 2010

Ron Curry, Secretary
New Mexico Environment Department
P.O. Box 26110
Santa Fe, NM 87502



Re: Request for EPA Review and Approval for "Total Maximum Daily Load (TMDL) for the Middle Rio Grande Watershed"

Dear Mr. Curry:

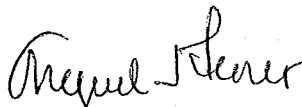
The Environmental Protection Agency (EPA) has received the final total maximum daily load (TMDL) package titled, "*Total Maximum Daily Load (TMDL) Report for the Middle Rio Grande Watershed*" for five (5) TMDLs. Based on our review, we conclude that the TMDLs listed above meet the requirements found in Section §303 of the Clean Water Act and the implementing regulations at 40 CFR §130.7. Therefore the EPA is pleased to approve the TMDL loads for the waters listed below.

<u>Water Body</u>	<u>Subsegment Number</u>	<u>Pollutant of Concern</u>
Rio Grande – Isleta Pueblo Boundary to Alameda Bridge	NM-2105_50	Escherichia coli
Rio Grande – Non-Pueblo Alameda to Angostura Diverson	NM-2105.1_00	Escherichia coli
Rio Grande – Rio Puerco to Isleta Pueblo Boundary	NM-2105_40	Escherichia coli
Rio Grande – San Marcial to USGS Gage to Rio Puerco	NM-2105_10	Escherichia coli and Alumnum

We note that you have included an aggregate Escherichia coli wasteload allocation (WLA) for municipal separate storm sewer systems (MS4) Phase II permittees. The MS4 Phase II permit expires on June 30, 2012. In order for the WLA for the Phase II permittees to be implementable in upcoming MS4 permits, NMED may need to provide to EPA, prior to current permit expiration, a mechanism to allow calculation of WLAs for individual MS4s. For future TMDLs, EPA strongly encourages NMED to provide separate WLAs for each covered entity.

We commend your staff for the considerable effort that went into developing and establishing this TMDL. If you would like to discuss this approval, please contact me at (214) 665-7101 or your staff may contact Linda Adams at (214)665-6546.

Sincerely yours,



Miguel I. Flores
Director

Water Quality Protection Division

Enclosure

US EPA-APPROVED

TOTAL MAXIMUM DAILY LOAD (TMDL)

FOR THE

Middle Rio Grande Watershed



JUNE 30, 2010

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LIST OF ABBREVIATIONS AND DEFINITIONS

AU	Assessment Unit
BLM	Bureau of Land Management
BMP	Best management practices- effective, practical, structural or nonstructural methods which prevent or reduce the movement of pollutants from the land to surface water.
CFR	Code of Federal Regulations
cfs	Cubic feet per second
CGP	Construction general storm water permit
CWA	Clean Water Act
°C	Degrees Celsius
°F	Degrees Fahrenheit
Ecoregion	Ecological regions based on geology, physiography, vegetation, climate, soils, land use, wildlife, and hydrology.
EQIP	Environmental Quality Incentive Program
GIS	Geographic Information Systems
HUC	Hydrologic unit code- a way of identifying all of the drainage basins in the United States in a catalogued arrangement from largest (Regions) to smallest (Cataloging Units).
LA	Load allocation
LFCC	Low Flow Conveyance Channel
mg/L	Milligrams per Liter
mi ²	Square miles
mL	Milliliters
MOS	Margin of safety
MOU	Memorandum of Understanding
MS4	Municipal Separate Storm Sewer System
MSGP	Multi-Sector General Storm Water Permit
NM	New Mexico
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NPDES	National Pollutant Discharge Elimination System-as authorized by the Clean Water Act, permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States.
%	Percent
QAPP	Quality Assurance Project Plan
RFP	Request for proposal
STORET	Storage and Retrieval Database- a repository for water quality, biological, and physical data and is used by state environmental agencies, EPA and other federal agencies, universities, private citizens, and others.
SWPPP	Storm Water Pollution Prevention Plan-a written document that describes the construction operator's activities to comply with the requirements in the construction general permit
SWQB	Surface Water Quality Bureau
TMDL	Total maximum daily load
USDA	U.S. Department of Agriculture

USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
WLA	Waste load allocation
WQCC	Water Quality Control Commission- The commission is the state water pollution control agency for NM, and for all purposes of the federal Clean Water Act and the wellhead protection and sole source aquifer programs of the federal Safe Drinking Water Act.
WQS	Water quality standards (NMAC 20.6.4 as amended through 2007)
WRAS	Watershed Restoration Action Strategy
WWTP	Wastewater treatment plant

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EXECUTIVE SUMMARY

Section 303(d) of the Federal Clean Water Act requires states to develop Total Maximum Daily Load (TMDL) management plans for waterbodies determined to be water quality limited. A TMDL documents the amount of a pollutant a waterbody can assimilate without violating a state's or a Tribe's water quality standard. It also allocates the load capacity to known point sources and nonpoint sources at a given flow. Total maximum daily loads are defined in 40 Code of Federal Regulations Part 130 as the sum of the individual Waste Load Allocations (WLAs) for point sources and Load Allocations (LAs) for nonpoint sources and background conditions, and includes a Margin of Safety (MOS). $TMDL = WLA + LA + MOS$

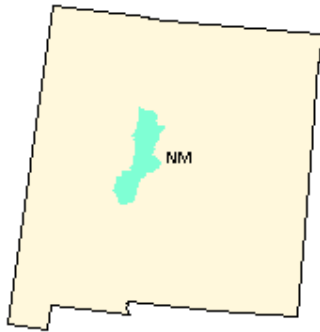
The Surface Water Quality Bureau (SWQB) held a pre-survey public meeting in Rio Rancho, NM on February 16, 2005 and conducted a surface water quality survey of the Middle Rio Grande watershed in 2005. Sampling stations were established along the streams in the watershed to evaluate the impact of tributary streams and to work toward establishing background conditions. As a result of assessing data generated during this monitoring effort, SWQB staff documented impairments of the New Mexico water quality standards for dissolved aluminum on Rio Grande (San Marcial at USGS Gage to Rio Puerco) and *E.coli* on Rio Grande (San Marcial at USGS Gage to Rio Puerco), Rio Grande (Rio Puerco to Isleta Pueblo boundary), Rio Grande (Isleta Pueblo boundary to Alameda Street Bridge), and Rio Grande (non-Pueblo Alameda Street Bridge to Angostura Diversion). This TMDL document addresses the above noted impairments as summarized in the tables that follow.

The data used to develop this TMDL were collected during the 2005 survey and additional collections by SWQB and other agencies from 2000-2007.

The 2005 Middle Rio Grande Watershed study also identified other potential water quality impairments in this watershed which are not addressed in this document. Subsequent TMDLs will be prepared in the near future in a separate TMDL document. SWQB developed TMDLs for fecal coliform in 2001 for the Rio Grande from Isleta Pueblo boundary to Angostura Diversion. The following *E.coli* TMDLs were developed to reflect the change in the water quality standards from fecal coliform to *E.coli*.

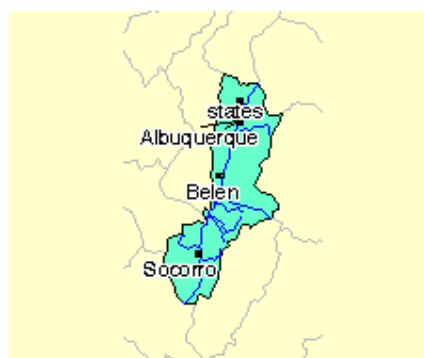
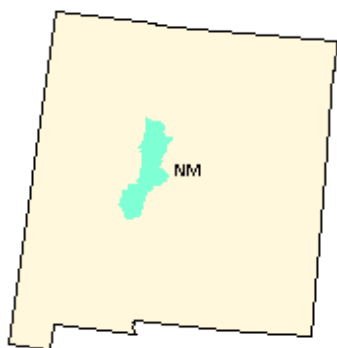
Additional water quality data will be collected by New Mexico Environment Department during the standard rotational period for water quality stream surveys. As a result, targets will be re-examined and potentially revised as this document is considered to be an evolving management plan. In the event that new data indicate that the targets used in this analysis are not appropriate and/or if new standards are adopted, the load capacity will be adjusted accordingly. When water quality standards have been achieved, the reach will be moved to the appropriate attainment category on the Clean Water Act Integrated §303(d)/§305(b) list of waters (NMED/SWQB 2008a).

**TOTAL MAXIMUM DAILY LOAD FOR *E.COLI*
RIO GRANDE (NON-PUEBLO ALAMEDA TO ANGOSTURA DIVERSION)**



New Mexico Standards Segment	Rio Grande Basin 20.6.4.106
Assessment Unit Identifier	Rio Grande (non-Pueblo Alameda to Angostura Diversion) NM-2105.1_00 (formerly NM-MRG3-30000)
Assessment Unit Length	11.66 miles
Parameters of Concern	<i>E.coli</i>
Designated Uses Affected	Secondary Contact
Geographic Location	Rio Grande-Albuquerque USGS Hydrologic Unit Code 13020203
Scope/size of Watershed	17, 006 square miles
Land Type	Arizona/New Mexico Plateau Ecoregion (22)
Land Use/Cover	Forest (94%), Barren/sand/clay (3%), Residential/commercial (1%), open water (1%)
Probable Sources	Avian Sources (waterfowl and/or other), Impervious Surface/Parking Lot Runoff, Municipal (Urbanized High Density Area), Municipal Point Source Discharges, On-site Treatment Systems (Septic Systems and Similar Decentralized Systems), Source Unknown, Wastes from Pets.
Land Management	USFS (38%), Private (36%), BLM (10%), Pueblo (9%), State (4%)
IR Category	5/5C
Priority Ranking	High
TMDL for:	WLA + LA + MOS = TMDL
<i>E.coli</i>	
High	$3.15 \times 10^{11} + 4.93 \times 10^{12} + 2.77 \times 10^{11} = 5.54 \times 10^{12}$ cfu/100 mL/day
Moist	$9.11 \times 10^{10} + 1.43 \times 10^{12} + 3.26 \times 10^{12} = 8.06 \times 10^{10}$ cfu/100 mL/day
Dry	$3.26 \times 10^{10} + 5.10 \times 10^{11} + 1.15 \times 10^{12} = 2.92 \times 10^{10}$ cfu/100mL/day
Low	$1.68 \times 10^{10} + 2.63 \times 10^{11} + 7.93 \times 10^9 = 2.96 \times 10^9$ cfu/100 mL/day

**TOTAL MAXIMUM DAILY LOAD FOR *E. COLI*
RIO GRANDE (ISLETA PUEBLO BOUNDARY TO ALAMEDA BRIDGE)**



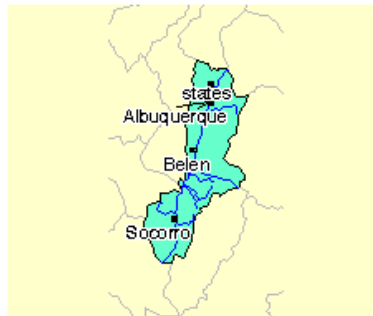
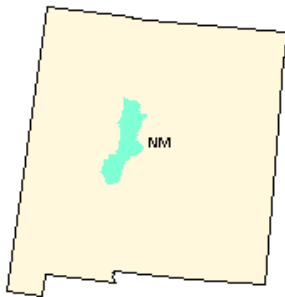
New Mexico Standards Segment	Rio Grande Basin 20.6.4.105
Assessment Unit Identifier	Rio Grande (Isleta Pueblo boundary to Alameda bridge) NM-2105_50 (formerly NM-MRG3-30000)
Assessment Unit Length	20.4 miles
Parameters of Concern	<i>E.coli</i>
Designated Uses Affected	Secondary Contact
Geographic Location	Rio Grande-Albuquerque USGS Hydrologic Unit Code 13020203
Scope/size of Watershed	17, 501 square miles
Land Type	Arizona/New Mexico Plateau Ecoregion (22)
Land Use/Cover	Forest (93%), Residential/commercial (3%), Barren/sand/clay (3%), Open water (1%)
Probable Sources	Avian Sources (waterfowl and/or other), Impervious Surface/Parking Lot Runoff, Municipal (Urbanized High Density Area), Municipal Point Source Discharges, On-site Treatment Systems (Septic Systems and Similar Decentralized Systems), Source Unknown, Wastes from Pets.
Land Management	USFS (38%), Private (37%), BLM (10%), Pueblo (9%), State (4%)
IR Category	5/5B
Priority Ranking	High
TMDL for:	WLA + LA + MOS = TMDL
<i>E.coli</i>	
High	$5.08 \times 10^{11} + 3.36 \times 10^{12} + 1.40 \times 10^{12} = 5.27 \times 10^{12}$ cfu/100 mL/day
Moist	$2.28 \times 10^{11} + 8.41 \times 10^{11} + 5.77 \times 10^{11} = 1.65 \times 10^{12}$ cfu/100 mL/day
Mid-range	$1.98 \times 10^{11} + 5.66 \times 10^{11} + 1.38 \times 10^{11} = 9.03 \times 10^{11}$ cfu/100 mL/day
Dry	$1.58 \times 10^{11} + 2.09 \times 10^{11} + 2.10 \times 10^{11} = 5.77 \times 10^{11}$ cfu/100 mL/day
Low	$1.40 \times 10^{11} + 4.86 \times 10^{10} + 1.89 \times 10^9 = 1.89 \times 10^{11}$ cfu/100 mL/day

**TOTAL MAXIMUM DAILY LOAD FOR *E.COLI*
RIO GRANDE (RIO PUERCO TO ISLETA PUEBLO BOUNDARY)**



New Mexico Standards Segment	Rio Grande Basin 20.6.4.105
Assessment Unit Identifier	Rio Grande (Rio Puerco to Isleta Pueblo boundary) NM-2105_40 (formerly NM-MRG3-20000)
Assessment Unit Length	35.4 miles
Parameters of Concern	<i>E.coli</i>
Designated Uses Affected	Secondary Contact
Geographic Location	Rio Grande-Albuquerque USGS Hydrologic Unit Code 13020203
Scope/size of Watershed	18,841 square miles
Land Type	Arizona/New Mexico Plateau Ecoregion (22)
Land Use/Cover	Forest (92%), Barren/sand/clay (4%), Residential/commercial (3%), Open water (1%)
Probable Sources	Avian Sources (waterfowl and/or other), Impervious Surface/Parking Lot Runoff, Municipal (Urbanized High Density Area), Municipal Point Source Discharges, On-site Treatment Systems (Septic Systems and Similar Decentralized Systems), Wastes from Pets.
Land Management	Private (39%), USFS (36%), Pueblo (10%), BLM (9%), State (4%)
IR Category	5
Priority Ranking	High
TMDL for:	WLA + LA + MOS = TMDL
<i>E.coli</i>	
High	$1.66 \times 10^{10} + 9.00 \times 10^{12} + 3.02 \times 10^{12} = 1.20 \times 10^{13}$ cfu/100 mL/day
Moist	$1.66 \times 10^{10} + 2.47 \times 10^{12} + 1.34 \times 10^{12} = 3.83 \times 10^{12}$ cfu/100 mL/day
Dry	$1.66 \times 10^{10} + 1.59 \times 10^{11} + 9.26 \times 10^9 = 1.85 \times 10^{11}$ cfu/100 mL/day

**TOTAL MAXIMUM DAILY LOAD FOR ALUMINUM AND *E.COLI*
RIO GRANDE (SAN MARCIAL AT USGS GAGE TO RIO PUERCO)**



New Mexico Standards Segment	Rio Grande Basin 20.6.4.105
Assessment Unit Identifier	Rio Grande (San Marcial at USGS gage to Rio Puerco) NM-2105_10 (formerly NM-MRG3-10000)
Assessment Unit Length	59.39 miles
Parameters of Concern	Aluminum, <i>E.coli</i>
Designated Uses Affected	Marginal Warmwater Aquatic Life, Secondary Contact
Geographic Location	Rio Grande-Albuquerque USGS Hydrologic Unit Code 13020203
Scope/size of Watershed	27, 410 square miles
Land Type	Chihuahuan Desert Ecoregion (24)
Land Use/Cover	Forest (91%), Barren/sand/clay (5%), Residential/commercial (2%), Open water (1%)
Probable Sources	Avian Sources (waterfowl and/or other), Impervious Surface/Parking Lot Runoff, Municipal (Urbanized High Density Area), Municipal Point Source Discharges, Natural Sources, On-site Treatment Systems (Septic Systems and Similar Decentralized Systems), Wastes from Pets.
Land Management	Private (37%), USFS (28%), Pueblo (15%), BLM (13%), State (5%)
IR Category	5
Priority Ranking	High
TMDL for:	WLA + LA + MOS = TMDL
Aluminum	
High	$1.89 + 1171 + 558 = 1731$ lbs/day
Dry	$1.89 + 38.8 + 2.13 = 42.8$ lbs/day
<i>E.coli</i>	
High	$6.21 \times 10^9 + 7.72 \times 10^{12} + 3.67 \times 10^{12} = 1.14 \times 10^{13}$ cfu/100 mL/day
Moist	$6.21 \times 10^9 + 2.16 \times 10^{12} + 1.23 \times 10^{12} = 3.40 \times 10^{12}$ cfu/100 mL/day
Mid-range	$6.21 \times 10^9 + 1.10 \times 10^{12} + 5.56 \times 10^{11} = 1.66 \times 10^{12}$ cfu/100 mL/day
Dry	$6.21 \times 10^9 + 2.61 \times 10^{11} + 1.40 \times 10^{10} = 2.81 \times 10^{11}$ cfu/100 mL/day

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1.0 INTRODUCTION

Under Section 303 of the Clean Water Act (CWA), states establish water quality standards, which are submitted and subject to approval of the U.S. Environmental Protection Agency (USEPA). Under Section 303(d)(1) of the CWA, states are required to develop a list of waters within a state that are impaired and establish a total maximum daily load (TMDL) for each pollutant. A TMDL is defined as “*a written plan and analysis established to ensure that a waterbody will attain and maintain water quality standards including consideration of existing pollutant loads and reasonably foreseeable increases in pollutant loads*” (USEPA 1999). A TMDL documents the amount of a pollutant a waterbody can assimilate without violating a state’s or a tribe’s water quality standards. It also allocates that load capacity to known point sources and nonpoint sources at a given flow. TMDLs are defined in 40 Code of Federal Regulations (CFR) Part 130 as the sum of the individual Waste Load Allocations (WLAs) for point sources and Load Allocations (LAs) for nonpoint sources and natural background conditions, and includes a margin of safety (MOS). This document provides TMDLs for assessment units within the Middle Rio Grande watershed that are impaired based on a comparison of measured concentrations with water quality criteria.

This document is divided into several sections. Section 2.0 provides background information on the location and history of the Middle Rio Grande watershed, provides applicable water quality standards for the assessment units addressed in this document, and briefly discusses the water quality survey conducted in the Middle Rio Grande in 2005. Section 3.0 presents the TMDLs developed for dissolved aluminum and Section 4.0 includes the *E.coli* TMDLs developed for the Middle Rio Grande watershed. Pursuant to Section 106(e)(1) of the Federal CWA, Section 5.0 provides a monitoring plan in which methods, systems, and procedures for data collection and analysis are discussed. Section 6.0 discusses implementation of TMDLs and the relationship between TMDLs and Watershed Restoration Action Strategies (WRAS). Section 7.0 discusses assurance, Section 8.0 public participation in the TMDL process, and Section 9.0 provides references.

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2.0 BACKGROUND

The Middle Rio Grande (MRG) watershed was sampled by the Surface Water Quality Bureau (SWQB) from March to October 2005. The Middle Rio Grande Basin includes the Rio Grande from San Marcial to Angostura Diversion. Surface water quality monitoring stations were selected to characterize water quality of the stream reaches. The SWQB has divided the MRG into four assessment units (AU) and all four AUs are addressed with TMDLs in this document. The 2005 MRG Tributary study also identified other potential water quality impairments in this watershed which are not addressed in this document. The results of water quality assessments performed following the MRG tributary survey are available on the 2008-2010 State of New Mexico CWA §303(d)/§305(b) Integrated List. Subsequent TMDLs will be prepared in the near future in a separate TMDL document. SWQB developed fecal coliform TMDLs for the Rio Grande from the Isleta Pueblo boundary to Angostura Diversion in 2001 (NMED/SWQB, 2001). The *E.coli* TMDLs discussed in this document were developed to reflect the changes in the State of New Mexico Water Quality Standards from fecal coliform to *E.coli*.

2.1 Description and Land Ownership

The Rio Grande drainage extends from the southern Colorado Rockies and enters into New Mexico just north of the Rio Grande Gorge. The Middle Rio Grande watershed (US Geological Survey [USGS] Hydrologic Unit Code [HUC] 13020203) is located in Sandoval, Bernalillo, Valencia, and Socorro Counties in central New Mexico (NM).

The Rio Grande-Albuquerque HUC (13020203) covers approximately 3,204 square miles (mi²) in central New Mexico (NM). Land use for the 13020203 HUC includes 57% shrubland, 24% grassland, 9% forest, 5% residential/commercial, 2% pasture/hay crops, and 2% barren rock/quarries (Figure 2.1). Land ownership for the 13020203 HUC is 52% private, 12% BLM, 9% USFS, 10% FWS, 10% Pueblo, 5% State, and 2% Department of Defense (Figure 2.2). The values listed in the Executive Summary describe the individual Assessment Unit watersheds.

Twenty-three river water quality sites and five drain and arroyo sites were sampled during this survey (Figures 2.1 through 2.3). Table 2.2 details location descriptions of sampling stations in each assessment unit (AU), station numbers, and STORET identification codes.

Natural Heritage New Mexico is a division of the Museum of Southwestern Biology at the University of New Mexico. The organization stores and retrieves data and maps of the distribution of plants and animals throughout New Mexico. Data from the Natural Heritage New Mexico website was used in the development of Table 2.1 which displays the state and federally listed endangered and threatened species within the HUC discussed in this TMDL.

2.2 History and Geology

The Rio Grande drainage extends from the southern Colorado Rockies through New Mexico and Texas where it finally reaches the Gulf of Mexico at sea level. Native American communities, including Pueblo, Navajo, and Apache groups have occupied the region since the early 1300's. Since early Spanish occupancy, the basin has experienced irrigated farming, grazing, fire suppression, and intensive hunting and along with the introduction of exotic plants, droughts, and floods the valley has undergone drastic changes since pre-colonial times (Scurlock, 1998). The acequia system of southern Colorado and northcentral New Mexico is the oldest, continuously operated water management system in the United States. The first acequias were established when Oñate established the first Spanish colony in New Mexico in 1598 (Rivera, 1999). Spanish settlements eventually extended down river to Cochiti and as far south as Socorro. Missions reached the Bernalillo to Isleta Pueblo reach of the Rio Grande by the mid-1620's. The Spanish providence in New Mexico was divided into two administrative units, the lower reach between Cochiti and Socorro was named Rio Abajo (Scurlock, 1998). Spanish land grants were issued in the late 1700's through the early 1800's and the farming and grazing that occurred on these land grants continue to be an important part of the cultural identity of the basin. The first non-Spanish Europeans in the Rio Grande valley were French trappers from the Mississippi Valley who came during the 18th and early 19th centuries. (Scurlock, 1998). The Santa Fe Trail was eventually established and linked up the with Camino Real that followed the Rio Grande into Mexico. Settlements in the Rio Grande Valley continued as the railroad was established in the region. The Middle Rio Grande Valley currently supports diverse land uses, from agriculture to the largest municipality in the state (Albuquerque, est 1706).

The MRG basin is primarily comprised of alluvial deposits, specifically the Quemado Formation and Upper Santa Fe Group (Figure 2.3). A number of gypsum mines operate in the basin below Cochiti Reservoir. Both the Ortiz and San Pedro Mountains in the Rio Grande basin contain Tertiary volcanic intrusions that pushed up on the east side of the Rio Grande Rift. An noteworthy result of this intrusions was the formation of turquoise, which has been mined in the area as early as 900 A.D. (Chronic, 1987). Gold, silver, anthracite coal, and lead were later mined in the mountains in the MRG basin. The 20-mile long Sandia Mountains flank the east side of Albuquerque. The Sandia Mountains are comprised of 1.4 billion year old Precambrian granite covered in 300-million year old Pennsylvanian sedimentary rocks and reach to over 10,000 feet in elevation (Chronic, 1987). South of the Sandia Mountains are the Manzano Mountains which are also fault block mountains. The Albuquerque volcanoes, west of the city, were last active in the Pleistocene Era and similar volcanoes exist south of Albuquerque near Isleta. Throughout this area, the Rio Grande Rift is much deeper than it seems and is filled with thousands of feet of alluvial deposits. The Albuquerque-Belen basin extends south of Albuquerque and is comprised of similar alluvial terraces as in the Albuquerque area. Small volcanoes also continue south of Albuquerque and include Sierra Lucero and Ladrone Peak (Chronic, 1987). The Rio Grande floodplain is broad and marshy downstream of the Rio Puerco and is the seasonal home to migratory birds. The floodplain is marshy near Socorro due to the Socorro Constriction from the surrounding mountain ranges. The Lemitar Mountains, southwest of the convergence of the Rio Salado with the Rio Grande, consist of a series of Precambrian and Paleozoic rocks. The southernmost end of this range consists of Tertiary lava flows that overlay the Paleozoic sedimentary rocks (Chronic, 1987). The mountains downstream of the Lemitar

Mountains include the Los Piños Mountains and the Socorro Mountains. The former is primarily Pennsylvanian and Permian sedimentary rocks and the latter is comprised of volcanic rocks from a former caldera. Continuing southward along the Rio Grande valley are the Magdalena, San Mateo, and Mimbres Mountains. Continuing southward along the Rio Grande valley to Elephant Butte Reservoir, the rocks to the west of the river continue to be volcanic.

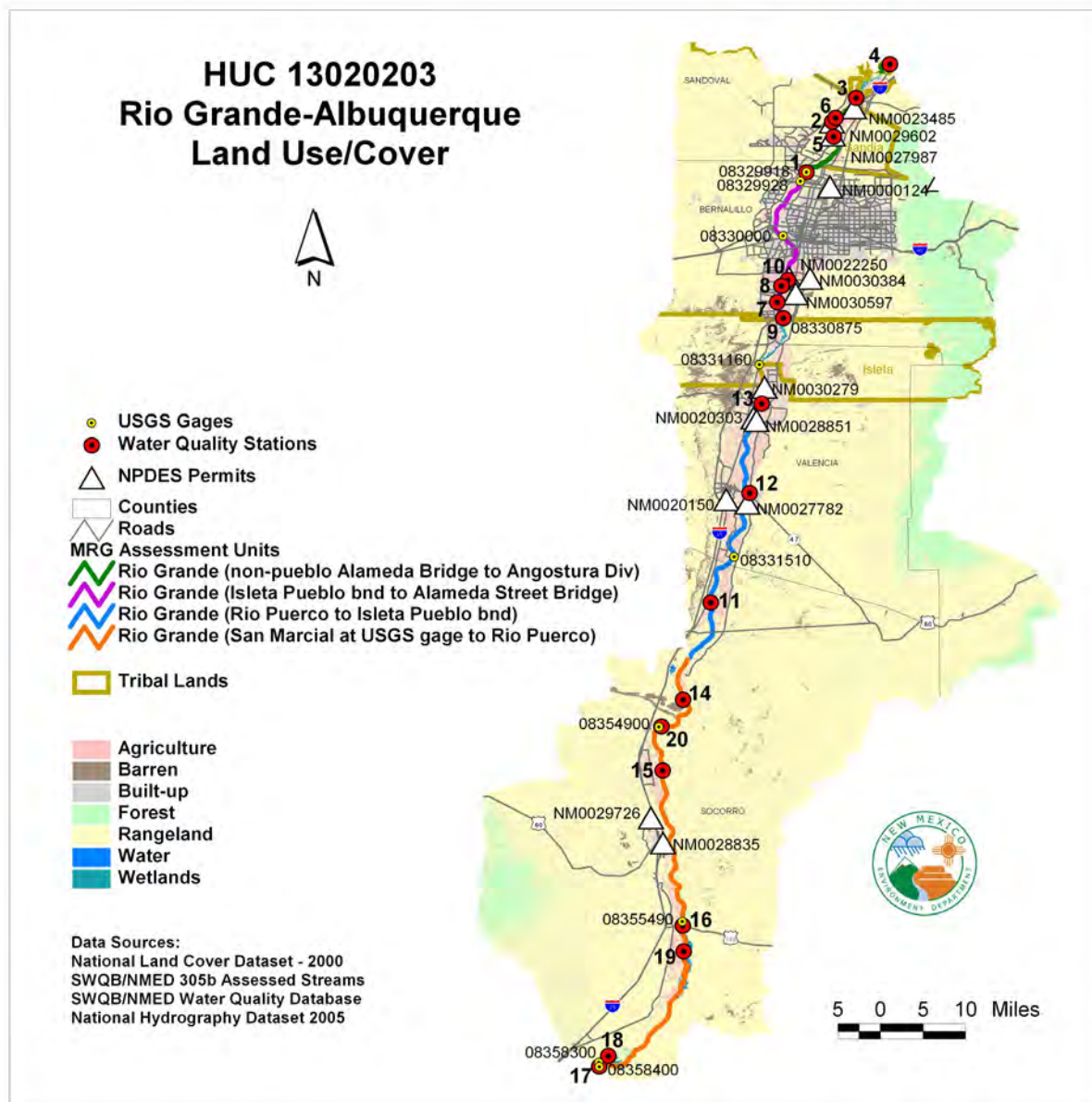


Figure 2.1 Middle Rio Grande Watershed Land Use/Land Cover

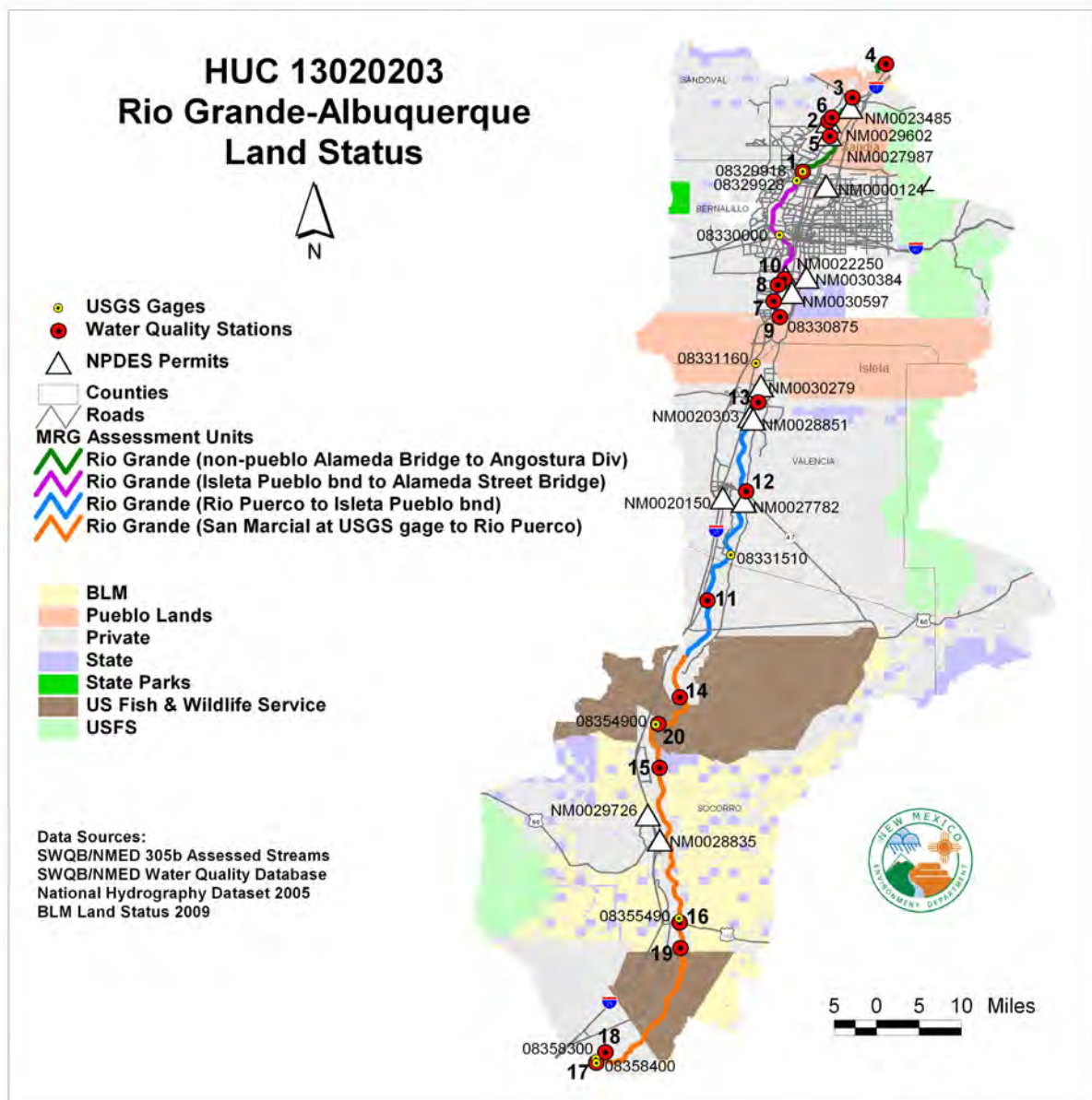


Figure 2.2 Middle Rio Grande Watershed Land Ownership

Table 2.1 State and Federally Listed Endangered and Threatened Species

HUC	Common Name	Scientific Name	Status
13020203	Chupadera Springsnail	<i>Pyrgulopsis chupaderae</i>	C, E
13020203	Socorro Isopod	<i>Thermosphaeroma thermophilum</i>	LE, E
13020203	Socorro Springsnail	<i>Pyrgulopsis neomexicana</i>	LE, E
13020203	Rio Grande Silvery Minnow	<i>Hybognathus amarus</i>	LE, E
13020203	Bald Eagle	<i>Haliaeetus leucocephalus</i>	T
13020203	Common Black-Hawk	<i>Buteogallus anthracinus</i>	T
13020203	Piping Plover	<i>Charadrius melodus</i>	LE, LT, T
13020203	Western Yellow-billed Cuckoo	<i>Coccyzus americanus occidentalis</i>	C
13020203	Whooping Crane	<i>Grus americana</i>	LE, XN, E
13020203	Mexican Spotted Owl	<i>Strix occidentalis lucida</i>	LT
13020203	Southwestern Willow Flycatcher	<i>Empidonax traillii extimus</i>	LE, E
13020203	Bell's Vireo	<i>Vireo bellii</i>	T
13020203	Gray Vireo	<i>Vireo vicinior</i>	T
13020203	New Mexican Jumping Mouse	<i>Zapus hudsonius luteus</i>	E
13020203	Spotted Bat	<i>Euderma maculatum</i>	T

Notes:

C = Candidate taxa for which the USFWS has on file enough substantial information on biological vulnerability and threat(s) to support proposals to list them as endangered or threatened species.

E = State of New Mexico-endangered status.

LE = Federally listed endangered species.

LT = Federally listed threatened species.

T = State of New Mexico-threatened status.

XN = nonessential experimental population

2.3 Water Quality Standards

The EPA-approved water quality standards (WQS) currently applicable to the Rio Grande are set forth in the following section of *New Mexico Standards for Interstate and Intrastate Surface Waters* (20.6.4 NMAC), effective August 2007:

- 20.6.4.105 RIO GRANDE BASIN - The main stem of the Rio Grande from the headwaters of Elephant Butte reservoir upstream to Alameda bridge (Corrales bridge) and intermittent water below the perennial reaches of the Rio Puerco that enters the main stem of the Rio Grande.**
- A. Designated Uses:** irrigation, marginal warmwater aquatic life, livestock watering, wildlife habitat and secondary contact.
- B. Applicable Criteria:**
- (1) The use-specific numeric criteria set forth in 20.6.4.900 NMAC are applicable to the designated uses listed above in Subsection A of this section.
 - (2) The monthly geometric mean of *E. coli* bacteria 126 cfu/100 mL or less; single sample 410 cfu/100 mL or less (see Subsection B of 20.6.4.14 NMAC).
- 20.6.4.106 RIO GRANDE BASIN - The main stem of the Rio Grande from Alameda bridge (Corrales bridge) upstream to the Angostura diversion works and intermittent water in the Jemez river below the Jemez pueblo boundary that enters the main stem of the Rio Grande.**
- A. Designated Uses:** irrigation, marginal warmwater aquatic life, livestock watering, wildlife habitat and secondary contact.
- B. Applicable Criteria:**
- (1) The use-specific numeric criteria set forth in 20.6.4.900 NMAC are applicable to the designated uses listed above in Subsection A of this section.
 - (2) The monthly geometric mean of *E. coli* bacteria 126 cfu/100 mL or less; single sample 410 cfu/100 mL or less (see Subsection B of 20.6.4.14 NMAC).

20.6.4.900 NMAC provides standards applicable to attainable or designated uses unless otherwise specified in 20.6.4.101 through 20.6.4.899 NMAC. 20.6.4.13 NMAC lists general criteria that apply to all surface waters of the state at all times, unless a specified criterion is provided elsewhere in 20.6.4 NMAC.

Additionally, both the Pueblo of Sandia and the Pueblo of Isleta have standards for the Rio Grande that are applicable to tribal waters within the watershed discussed in this document. Section V, Part A of the Pueblo of Sandia Water Quality Standards (Pueblo of Sandia, 2008)

reads:

- A. *The uses and standards are as follows for the segment of the Rio Grande that passes through the PUEBLO OF SANDIA Reservation, from a northernmost point located in Township 13 North, Range 4 East, Section 31, Southeast Quarter of the Northwest Quarter of the Southeast Quarter, to a southernmost point located in Township 11 North, Range 3 East, Section 3, Northeast Quarter of the Northwest Quarter of the Southwest Quarter, and the following waterways: Albuquerque Main Canal, Bernalillo Acequia, Corrales Main Canal, Sandia Acequia and Wasteway, Alameda Lateral, Bosque Lateral No. 2, and Sandia Lateral No. 2 (Station 426+00 at Albuquerque Main Canal).*

Section V, Part A.2 (Pueblo of Sandia, 2008) lists the standard for E.coli as follows:

c. *Escherichia coli*

1. *geometric mean maximum: 47 colonies/100 ml*
2. *single sample maximum of 88 colonies/100 ml, in accordance with an illness rate of 4 per 1,000 exposures*

Likewise, Section V of the Pueblo of Isleta Water Quality Standards (Pueblo of Isleta, 2002) reads:

- A. *The designated uses are as follows for the segment of the Rio Grande that passes through the PUEBLO OF ISLETA Reservation, from a northernmost point located in Township 8 North, Range 2 East, Section 1, Southwest Quarter, approximately ¼ mile south of the I-25 overpass over the Rio Grande, to a southernmost point located in Township 7 North, Range 2 East, Section 15, Northeast Quarter, approximately two miles north of the State Road 49 bridge over the Rio Grande, including all tributaries thereof, except for water bodies such as Drains, that are especially designated in this Section (Section V):*
1. *Uses:*
 - a. *Warmwater fishery use*
 - b. *Primary contact ceremonial use*
 - c. *Primary contact recreational use*
 - d. *Agricultural water supply use*
 - e. *Industrial water supply use*
 - f. *Wildlife usage*

The applicable WQS specific to both the Primary Contact Ceremonial Use and the Primary Contact Recreational Use are listed in Section IV, Parts D and E as follows:

a) *Bacteria*

- *Geometric mean maximum Escherichia coli (E.coli): 47 per 100 mL (geometric mean calculation based on a minimum of five samples taken over a maximum of 30 days)*
- *Single sample maximum: 88 colonies/100 mL.*

The appropriate tribal WQS will be used in the TMDL calculations in this document (Section 3.1 and Section 4.1). Assessment Units that are upstream of water with Tribal jurisdiction will have TMDLs calculated based on the Tribal, rather than the State, WQS. The regulations in 40 CFR §131.10(b) require the development of the TMDL using the Tribal standards in order to be protective of the downstream standards. The regulations in 40 CFR §122.4(d) require allocations and effluent limits to be developed using the Tribal standards in order to be protective of the downstream waters.

2.4 Water Quality Sampling

The Middle Rio Grande watershed was sampled by the SWQB in 2005. A brief summary of the survey and the hydrologic conditions during the sample period is provided in the following subsections. A more detailed description of the Middle Rio Grande survey can be found in *Water Quality Monitoring of the Middle Rio Grande: 2000-2007* (NMED/SWQB 2009b). Survey summary reports are also available by contacting SWQB at 505-827-0187 or by emailing the contacts listed on the SWQB website at <http://www.nmenv.state.nm.us/swqb>.

2.4.1 Survey Design

Surface water quality samples were collected monthly between March and October during the 2005 SWQB study. Surface water quality monitoring stations were selected to characterize water quality of various assessment units (i.e., stream reaches) throughout the watershed (Table 2.2, Figures 2.1 through 2.3). Stations were located to evaluate the impact of tributary streams and to determine ambient and background water quality conditions. Surface water grab and composite samples were analyzed for a variety of chemical/physical parameters. Data from grab samples and field measurements are housed in the SWQB provisional water quality database and were uploaded to USEPA's Storage and Retrieval (STORET) database.

Table 2.2 SWQB 2005 Middle Rio Grande Sampling Stations

Site Number	Assessment Unit	STORET ID	Station Description
1	Rio Grande (non-Pueblo Alameda to Angostura Diversion)	32RGrand445.4	Rio Grande above Alameda Bridge ^{a, c, t}
2		32RGrand458.0	Rio Grande above Rio Rancho WWTF #3
3		32RGrand464.2	Rio Grande abv Hwy 550 Bridge ^a
4		30RGrand473.7	Rio Grande Below Angostura Diversion Works ^c
5		32RGrand455.0	Rio Grande blw RR WWTF #2 ^c
6		32RGrand458.9	Rio Grande on Sandia Pueblo ^b
NM0023485		NM0023485	Bernalillo WWTP effluent
NM0027987		NM0027987	Rio Rancho #2 WWTP
7	Rio Grande (Isleta Pueblo bnd to Alameda Street Bridge)	32RGrand419.7	Rio Grande @ Los Padillas ^{s, t}
8		32RGrand416.5	Rio Grande @ Los Padillas ^d
9		32RGrand413.2	Rio Grande @ I-25 Bridge ^d
10		32RGrand421.2	Rio Grande blw Abq WWTF ^d
NM0022250		NM0022250	Albuquerque WWTP effluent
11	Rio Grande (Rio Puerco to Isleta Pueblo bnd)	32RGrand361.7	Rio Grande @ Abeytas ^{s, t}
12		32RGrand385.5	Rio Grande at Belen (309 Bridge) ^{a, c}
13		32RGrand394.8	Rio Grande at Hwy 6 at Los Lunas, NM ^{a, c, t}
NM0020150		NM0020150	Belen WWTP effluent
NM0030279		NM0030279	Bosque Farms WWTP effluent
NM0020303		NM0020303	Los Lunas WWTP effluent
14	Rio Grande (San Marcial at USGS gage to Rio Puerco)	32RGrand341.2	Rio Grande @ La Joya ^{c, t}
15		32RGrand323.4	Rio Grande @ Lemitar ^c
16		32RGrand292.1	Rio Grande at San Antonio ^{a, c, t}
17		32RGrand258.0	Rio Grande at USGS gage near San Marcial ^t
18		32RGrand261.0	Rio Grande Conveyance Channel at San Marcial near USGS gage 0858300
19		32RGrand286.9	Rio Grande @ Bosque del Apache ^d
20		32RGrand332.5	Rio Grande at San Acacia above diversion dam ^d
NM0028835		NM0028835	Socorro WWTP effluent

^a Grab and composite samples collected throughout 2005

^b EMAP site

^c SWQB MRG (2005) and BoR (2006-2007) grant site

^d SWQB MRG BoR (2006-2007) grant site only

^s Sonde deployed

^t Water thermograph deployed

All sampling and assessment techniques used during the 2005 SWQB survey are detailed in the *Quality Assurance Project Plan* (QAPP) (NMED/SWQB 2009a) and assessment protocols (NMED/SWQB 2008b) both of which are available online or may be obtained by contacting the SWQB at 505-827-0187. As a result of the 2005 SWQB monitoring effort, several impairments were identified. Accordingly, these impairments were added to the 2008-2010 Integrated CWA §303 (d)/305(b) list (NMED/SWQB 2008a).

2.4.2 Hydrologic Conditions

There are 69 U.S. Geological Survey (USGS) gaging stations in the 13020203 HUC watershed. The real-time, active USGS gages on the Rio Grande in the 13020203 HUC are listed in Table 2.3. Tables 2.4-2.7 display the mean daily streamflow for the 4 USGS gages used in the TMDL calculations.

The Flood Control Act of 1948 established the MRG Project which authorized the Bureau of Reclamation to perform maintenance on the river channel and the Low Flow Conveyance Channel (LFCC). The initial work on the MRG Project in the 1950's and 1960's consisted of the construction of the LFCC between San Acacia Diversion Dam and Elephant Butte Reservoir. (USBR, 2007). The LFCC was constructed to reduce seepage losses as water moved downstream to Elephant Butte Reservoir. After 1959, most of the water from the Rio Grande was diverted to the LFCC at the San Acacia Diversion Dam and travelled 75 miles downstream to the head of Elephant Butte Reservoir (Price *et al*, 2007). The LFCC parallels the Rio Grande and serves as an riverside drain. (MRGESCP, 2004). During the irrigation season, the Rio Grande is intermittent in this reach. The March 2003 Biological Opinion specifies that the Bureau of Reclamation will pump water from the LFCC into the Rio Grande when intermittency is likely and these pumping actions are subject to permits from the Office of the State Engineer (MRGESCP, 2004).

The 2005 SWQB survey was performed over varying flow conditions from March to October. As stated in the Assessment Protocol (NMED/SWQB 2008b), data collected during all flow conditions, including low flow conditions (i.e., flows below the 4-day, 3-year low flow frequency [4Q3]), will be used to determine attainment status of designated or existing uses. In terms of assessing designated use attainment in ambient surface waters, WQS apply at all times under all flow conditions, unless the WQS specify a qualifier.

Table 2.3: Active real-time USGS gages on Rio Grande in HUC 13020203

Gage Number	Gage Name	Period of Record ¹	4Q3* (cfs)
08317400	Rio Grande below Cochiti Dam, NM	1974-2008	148
08329918	Rio Grande at Alameda Bridge at Alameda, NM	2003-2008	233
08329928	Rio Grande near Alameda, NM	1989-2008	191
08330000	Rio Grande at Albuquerque, NM	1942-2008	72.3
08330875	Rio Grande at Isleta Lakes near Isleta, NM	2002-2008	147
08331160	Rio Grande near Bosque Farms, NM	2006-2008	n/a
08331510	Rio Grande at State Hwy 346 near Bosque, NM	2005-2008	n/a
08354900	Rio Grande Floodway at San Acacia, NM	1958-2008	2.90
08355490	Rio Grande above US Hwy 380 near San Antonio, NM	2005-2008	n/a
08358400	Rio Grande Floodway at San Marcial, NM	1949-2008	0
08358300	Rio Grande Conveyance Channel at San Marcial, NM ²	1951-2008	6.20

* 4Q3 calculated using USGS flow data and DFlow 3.1b software

¹ Impoundment of the Rio Grande behind Cochiti Reservoir began in 1973. The 4Q3 was calculated for the period of record beginning in 1974.

² Conveyance channel is managed by U.S. Bureau of Reclamation and is a diversion of the Rio Grande.

n/a = not available due to limited flow data

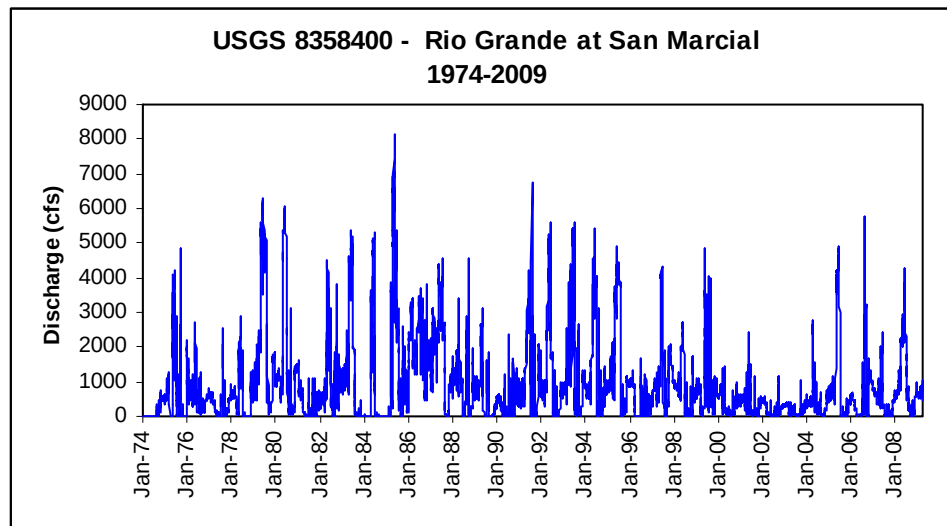


Figure 2.4 Daily Mean Streamflow: USGS 08358400 - Rio Grande at San Marcial

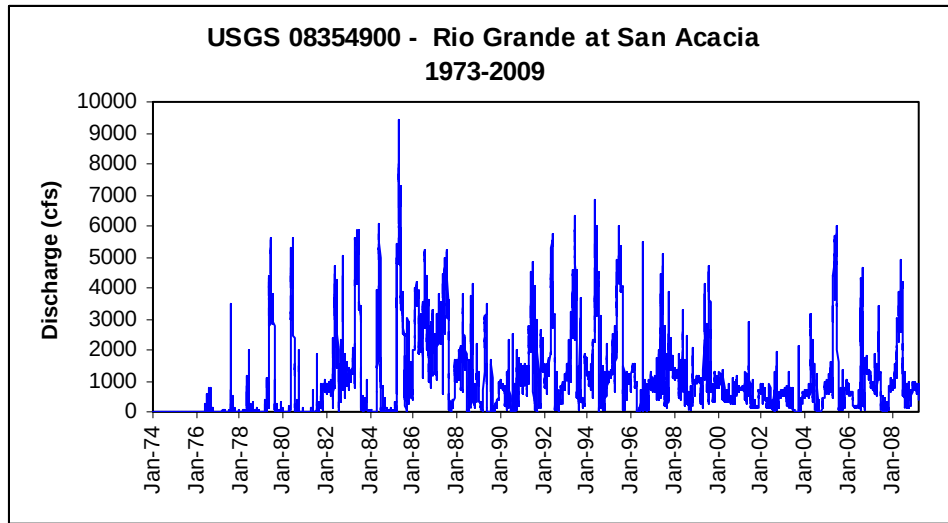


Figure 2.5 Daily Mean Streamflow: USGS 08354900 - Rio Grande at San Acacia

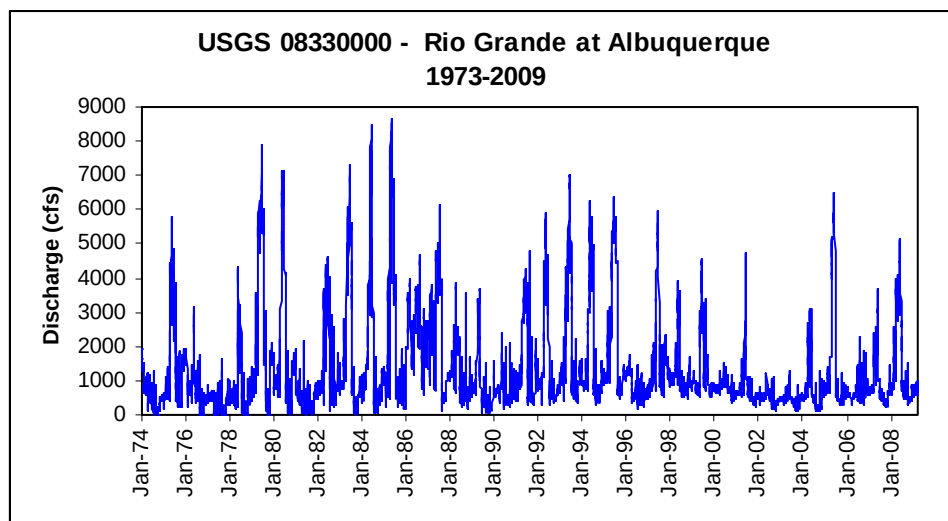


Figure 2.6 Daily Mean Streamflow: USGS 08330000 - Rio Grande at Albuquerque

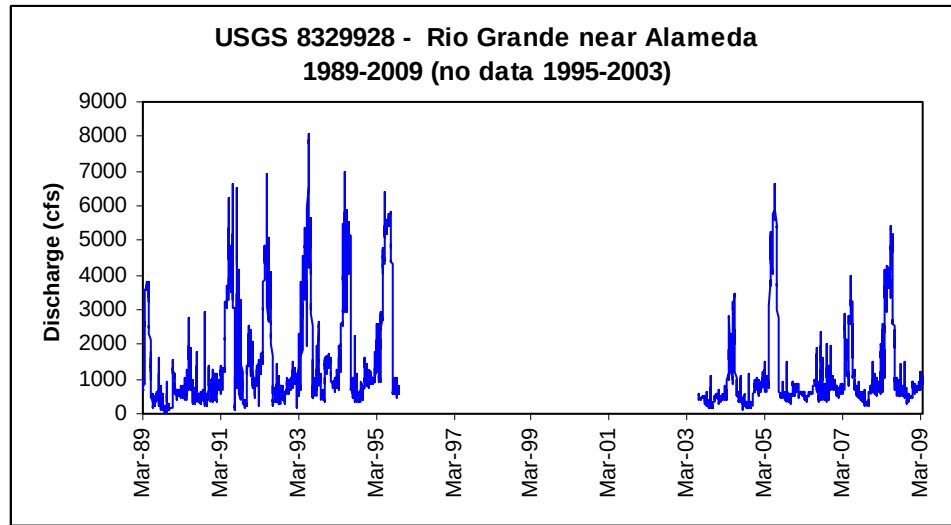


Figure 2.7 Daily Mean Streamflow: USGS 08329928 - Rio Grande near Alameda

3.0 ALUMINUM

Assessment of the data from the 2005 SWQB intensive water quality survey as well as other data collection efforts in the Middle Rio Grande watershed identified several exceedences of the New Mexico water quality standards for dissolved aluminum in Rio Grande (San Marcial at USGS gage to Rio Puerco). Consequently, this AU was listed on the 2008-2010 Integrated CWA §303(d)/§305(b) List (NMED/SWQB 2008a) for aluminum.

3.1 Target Loading Capacity

Target values for these aluminum TMDLs will be determined based on 1) the presence of numeric criteria 2) the degree of experience in applying the criterion, and 3) the ability to easily monitor and produce quantifiable and reproducible results. This TMDL is also consistent with New Mexico's antidegradation policy.

According to the New Mexico water quality standards (20.6.4.900 NMAC), the dissolved aluminum chronic criterion is 0.087 mg/L and the dissolved aluminum acute criterion is 0.75 mg/L for aquatic life uses. Of the values assessed for the 2008-2010 Integrated CWA §303(d)/§305(b) List, the chronic criterion was exceeded 4 of 8 times on the Rio Grande (San Marcial at USGS gage to Rio Puerco) AU. These exceedences are presented in Appendix C and Figure 3.2. The determination of these impairments was based on the application of the Assessment Protocol (NMED/SWQB 2008b). The samples that were not spatially or temporally independent were averaged and the Assessment Protocols were then applied to the averaged value.

High chronic levels of dissolved aluminum can be toxic to fish, benthic invertebrates, and some single-celled plants. Aluminum concentrations from 0.100-0.300 mg/L increase mortality, retard growth, gonadal development and egg production of fish (<http://www.bae.ncsu.edu/programs/extension/wqg/>). High acute levels of dissolved aluminum can be especially detrimental to aquatic life increasing mortality rates for many species of fish and macroinvertebrates.

3.2 Flow

Flow duration curve analysis looks at the cumulative frequency of historic flow data over a specified period. A flow duration curve relates flow values to the percent of time those values have been met or exceeded. The use of "*percent of time*" provides a uniform scale ranging between 0 and 100. Thus, the full range of stream flows is considered. Low flows are exceeded a majority of the time, while floods are exceeded infrequently (USEPA, 2007).

A basic flow duration curve runs from high to low along the x-axis. The x-axis represents the duration amount, or "*percent of time*", as in a cumulative frequency distribution. The y-axis represents the flow value (e.g., cubic feet per second) associated with that "*percent of time*" (or duration). Flow duration curve development typically uses daily average discharge rates, which are sorted from the highest value to the lowest (Figures 3.1 and 3.2). Using this convention,

flow duration intervals are expressed as a percentage, with zero corresponding to the highest stream discharge in the record (i.e., flood conditions) and 100 to the lowest (i.e., drought conditions). Thus, a flow duration interval of sixty associated with a stream discharge of 357 cubic feet per second (cfs) implies that sixty percent of all observed daily average stream discharge values equal or exceed 357 cfs (Figure 3.1). It should be noted that impoundment of water in Cochiti Reservoir began in 1973. The flow regime of the Rio Grande changed significantly following the construction of this reservoir, therefore, flow data available before 1974 were not used in this analysis.

Duration curve analysis identifies intervals, which can be used as a general indicator of hydrologic condition (i.e., wet versus dry and to what degree). Flow duration curve intervals can be grouped into several broad categories or zones. These zones provide additional insight about conditions and patterns associated with the impairment. A common way to look at the duration curve is by dividing it into five zones, as illustrated in Figures 3.1 and 3.2: one representing *high flows* (0-10%), another for *moist conditions* (10-40%), one covering *mid-range flows* (40-60%), another for *dry conditions* (60-90%), and one representing *low flows* (90-100%) (Cleland 2003). This particular approach places the midpoints of the moist, mid-range, and dry zones at the 25th, 50th, and 75th percentiles respectively (i.e., the quartiles). The high zone is centered at the 5th percentile, while the low zone is centered at the 95th percentile.

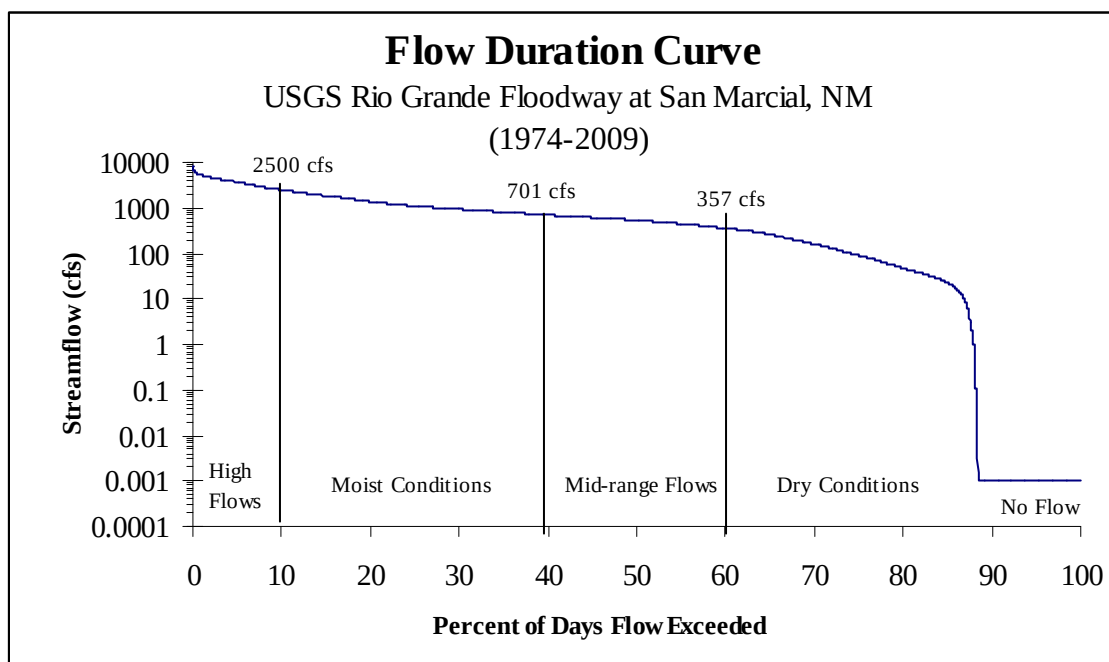


Figure 3.1 USGS 08358400 Rio Grande Floodway at San Marcial, NM (1974-2009)

The use of duration curves provides a technical framework for identifying “daily loads” in TMDL development, which accounts for the variable nature of water quality associated with different stream flow rates. Specifically, a maximum daily concentration limit can be used with basic hydrology and a duration curve to identify a TMDL that covers the full range of flow conditions. With this approach, ambient water quality data, taken with some measure or estimate

of flow at the time of sampling, can be used to compute an instantaneous load. Using the relative percent exceedence from the flow duration curve that corresponds to the stream discharge at the time the water quality sample was taken, the computed load can be plotted in a duration curve format (Figure 3.2).

By displaying instantaneous loads calculated from ambient water quality data and the daily average flow on the date of the sample (expressed as a flow duration curve interval), a pattern develops, which describes the characteristics of the water quality impairment. Loads that plot above the curve indicate an exceedence of the water quality criterion (chronic dissolved aluminum in this case), while those below the load duration curve show compliance. The pattern of impairment can be examined to see if it occurs across all flow conditions, corresponds strictly to high flow events, or conversely, only to low flows. Impairments observed in the low flow zone typically indicate the influence of point sources, while those further left generally reflect probable nonpoint source contributions. This concept is illustrated in Figure 3.2.

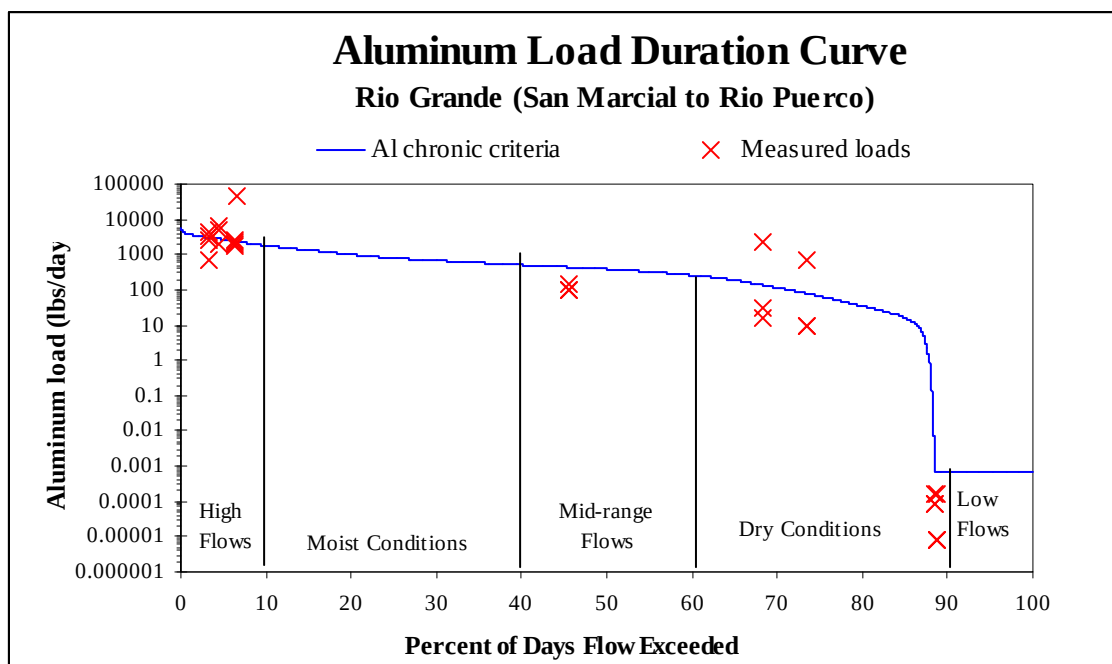


Figure 3.2 Aluminum Load Duration Curve – Rio Grande (San Marcial to Rio Puerco)

It is important to remember that the TMDL itself is a value calculated at a defined critical condition, and is calculated as part of planning processes designed to achieve water quality standards. Since flows vary throughout the year in these systems, the actual load at any given time will vary based on the changing flow. Management of the load to improve stream water quality should be a goal to be attained.

3.3 Calculations

A target load for dissolved aluminum is calculated based on a flow, the current water quality criterion, and a conversion factor (8.34) that is used to convert mg/L units to lbs/day (see Appendix A for Conversion factor derivation). The critical flow was converted from cfs to million gallons per day using **Equation 1**. The target loading capacity is calculated using **Equation 2**. The results are shown in Table 3.1.

$$flow \frac{ft^3}{sec} \times 1,728 \frac{in^3}{ft^3} \times 0.004329 \frac{gal}{in^3} \times 86,400 \frac{sec}{day} \times 10^{-6} MG / gal = flow(MGD) \quad (Eq. 1)$$

$$Critical \ flow \ (MGD) \times Criterion \ (mg/L) \times 8.34 = Target \ Loading \ Capacity \ (Eq. 2)$$

Under the duration curve framework, the loading capacity is essentially the curve itself. The loading capacity, which sets the target load on any given day, is determined by the flow on the particular day of interest. However, a continuous curve that represents the loading capacity has some logistical drawbacks. It is often easier to communicate information with a set of fixed targets. Critical points along the curve can be used as an alternative method to quantify the loading capacity, such as the mid-point of each hydrologic zone (e.g., the 5th, 25th, 50th, 75th, and 95th percentiles). A unique loading capacity for each hydrologic zone allows the TMDL to reflect changes in dominant watershed processes that may occur under different flow regimes. The target loads (TMDLs) predicted to attain current standards were calculated using **Equation 1** and are shown in Table 3.1.

Table 3.1 Calculation of Target Loads: Rio Grande (San Marcial at to Rio Puerco)

	FLOW CONDITIONS				
	High	Moist ^(b)	Mid-Range ^(b)	Dry	Low ^(b)
Chronic dissolved aluminum criteria	0.087	-	-	0.087	-
Mid-point Flow (mgd)	2385	-	-	59	-
Conversion Factor^(a)	8.34	-	-	8.34	-
TMDL	1731 lbs/day	-	-	42.8 lbs/day	-

a) Conversion factor is based on Equation 1.

b) There are no TMDL calculations for Moist, Mid-Range, or Low flow conditions because there were no observed exceedences during these flow regimes (refer to Figure 3.2).

It is important to remember that the TMDL is a planning tool to be used to achieve water quality standards. Since flows vary throughout the year in these systems the target load will vary based on the changing flow. Management of the load to improve stream water quality and meet water quality criteria should be a goal to be attained. Meeting the calculated TMDL may be a difficult objective.

3.4 Waste Load Allocations and Load Allocations

3.4.1 Waste Load Allocation

There are two NPDES permitted discharges in the Rio Grande (San Marcial at USGS gage to Rio Puerco) AU. The City of Socorro Wastewater Treatment Plant (WWTP) (NM0028835, December 31, 2009 expiration) discharges into the Luis Lopez Drain, thence to Socorro Riverside Drain, thence to the Rio Grande in Water Quality Standards Segment 20.6.4.105. The NPDES permit does not have a limit for aluminum. A final effluent sample was collected in February 2004 as part of the permit renewal process. This sample yielded a dissolved aluminum concentration of 0.023 mg/L which is below the chronic dissolved aluminum criteria of 0.087 mg/L. The current permit uses 1.3 mgd as the design flow. The permit application describes the periodic discharge from the WWTP as occurring for 25 minutes with an average flow of 0.037 mgd per discharge and an average daily flow rate as 0.66 mgd. A WLA will be assigned based on design flow and the chronic water quality standard for dissolved aluminum from 20.6.4.900 NMAC and is discussed further in Table 3.2.

The New Mexico Firefighters Training Academy (NM0029726) discharges into Dry Arroyo, then Diversion Channel, and finally to the Rio Grande in Segment 20.6.4.105. NM0029726 likewise does not have a permit limit for aluminum. The permit effective July 1, 2009 (June 30, 2014 expiration) does not have a permit requirement for aluminum. However, according to the draft permit from EPA R6, “because analytical result of aluminum was not reported with the 2004 application, a monitoring requirement of dissolved aluminum is established.” Dissolved aluminum samples collected from the ponds in April 2009 showed maximum results of 0.022 mg/L. On-site lagoons will be drained of approximately 1.3 million gallons at 3 to 5 year intervals to allow for silt removal. In order to be conservative, a WLA will be assigned and is further discussed in Table 3.2.

SWQB recognizes the TMDL provides a WLA for dissolved aluminum, but permits are required to include a limit for total aluminum. The Procedures for Implementing National Pollutant Discharge Elimination System Permits in New Mexico (2009) states:

“Monitoring requirements in permits can be expressed in the dissolved form, but limitations must be expressed in the total recoverable form, per the requirements of 40 CFR 122.45(c). When a limitation is required, or when the only effluent or ambient data available is in the total recoverable form, a 1:1 conversion to the dissolved form will be made for water quality screens. The reverse process will be made to obtain a limitation in the total recoverable form. During the permit development or the public participation process of the permit, the permittee shall be allowed the opportunity to submit data in the dissolved form for a water quality screening directly with numeric criteria in the proper form.”

The TMDL document presents WLA values for dissolved aluminum that are protective of the NM WQS for chronic aquatic life as applicable to NMAC 20.6.4.105. SWQB anticipates the

facilities will monitor both dissolved and total aluminum in order to produce a relationship between the two constituents.

There are no Municipal Separate Storm Sewer System (MS4) storm water permits in this Assessment Unit. Sediment may be a component of some industrial and construction storm water discharges covered under General NPDES Permits, so the load from these discharges should be addressed. In contrast to discharges from other industrial storm water and individual process wastewater permitted facilities, storm water discharges from construction activities are transient because they occur mainly during the construction itself, and then only during storm events. Coverage under the NPDES construction general storm water permit (CGP) for construction sites greater than one acre requires preparation of a Storm Water Pollution Prevention Plan (SWPPP) that includes identification and control of all pollutants associated with the construction activities to minimize impacts to water quality. In addition, the current CGP also includes state specific requirements that the SWPPP must include site-specific interim and permanent stabilization, managerial, and structural solids, erosion, and sediment control best management practices (BMPs) and/or other controls that are designed to prevent to the maximum extent practicable an increase in the sediment yield and flow velocity from pre-construction, pre-development conditions to assure that applicable standards in 20.6.4 NMAC, including the antidegradation policy, or WLAs are met. In this case, compliance with a SWPPP that meets the requirements of the CGP is generally assumed to be consistent with this TMDL.

Other industrial storm water facilities are generally covered under the current NPDES Multi-Sector General Storm Water Permit (MSGP). This permit also requires preparation of an SWPPP that includes identification and control of all pollutants associated with the industrial activities to minimize impacts to water quality. In this case, compliance with a SWPPP that meets the requirements of the MSGP is generally assumed to be consistent with this TMDL.

Individual wasteload allocations for the General Permits were not possible to calculate at this time in this watershed using available tools. Loads that are in compliance with the General Permits from facilities covered are therefore currently calculated as part of the watershed load allocation.

3.4.2 Load Allocation

In order to calculate the LA, the WLAs listed in Table 3.2 and the MOS were subtracted from the target capacity (TMDL), as shown below in **Equation 3**.

$$\begin{aligned} WLA + LA + MOS &= TMDL && (Eq. 3) \\ \text{In other words, } LA &= TMDL - WLA - MOS \end{aligned}$$

The MOS was developed using a combination of conservative assumptions and explicit recognition of potential errors (see Section 3.7 for details). Results are presented in Table 3.4

Table 3.2 TMDLs for Dissolved Aluminum: Rio Grande (San Marcial to Rio Puerco)

	FLOW CONDITIONS				
	High	Moist	Mid-Range	Dry	Low
TMDL	1731 lbs/day	-	-	42.8 lbs/day	-
NM0028835 ^(b)	0.943	-	-	0.943	-
NM0029726 ^(b)	0.943	-	-	0.943	-
Total Waste Load Allocation	1.89	-	-	1.89	-
Load Allocation	1171	-	-	38.8	-
Margin of Safety	558	-	-	2.13	-

- a) There are no TMDL calculations for Moist, Mid-Range, or Low flow conditions because there were no observed exceedences during these flow regimes (refer to Figure 3.2).
b) WLA calculated as WQS x design flow x 8.34.

The extensive data collection and analyses necessary to determine background aluminum loads for the Middle Rio Grande watershed were beyond the resources available for this study. It is therefore assumed that a portion of the load allocation is made up of natural background loads.

3.5 Identification and Description of Pollutant Source(s)

Probable nonpoint sources that may be contributing to the observed load are displayed in Table 3.3:

Table 3.3 Pollutant source summary for Aluminum

Pollutant Sources	Magnitude	Location	Probable Sources ^(a)
<u>Point:</u> ^(b)	1.89 lbs/day ^(c)	Rio Grande (San Marcial at USGS Gage to Rio Puerco)	Municipal Point Source Discharges
<u>Nonpoint:</u>		Rio Grande (San Marcial at USGS Gage to Rio Puerco)	Avian Sources (waterfowl and/or other), Impervious Surface/Parking Lot Runoff, Municipal (Urbanized High Density Area), Natural Sources, On-site Treatment Systems (Septic Systems and Similar Decentralized Systems), Wastes from Pets.

Notes:

- (a) From the 2008-2010 Integrated CWA 303(d)/305(b) list (NMED/SWQB 2008a). This list of probable sources for all impairments is based on staff observation and known land use activities in the watershed. These sources are not confirmed or quantified at this time.
(b) Current probable point source contributions (based on WLA in Table 3.2).
(c) Based on NPDES permit values.

3.6 Linkage of Water Quality and Pollutant Sources

SWQB fieldwork includes an assessment of the potential sources of impairment. The Pollutant Source(s) Documentation Summary provides a visual analysis of probable sources along an impaired reach. Although this procedure is subjective, SWQB feels that it provides the best available information for the identification of potential sources of impairment in this watershed. Staff completing these forms identify probable sources of nonpoint source impairments along each reach as determined by field reconnaissance. It is important to consider not only the land directly adjacent to the stream, but also to consider upland and upstream areas in a more holistic watershed approach to implementing these TMDLs.

In general, increased metals in the water column can commonly be linked to sediment transport and accumulation, where the metals are a constituent part of the stream. This does not appear to be the case for the Rio Grande as evidenced by the fact that there is a very weak relationship between the dissolved aluminum and TSS concentrations according to the data used to determine the impairment (Figure 3.3). However, the degree to which sediment delivery and transport in this watershed is a natural phenomenon, or has been exacerbated by human activities, or is the result of a combination of both should be considered.

The Rio Puerco enters the Rio Grande just south of Bernardo, NM. When the Rio Puerco flows, it carries a heavy sediment load and is a major contributor of sediment to the Rio Grande (Chronic, 1987). Even though the highly erodible soils of the Rio Puerco Watershed are a significant source of sediment transport to the Rio Grande, the anthropogenic influence of highway construction, channelization, land development, and historical rangeland grazing practices may be contributing to impairment, particularly in the Rio Puerco and thus the Rio Grande. The geology in the Rio Puerco watershed contributes to the amount of sediment available for transport (NMED/SWQB, 2007). Two dissolved aluminum samples were collected at the Rio Puerco near Bernardo, NM USGS gage (08353000) in 2005. A sample collected on 2/24/2005 measured 0.0935 mg/L and a sample collected on 5/26/2005 measured 0.0012 mg/L. The February 2005 sample exceeds the chronic WQS of 0.087 mg/L for dissolved aluminum.

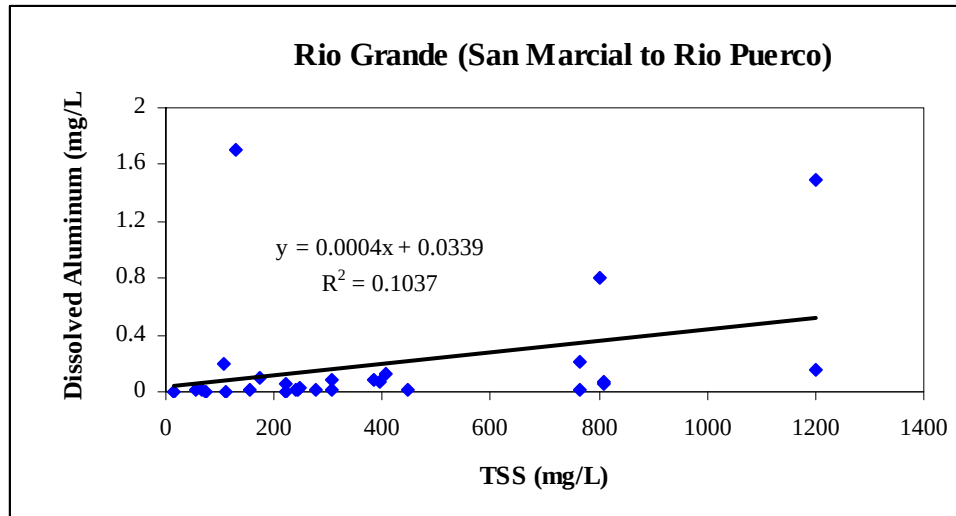


Figure 3.3 Relationship between dissolved aluminum and TSS

Normal aqueous chemical processes, enhanced by the slight natural acidity of snow and rain, are capable of rendering any naturally occurring aluminum available to the stream system. The fact that dissolved aluminum concentrations above the chronic aluminum criterion were measured during April, May, June, July, August, and October and during both High and Dry flow regimes is indicative of a year-round watershed source. Appendix C lists dissolved aluminum results along with daily USGS gage flows in relation to these samples.

3.7 Margin of Safety

TMDLs should reflect a margin of safety (MOS) based on the uncertainty or variability in the data, the point and nonpoint source load estimates, and the modeling analysis. For these aluminum TMDLs, the MOS was developed using a combination of conservative assumptions and explicit allocations. Therefore, this MOS is the sum of the following two elements:

- *Implicit Margin of Safety*

Treating aluminum as a conservative pollutant, that is a pollutant that does not readily degrade in the environment, was used as a conservative assumption in developing these loading limits.

- *Explicit Margin of Safety*

Using a duration curve framework, an explicit MOS can be identified for each listed reach and corresponding set of flow regimes. In this TMDL, the MOS was calculated based on the difference between the loading capacity at the midpoint of the relevant flow regimes (high and dry) and the loading capacity at the minimum flow in each flow regime. Given that the loading capacity is typically much less at the minimum flow of a zone as compared to the mid-point, a substantial MOS is provided. This explicit MOS ensures that allocations will not exceed the load associated with the minimum flow in each zone (USEPA 2006).

The MOS for the dry flow zone was determined using a different method because the lowest flow recorded was only 0.001 cfs. If the MOS was calculated as described above, the MOS

would constitute the majority of the target load. In other words, there would not be enough load to allocate to point and nonpoint sources under this flow regime. Similar to previous SWQB TMDLs which were based on 4Q3 low-flows, there is inherent error in all flow measurements. A conservative MOS of **5 percent** was therefore explicitly allocated to the dry flow hydrologic zone.

An explicit MOS identified using a duration curve framework is basically unallocated assimilative capacity intended to account for uncertainty (e.g., loads from tributary streams, effectiveness of controls, etc). As new information becomes available, this unallocated capacity may be attributed to nonpoint sources including tributary streams (which could then be added to the load allocation); or it may be attributed to point sources (and become part of the waste load allocations).

3.8 Consideration of Seasonal Variation

Federal regulations (40 CFR §130.7(c)(1)) require that TMDLs take into consideration seasonal variation in watershed conditions and pollutant loading. Seasonal variation was accounted for in these TMDLs by using 25 years of USGS flow records when estimating flows to develop flow exceedence percentiles.

During the 2005 water quality survey, dissolved aluminum exceedences occurred during spring, summer, and fall months. Higher flows may flush more nonpoint source runoff containing aluminum. It is also possible the criterion may be exceeded under a low flow condition when there is insufficient dilution of a point source. The use of duration curves provides a technical framework for identifying “*daily loads*” in TMDL development, which accounts for the variable nature of water quality associated with different stream flow rates during different seasons. Allocations within the TMDL are set in a way that reflects dominant concerns associated with appropriate hydrologic conditions.

3.9 Future Growth

Growth estimates by county are available from the New Mexico Bureau of Business and Economic Research. These estimates project growth to the year 2035. Table 3.4 shows the population estimates for the counties discussed in this TMDL.

Table 3.4 Population Estimates by County

County	2007*	2015	2025	2035	% Increase (2007-2035)
Sandoval	123,694	144,087	182,592	217,806	43
Bernalillo	644,023	811,861	993,650	1,166,590	45
Valencia	75,807	89,045	107,294	123,212	38
Socorro	18,788	20,012	21,167	21,837	14

**estimate revised 11/2008*

According to the calculations, the overwhelming source of aluminum loading is from nonpoint sources (Table 3.2). Estimates of future growth are not anticipated to lead to a significant increase in aluminum concentrations that cannot be controlled with BMP implementation and appropriate NPDES permit limits in this watershed. However, it is imperative that BMPs continue to be utilized and improved upon in this watershed while continuing to improve watershed conditions and adhering to SWPPP requirements related to construction and industrial activities covered under the general permit. The existing Middle Rio Grande-Albuquerque Reach Watershed Restoration Action Strategy (Middle Rio Grande-Albuquerque Reach Watershed Group, 2008) defines framework for design, implementation, and maintenance of BMPs in the northern portion of the watershed addressed by this TMDL. Section 6.0 provides details on this WRAS.

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4.0 BACTERIA

During the 2005 SWQB sampling monitoring effort in the Middle Rio Grande watershed, *E. coli* data showed several exceedences of the New Mexico water quality standard for secondary contact use in several assessment units. This data was combined with other sources of data to determine overall impairment for these assessment units. As a result, four assessment units in the Middle Rio Grande watershed were determined to be impaired with *E. coli* as a pollutant of concern (see summary in Table 4.1 and data in Appendix D). The determination of these impairments was based on the application of the Assessment Protocol (NMED/SWQB 2008b). The samples that were not spatially or temporally independent were averaged and the Assessment Protocols were then applied to the averaged value. When water quality standards have been achieved, the reach will be moved to the appropriate category on the Clean Water Act Integrated §303(d)/§305(b) list of assessed waters. Presence of *E. coli* bacteria is an indicator of the possible presence of other bacteria that may limit beneficial uses and present human health concerns. There are probable nonpoint and point sources of *E. coli* bacteria throughout the basin that could be contributing to the *E. coli* levels.

According to the New Mexico Water Quality Standards (WQS), the *E. coli* standard reads:

20.6.4.105 NMAC: The monthly geometric mean of E. coli bacteria 126 cfu/100 mL or less; single sample 410 cfu/100 mL or less.

20.6.4.106 NMAC: The monthly geometric mean of E. coli bacteria 126/100mL or less; single sample 410/100mL or less.

The Pueblo of Sandia and the Pueblo of Isleta have the following *E.coli* WQS (See Section 2.3):
Escherichia coli

1. *geometric mean maximum: 47 colonies/100 ml*
2. *single sample maximum of 88 colonies/100 ml, in accordance with an illness rate of 4 per 1,000 exposures*

Table 4.1. Summary of Bacteria Data in the Middle Rio Grande

Assessment Unit	New Mexico Standards Segment	<i>E. coli</i> : # Exceedences/ Total Samples ^(a)	<i>E. coli</i> ^(b) %Exceedence
Rio Grande (non-Pueblo Alameda to Angostura Diversion)	20.6.4.106	6/17	35%
Rio Grande (Isleta Pueblo bnd to Alameda Bridge)	20.6.4.105	4/16	25%
Rio Grande (Rio Puerco to Isleta Pueblo bnd)	20.6.4.105	2/7	29%
Rio Grande (San Marcial to Rio Puerco)	20.6.4.105	14/35	40%

Notes:

- a) Of the values assessed for the 2008-2010 Integrated CWA §303(d)/§305(b) List
- b) Exceedence rates $\geq 15\%$ result in a determination of Non Support based on the assessment protocol (NMED/SWQB 2008b)

4.1 Target Loading Capacity

Overall, the target values for bacteria TMDLs will be determined based on (1) the presence of numeric criteria, (2) the degree of experience in applying the indicator and (3) the ability to easily monitor and produce quantifiable and reproducible results. For this TMDL document, target values for bacteria are based on the reduction in bacteria necessary to achieve numeric criteria. This TMDL is also consistent with New Mexico's antidegradation policy.

The segment-specific criteria leading to an assessment of use impairment for the four MRG Assessment Units is the numeric criteria stating that "The monthly geometric mean of *E. coli* bacteria 126cfu/100 mL or less; single sample 410cfu/100 mL or less" for the designated contact use (20.6.4.105 NMAC and 20.6.4.106 NMAC). However, in order to be protective of downstream waters, the WQS for the Pueblo of Sandia will be used for the TMDL calculations for the Rio Grande (non-Pueblo Alameda to Angostura) Assessment Unit. Likewise, the WQS for the Pueblo of Isleta will be used for the Rio Grande (Isleta Pueblo bnd to Alameda bridge) Assessment Unit.

4.2 Flow

Flow duration curve analysis looks at the cumulative frequency of historic flow data over a specified period. A flow duration curve relates flow values to the percent of time those values have been met or exceeded. The use of "*percent of time*" provides a uniform scale ranging between 0 and 100. Thus, the full range of stream flows is considered. Low flows are exceeded a majority of the time, while floods are exceeded infrequently (USEPA, 2007).

A basic flow duration curve runs from high to low along the x-axis. The x-axis represents the duration amount, or "*percent of time*", as in a cumulative frequency distribution. The y-axis represents the flow value (e.g., cubic feet per second) associated with that "*percent of time*" (or duration). Flow duration curve development typically uses daily average discharge rates, which are sorted from the highest value to the lowest (Figures 4.1-4.4). Using this convention, flow duration intervals are expressed as a percentage, with zero corresponding to the highest stream discharge in the record (i.e., flood conditions) and 100 to the lowest (i.e., drought conditions). Thus, a flow duration interval of sixty associated with a stream discharge of 357 cubic feet per second (cfs) implies that sixty percent of all observed daily average stream discharge values equal or exceed 357 cfs (Figure 4.1). It should be noted that impoundment of water in Cochiti Reservoir began in 1973. The flow regime of the Rio Grande changed significantly following the construction of this reservoir, therefore, flow data available before 1974 were not used in this analysis.

Duration curve analysis identifies intervals, which can be used as a general indicator of hydrologic condition (i.e., wet versus dry and to what degree). Flow duration curve intervals can be grouped into several broad categories or zones. These zones provide additional insight about conditions and patterns associated with the impairment. A common way to look at the duration curve is by dividing it into five zones, as illustrated in Figures 4.1 and 4.4: one representing *high flows* (0-10%), another for *moist conditions* (10-40%), one covering *mid-range flows* (40-60%), another for *dry conditions* (60-90%), and one representing *low flows* (90-100%) (Cleland 2003).

This particular approach places the midpoints of the moist, mid-range, and dry zones at the 25th, 50th, and 75th percentiles respectively (i.e., the quartiles). The high zone is centered at the 5th percentile, while the low zone is centered at the 95th percentile.

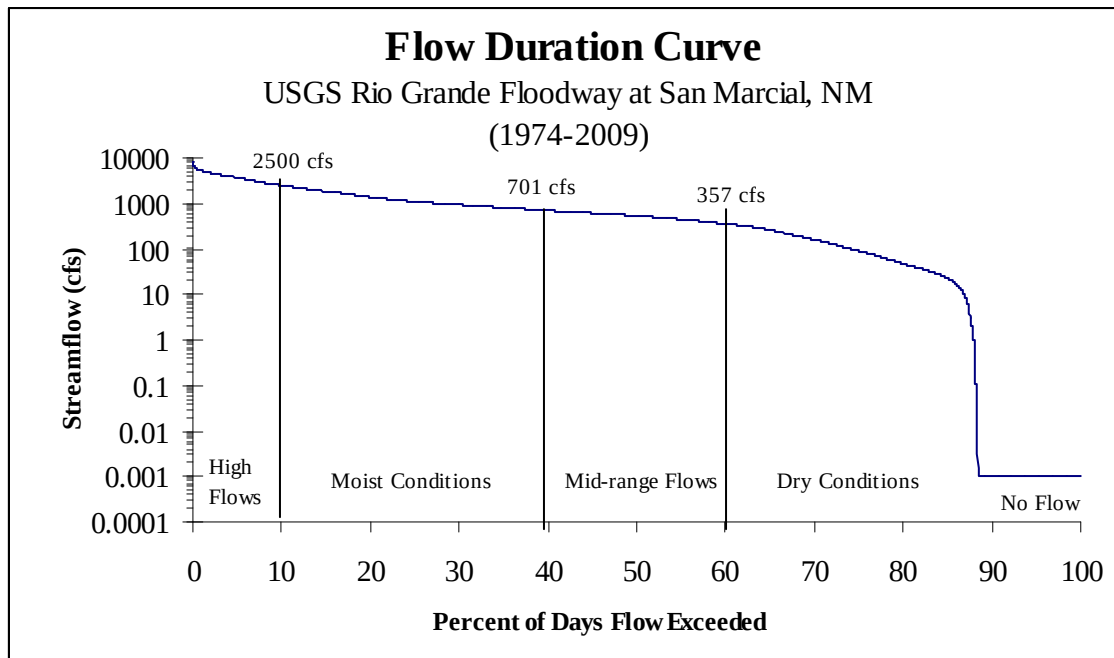


Figure 4.1 Flow Duration Curve: USGS 08358400 Rio Grande Floodway at San Marcial

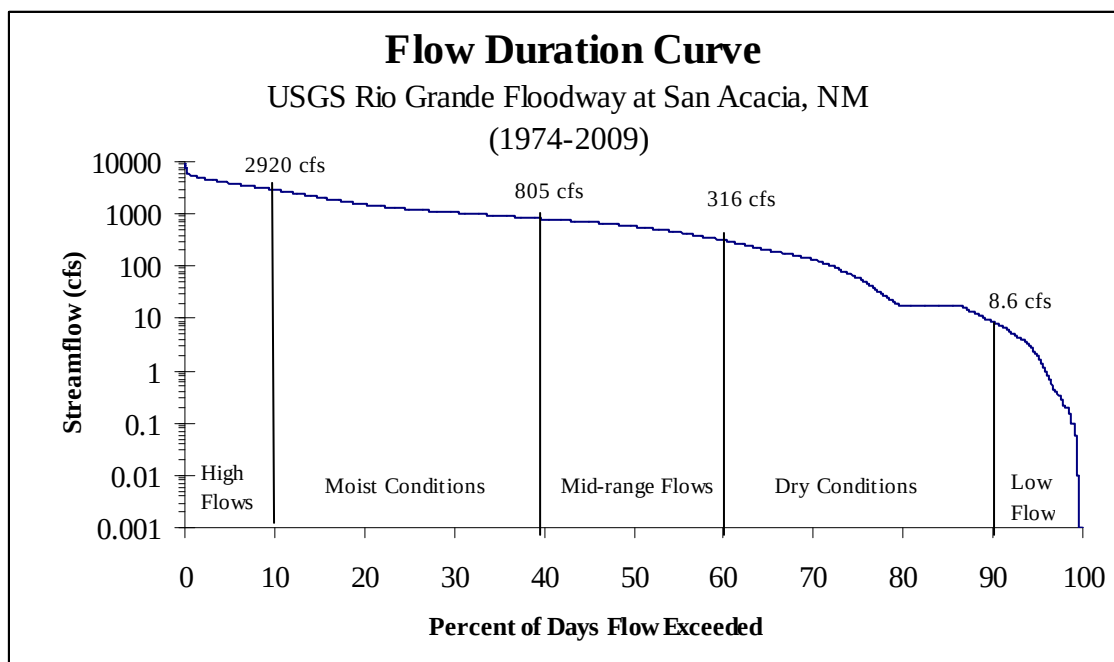


Figure 4.2 Flow Duration Curve: USGS 08354900 Rio Grande Floodway at San Acacia

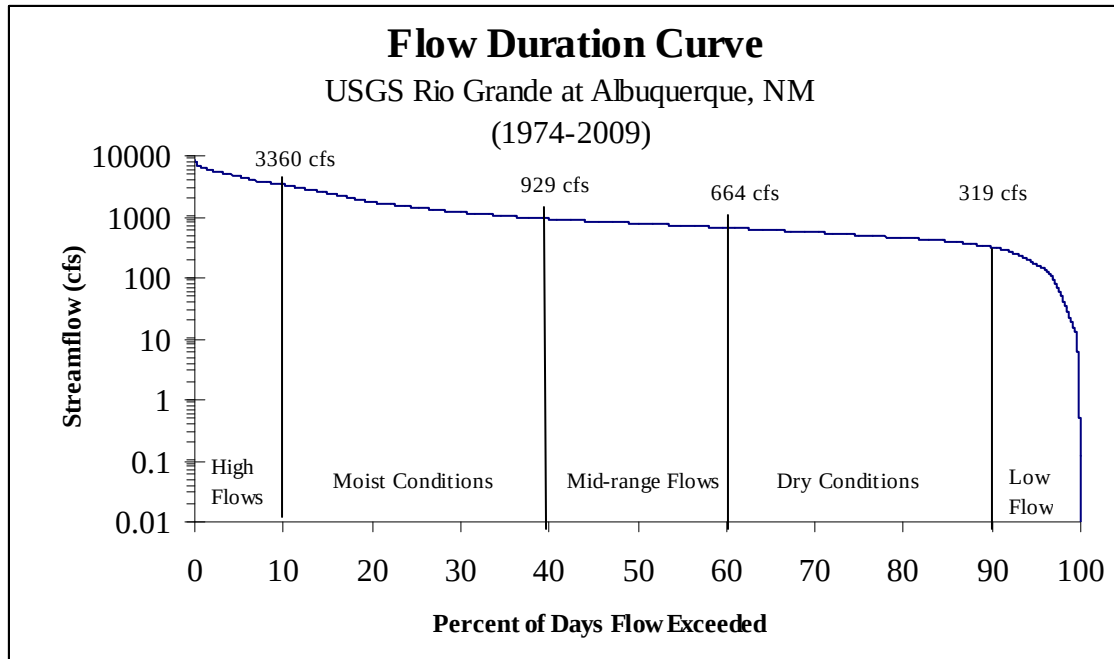


Figure 4.3 Flow Duration Curve: USGS 08330000 Rio Grande at Albuquerque, NM

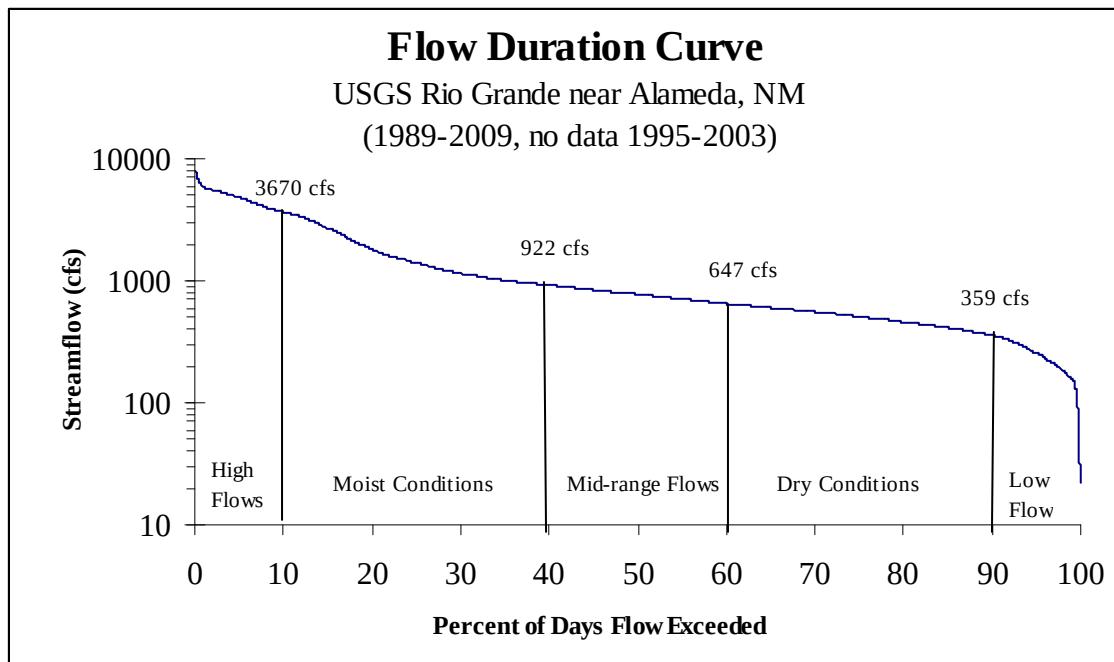


Figure 4.4 Flow Duration Curve: USGS 08329928 Rio Grande near Alameda, NM

The use of duration curves provides a technical framework for identifying “daily loads” in TMDL development, which accounts for the variable nature of water quality associated with different stream flow rates. Specifically, a maximum daily concentration limit can be used with basic hydrology and a duration curve to identify a TMDL that covers the full range of flow

conditions. With this approach, ambient water quality data, taken with some measure or estimate of flow at the time of sampling, can be used to compute an instantaneous load. Using the relative percent exceedence from the flow duration curve that corresponds to the stream discharge at the time the water quality sample was taken, the computed load can be plotted in a duration curve format (Figures 4.1 - 4.4).

By displaying instantaneous loads calculated from ambient water quality data and the daily average flow on the date of the sample (expressed as a flow duration curve interval), a pattern develops, which describes the characteristics of the water quality impairment. Loads that plot above the curve indicate an exceedence of the water quality criterion, whereas those below the load duration curve show compliance. The pattern of impairment can be examined to see if it occurs across all flow conditions, corresponds strictly to high flow events, or conversely, only to low flows. Impairments observed in the low flow zone typically indicate the influence of point sources, while those further left generally reflect probable nonpoint source contributions. This concept is illustrated in Figures 4.5 – 4.8.

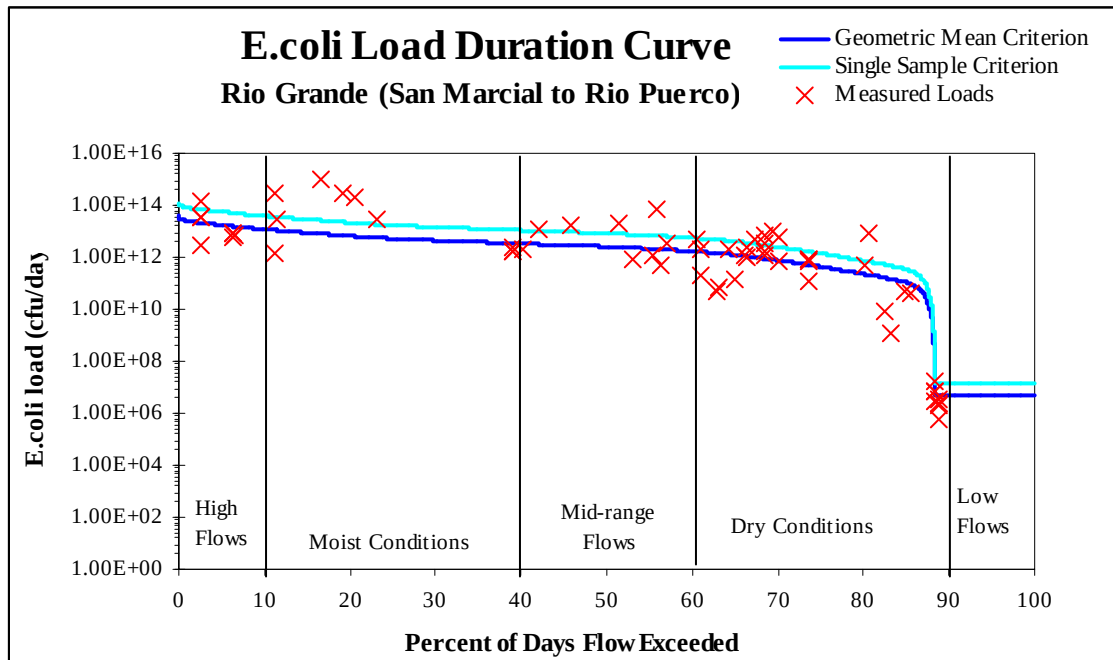


Figure 4.5 *E. coli* Load Duration Curve – Rio Grande (San Marcial to Rio Puerco)

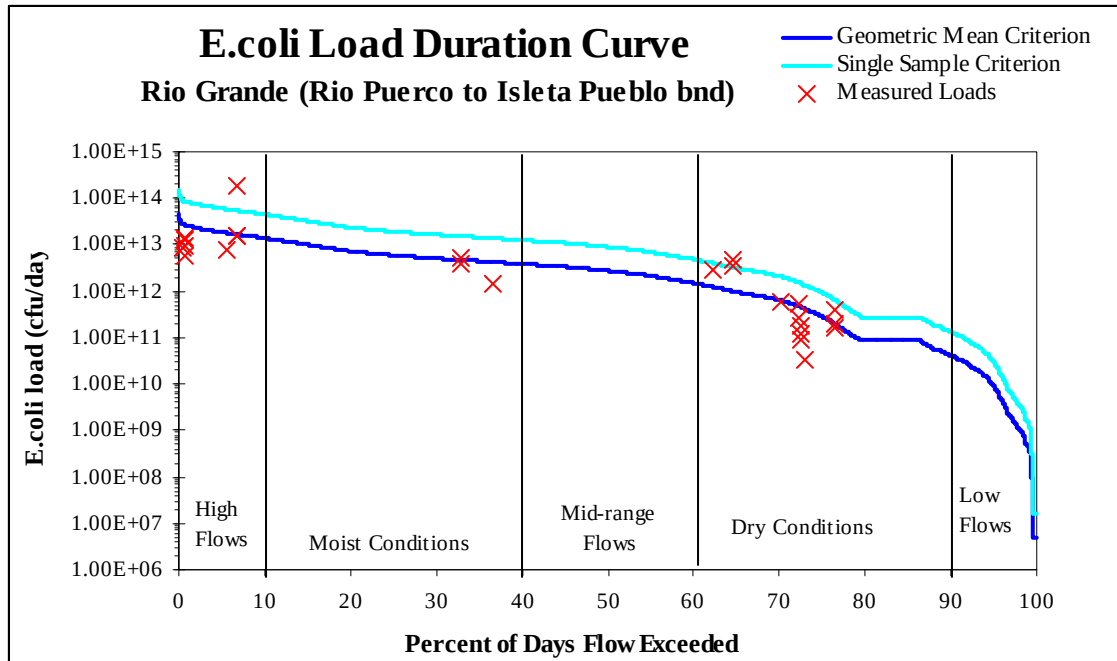


Figure 4.6 *E. coli* Load Duration Curve – Rio Grande (Rio Puerco to Isleta Pueblo bnd)

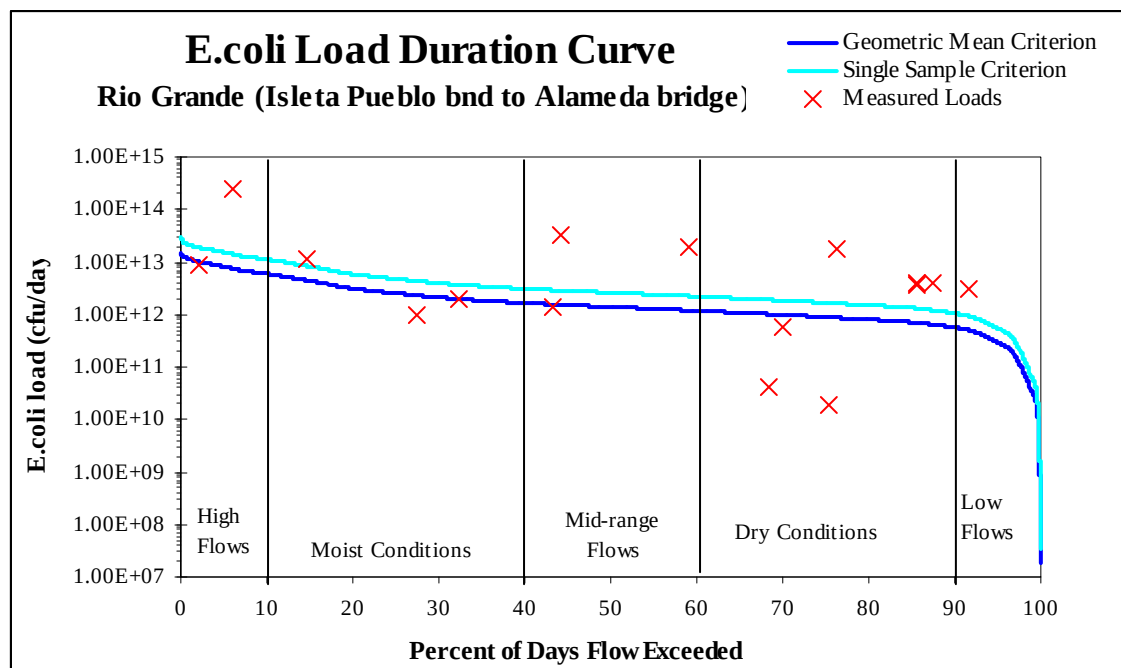


Figure 4.7 *E. coli* Load Duration Curve–Rio Grande (Isleta Pueblo bnd to Alameda bridge)

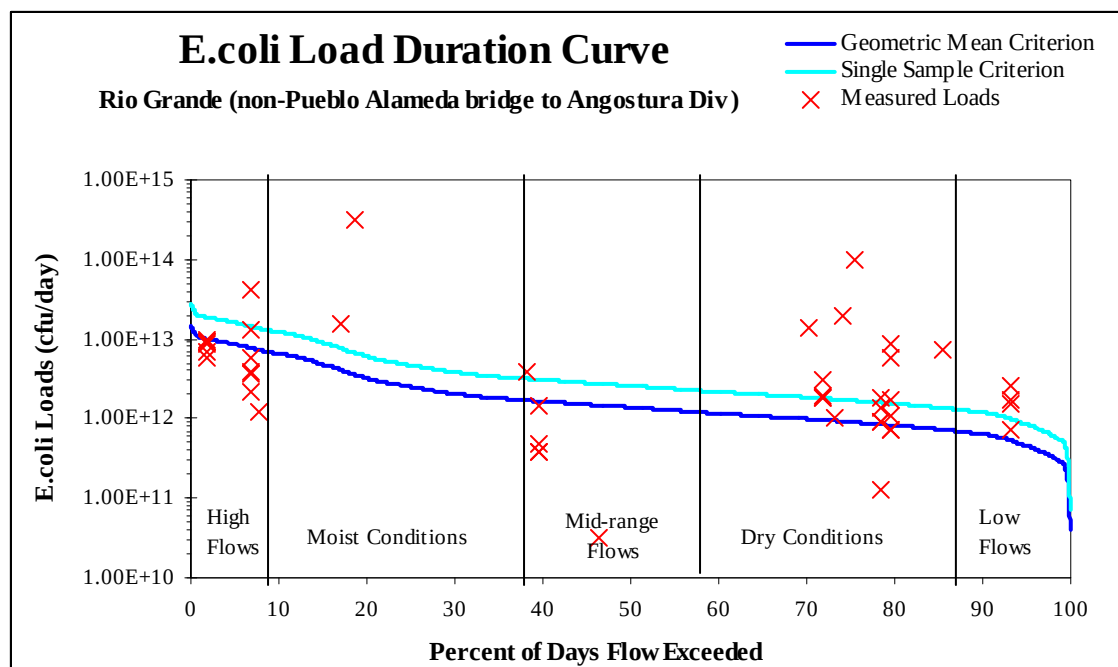


Figure 4.8 *E. coli* Load Duration Curve–Rio Grande (non-Pueblo Alameda bridge to Angostura)

It is important to remember that the TMDL itself is a value calculated at a defined critical condition, and is calculated as part of planning processes designed to achieve water quality standards. Since flows vary throughout the year in these systems, the actual load at any given time will vary based on the changing flow. Management of the load to improve stream water quality should be a goal to be attained.

4.3 Calculations

Bacteria standards are expressed as colony forming units (cfu) per unit volume. The *E. coli* geometric mean criteria are listed in Tables 4.2 through 4.5. Target loads for bacteria are calculated based on flow values, current and proposed WQS, and conversion factors (**Equation 4**). The more conservative monthly geometric mean criteria are utilized in TMDL calculations to provide an implicit MOS. In addition, if the single sample criteria were used as targets, the geometric mean criteria may not be reached.

$$C \text{ as cfu/100 mL} * 1,000 \text{ mL/1 L} * 1 \text{ L/0.264 gallons} * 1,000,000 \text{ gallons/MG} * Q \text{ as MG/day} = \text{cfu/day} \quad (\text{Eq. 4})$$

Where C = water quality standard criterion for bacteria,
 Q = stream flow in million gallons per day (mgd)

Under the duration curve framework, the loading capacity is essentially the curve itself. The loading capacity, which sets the target load on any given day, is determined by the flow on the particular day of interest and the numerical criterion for *E. coli*. However, a continuous curve

that represents the loading capacity has some logistical drawbacks. It is often easier to communicate information with a set of fixed targets. Critical points along the curve can be used as an alternative method to quantify the loading capacity, such as the mid-point of each hydrologic zone (e.g., the 5th, 25th, 50th, 75th, and 95th percentiles). A unique loading capacity for each hydrologic zone allows the TMDL to reflect changes in dominant watershed processes that may occur under different flow regimes. The target loads (TMDLs) predicted to attain current standards were calculated using **Equation 4** and are shown in Tables 4.2 and 4.5.

Table 4.2. Calculation of Target Loads: Rio Grande (San Marcial at USGS gage to Rio Puerco)

	FLOW CONDITIONS				
	High	Moist	Mid-Range	Dry	Low ^(c)
<i>E. coli</i> geometric mean criterion (cfu/100mL) (a)	126	126	126	126	-
Mid-point Flow (mgd)	2385	711	347	59	-
Conversion Factor^(b)	3.79×10^7	3.79×10^7	3.79×10^7	3.79×10^7	-
TMDL (cfu/100mL/day)	1.14×10^{13}	3.40×10^{12}	1.66×10^{12}	2.81×10^{11}	-

(a) Per 20.6.4.105 NMAC

(b) Conversion factor is based on Equation 4.

(c) There are no TMDL calculations for Low flow conditions because there were no observed exceedences during this flow regime (refer to Figure 4.5).

Table 4.3. Calculation of Target Loads: Rio Grande (Rio Puerco to Isleta Pueblo bnd)

	FLOW CONDITIONS				
	High	Moist ^(b)	Mid-Range ^(c)	Dry	Low ^(b)
<i>E. coli</i> geometric mean criterion (cfu/100mL) (a)	126	126	-	126	-
Mid-point Flow (mgd)	2521	801	-	39	-
Conversion Factor^(b)	3.79×10^7	3.79×10^7	-	3.79×10^7	-
TMDL (cfu/100mL/day)	1.20×10^{13}	3.83×10^{12}	-	1.85×10^{11}	-

(a) Per 20.6.4.102 NMAC

(b) Conversion factor is based on Equation 4.

(c) There are no TMDL calculations for Mid-Range or Low flow conditions because there were no observed exceedences during these flow regimes (refer to Figure 4.6 and Appendix D). No exceedences of the single sample criterion were observed during Moist conditions, but calculations were included to be conservative because geometric mean exceedences were observed.

Table 4.4. Calculation of Target Loads: Rio Grande (Isleta Pueblo bnd to Alameda Bridge)

	FLOW CONDITIONS				
	High	Moist	Mid-Range	Dry	Low
<i>E. coli</i> geometric mean criterion (cfu/100mL) (a)	47	47	47	47	47
Mid-point Flow (mgd)	2960	924	507	324	106
Conversion Factor (b)	3.79×10^7	3.79×10^7	3.79×10^7	3.79×10^7	3.79×10^7
TMDL (cfu/100mL/day)	5.27×10^{12}	1.65×10^{12}	9.03×10^{11}	5.77×10^{11}	1.89×10^{11}

(a) Per Pueblo of Isleta water quality standards

(b) Conversion factor is based on Equation 4.

Table 4.5. Calculation of Target Loads: Rio Grande (non-pueblo Alameda Bridge to Angostura Diversion)

	FLOW CONDITIONS				
	High	Moist	Mid-Range(c)	Dry	Low
<i>E. coli</i> geometric mean criterion (cfu/100mL) (a)	47	47	-	47	47
Mid-point Flow (mgd)	3109	905	-	328	166
Conversion Factor (b)	3.79×10^7	3.79×10^7	-	3.79×10^7	3.79×10^7
TMDL (cfu/100mL/day)	5.54×10^{12}	1.61×10^{12}	-	5.84×10^{11}	2.96×10^{11}

(a) Per Pueblo of Sandia water quality standards

(b) Conversion factor is based on Equation 4.

(c) There are no TMDL calculations for Mid-Range flow conditions because there were no observed exceedences during this flow regime (refer to Figure 4.8).

It is important to remember that the TMDL is a planning tool to be used to achieve water quality standards. Since flows vary throughout the year in these systems the target load will vary based on the changing flow. Management of the load to improve stream water quality and meet water quality criteria should be a goal to be attained. Meeting the calculated TMDL may be a difficult objective.

4.4 Waste Load Allocations and Load Allocations

4.4.1 Waste Load Allocation

There are numerous NPDES permitted facilities in the Assessment Units in the 13020203 HUC. Not all NPDES permitted facilities have been assigned a WLA for *E.coli*. The permits to which a WLA is assigned are discussed in Table 4.8 and those without a WLA are in Table 4.6. Those not assigned a WLA either do not contribute flow to the Rio Grande or have shown no reasonable potential to discharge *E.coli*.

Table 4.6. Summary of NPDES Permits in 13020203 HUC without a WLA

Assessment Unit	Permit Number	Facility	Receiving Water	<i>E.coli</i> permit limits	Design Flow (mgd)
Rio Grande (San Marcial at USGS gage to Rio Puerco)	NM0029726 (June 30, 2014 expiration)	New Mexico Firefighters Training Academy	Dry arroyo to diversion channel to Rio Grande 20.6.4.105	500 colonies/100mL 7-day and 30-day average * ¹	n/a
Rio Grande (Isleta Pueblo bnd to Alameda Street Bridge)	NM0030384 (July 31, 2009 expiration)	PNM/Person Station	AMAFCA South Diversion Channel to Rio Grande 20.6.4.105	None	n/a
	NM0030376 (July 31, 2009 expiration)	Delta-Person Generating Station	AMAFCA South Diversion channel, never reaching Rio Grande 20.6.4.105	None	0.032 facility flow
	NM0030597 (July 31, 2009 expiration)	Valero Logistics Operations	Unnamed arroyo, never reaching Rio Grande 20.6.4.105	None	Intermittent and variable flow
Rio Grande (non-pueblo Alameda Bridge to Angostura Div)	NM0000124 (June 30, 2009 expiration)	Public Service Co. of NM/Reeves Station	AMAFCA North Diversion Channel, then to Rio Grande 20.6.4.106	None	Discharge during emergency circumstances

Notes: *
1 fecal coliform permit limit for permit expiring May 2009. Fecal limit proposed to be removed in new permit. Draft permit says “facility would have no reasonable potential to contribute *E.coli* because it ceased pumping domestic wastewater into the sedimentation ponds.”

Excess bacteria levels may be a component of some storm water discharges so these discharges should be addressed. On September 29, 2006, EPA Region 6 issued general permits for discharges from regulated small municipal separate storm sewer system (sMS4s) in New Mexico

and on Indian Country lands in New Mexico and Oklahoma. This permit became effective on July 1, 2007. The general permits offer coverage for discharges of storm water from SMS4s that are regulated under Phase II of the National Pollutant Discharge Elimination System (NPDES) Storm Water Program to various waters of the United States in New Mexico and Oklahoma. In New Mexico, some of the major impacts to small MS4s are as follows: operators of MS4s located in urbanized areas (UAs) must develop, implement, and enforce a storm water management program to reduce the discharge of pollutants from its MS4 to the "maximum extent practicable" and protect water quality; operators of "regulated" MS4s must obtain NPDES permit coverage; the permit application (Notice of Intent [NOI]) must include six "minimum control measures" (using Best Management Practices, or BMPs) and measurable goals; the BMPs must be fully implemented within 5 years of permit issuance; and, operators must submit yearly progress reports to EPA.

There are nine municipalities along the Rio Grande (non-Pueblo Alameda to Angostura) and Rio Grande (Isleta Pueblo bnd to Alameda Street bridge) assessment units that are eligible for coverage under the Albuquerque urbanized area, general SMS4 permit (#NMR040000). These permittees are outlined in Table 4.7. In addition to the general SMS4 permit, there are numerous NPDES permitted facilities in the region as listed in Tables 4.6 and 4.8.

Table 4.7: Phase II NPDES permittees

NPDES Tracking Number	Phase II Permittee
NM R04 A001	SSCAFCA
NM R04 A002	Town of Bernalillo ¹
NM R04 A003	Sandoval County
NM R04 A004	Corrales
NM R04 A006	Los Ranchos de Albuquerque
NM R04 A007	City of Rio Rancho
NM R04 A008	Bernalillo County
NM R04 A009	Kirtland AFB
NM R04 A0010	NM DOT Dist 3

Notes: ¹ Individual small MS4 permit

The waste load allocation (WLA) for SMS4s was based on the percent jurisdictional area approach (see Appendix F). For each zone, the amount available for nonpoint source load allocations (LAs) and the SMS4 WLA was the TMDL for that zone minus the margin of safety (MOS) and the WLAs for WWTPs. In the case of the Middle Rio Grande area, both the Phase I permit and the SMS4 Phase II permittees are assigned WLAs. The total contributing area to these assessment units includes the eight 10-digit USGS HUCs displayed in Figure 4.9.

Four entities are authorized to discharge under the Phase I MS4 permit: City of Albuquerque, Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA), New Mexico Department of Transportation District 3, and University of New Mexico. The Phase I permit states:

“This permit covers all areas, except agricultural lands, within the corporate boundary of the City of Albuquerque, New Mexico served by, or otherwise contributing to discharges from municipal separate storm sewers owned or operated by the permittees listed above.”

Based on the square miles of the incorporated city limits of the City of Albuquerque and the contributing drainages (see Figure 4.9), 9 percent of the watershed falls within the jurisdiction of the Phase I MS4 communities in the Rio Grande (Isleta Pueblo boundary to Alameda Street Bridge) AU and 1% of the watershed falls within the jurisdiction of the Phase I MS4 communities in the Rio Grande (Alameda Street Bridge to Angostura Diversion) AU. Further details are in Appendix F.

The nine sMS4 permittees eligible for coverage under the general Phase II MS4 permit are listed in Table 4.7. The Phase II sMS4 permit (NMR040000) reads:

“This permit authorizes the discharge of storm water from small municipal separate storm sewer systems (MS4s) provided the MS4 is located fully or partially within an urbanized area as determined by the 2000 Decennial Census.”

Based on the square miles of urbanized area and the contributing drainages (see Figure 4.9), 1 percent of the watershed falls within the jurisdiction of the Phase II MS4 communities in the Rio Grande (Isleta Pueblo boundary to Alameda Street Bridge) AU and 5% of the watershed falls within the jurisdiction of the Phase II MS4 communities in the Rio Grande (Alameda Street Bridge to Angostura Diversion) AU. Further details are in Appendix F.

The remaining ninety percent was designated for nonpoint sources and natural background as the LA for each zone in the Rio Grande (Isleta Pueblo boundary to Alameda Street Bridge) AU. The remaining ninety four percent was designated for nonpoint sources and natural background as the LA for each zone in the Rio Grande (Alameda Street Bridge to Angostura Diversion). Individual waste load allocations for all NPDES permits in the impaired assessment units are shown in Table 4.8.

In contrast to discharges from other industrial storm water and individual process wastewater permitted facilities, storm water discharges are transient because they occur during storm events. Coverage under Phase II of the NPDES Storm Water Program requires preparation of a Storm Water Pollution Prevention Plan (SWPPP) that includes identification and control of all pollutants associated with urban activities to minimize impacts to water quality. In this case, compliance with a SWPPP that meets the requirements of the CGP is generally assumed to be consistent with this TMDL. In the case of the Middle Rio Grande, compliance by those municipalities within the terms of their individual MS4 permits will fulfill any obligations they have toward implementing this TMDL.

MRG TMDL MS4 Watersheds

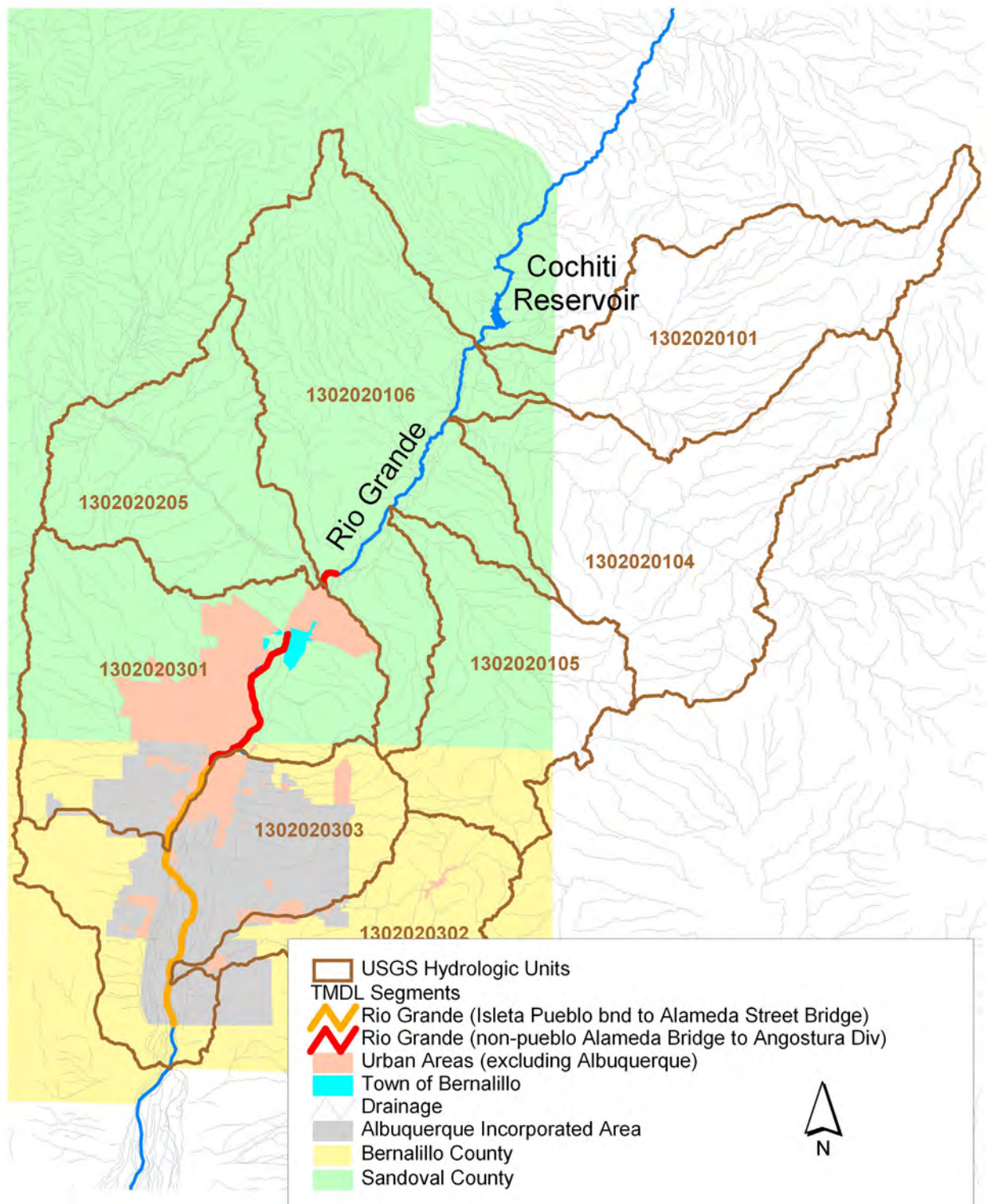


Figure 4.9. Albuquerque-area MS4 jurisdictions

Table 4.8. Waste Load Allocations for *E. coli*

Assessment Unit	Facility	Design Capacity Flow (mgd)	Proposed <i>E. coli</i> Effluent limits ^(a) (cfu/100mL)	Conversion Factor ^(b)	Waste Load Allocations (cfu/day)
Rio Grande (non-Pueblo Alameda Bridge to Angostura Div)	NM0023485 Town of Bernalillo WWTP (January 31, 2009 expiration)	0.8	47	3.79×10^7	1.43×10^9
	NM0027987 City of Rio Rancho, No. 2 (January 31, 2009 expiration)	5.5	47	3.79×10^7	9.80×10^9
	NM0029602 City of Rio Rancho, No. 3 (January 31, 2009 expiration)	0.85	47	3.79×10^7	1.51×10^9
	NMS000101 Albuquerque Phase I MS4 (November 30, 2008 expiration)	--	--	--	Variable ^(c)
	NMR040000 Phase II MS4s (June 30, 2012 expiration)	--	--	--	Variable ^(c)
Rio Grande (Isleta Pueblo bnd to Alameda Street Bridge)	NM0022250 Albuquerque Bernalillo County Water Utility Authority (April 30, 2010 expiration)	76	47	3.79×10^7	1.35×10^{11}
	NM0027863 Sandia Peak Ski Company (February 28, 2010 expiration)	0.0075--	47	3.79×10^7	1.34×10^7
	NMS000101 Albuquerque Phase I MS4		--	--	Variable ^(c)
	NMR040000 Phase II MS4s (June 30, 2012 expiration)		--	--	Variable ^(c)

Assessment Unit	Facility	Design Capacity Flow (mgd)	Proposed <i>E. coli</i> Effluent limits ^(a) (cfu/100mL)	<i>E. coli</i> Conversion Factor ^(b)	Waste Load Allocations (cfu/day)
Rio Grande (Rio Puerco to Isleta Pueblo bnd)	NM0020150 City of Belen WWTP (September 30, 2009 expiration)	1.2	126	3.79 x 10 ⁷	5.73 x 10 ⁹
	NM0020303 Village of Los Lunas WWTP (June 30, 2012 expiration)	0.9	126	3.79 x 10 ⁷	4.30 x 10 ⁹
	NM0027782 NM Water Service Co./Rio Communities (October 31, 2012 expiration)	0.3	126	3.79 x 10 ⁷	1.43 x 10 ⁹
	NM0028851 NMCD/Central NM Correctional Facility WWTP (January 31, 2010 expiration)	0.285	126	3.79 x 10 ⁷	1.36 x 10 ⁹
	NM0030279 Village of Bosque Farms (March 31, 2012 expiration)	0.5	126	3.79 x 10 ⁷	2.39 x 10 ⁹
	NM0030414 NM Water Service Co./Rio del Oro WWTF (October 31, 2009 expiration)	0.3	126	3.79 x 10 ⁷	1.43 x 10 ⁹
Rio Grande (San Marcial at USGS gage to Rio Puerco)	NM0028835 City of Socorro WWTP (December 31, 2009 expiration)	1.3	126	3.79 x 10 ⁷	6.21 x 10 ⁹

Notes:

- (a) Based on current in-stream New Mexico WQS for segment 20.6.4.105 and 20.6.4.106 NMAC as well as the Pueblo of Sandia and Pueblo of Isleta WQS.
- (b) Based on equation 4.
- (c) The waste load allocation for the storm water MS4 permit was based on the percent jurisdictional area approach. Thus, the MS4 waste load allocation is a percentage of the available allocation for each hydrologic zone, where the available allocation = TMDL – WLA – MOS. See Tables 4.11 and 4.12 for details and Appendix F for details.

4.4.2 Load Allocation

In order to calculate the LA, the WLAs listed in table 4.8 and the MOS were subtracted from the target capacity (TMDL), as shown below in **Equation 2**.

$$WLA + LA + MOS = TMDL$$

or, $LA = TMDL - WLA - MOS$ (Eq. 5)

The MOS was developed using a combination of conservative assumptions and explicit recognition of potential errors (see Section 4.7 for details). Results are presented in Tables 4.9-4.12.

Table 4.9. TMDLs for *E. coli*: Rio Grande (San Marcial at USGS gage at Rio Puerco)

	FLOW CONDITIONS				
	High	Moist	Mid-Range	Dry	Low
TMDL	1.14×10^{13}	3.40×10^{12}	1.66×10^{12}	2.81×10^{11}	-
Load Allocation	7.72×10^{12}	2.16×10^{12}	1.10×10^{12}	2.61×10^{11}	-
Waste Load Allocation ^(a)	6.21×10^9	6.21×10^9	6.21×10^9	6.21×10^9	-
Margin of Safety	3.67×10^{12}	1.23×10^{12}	5.56×10^{11}	1.40×10^{10}	-

(a) WLA for NM0028835

Table 4.10. TMDLs for *E. coli*: Rio Grande (Rio Puerco to Isleta Pueblo bnd)

	FLOW CONDITIONS				
	High	Moist	Mid-Range	Dry	Low
TMDL	1.20×10^{13}	3.83×10^{12}	-	1.85×10^{11}	-
NM0020150	5.73×10^9	5.73×10^9	-	5.73×10^9	-
NM0020303	4.30×10^9	4.30×10^9	-	4.30×10^9	-
NM0027782	1.43×10^9	1.43×10^9	-	1.43×10^9	-
NM0028851	1.36×10^9	1.36×10^9	-	1.36×10^9	-
NM0030279	2.39×10^9	2.39×10^9	-	2.39×10^9	-
NM0030414	1.43×10^9	1.43×10^9	-	1.43×10^9	-
Total Waste Load Allocation	1.66×10^{10}	1.66×10^{10}	-	1.66×10^{10}	-
Load Allocation	9.00×10^{12}	2.47×10^{12}	-	1.59×10^{11}	-
Margin of Safety	3.02×10^{12}	1.34×10^{12}	-	9.26×10^9	-

Table 4.11. TMDLs for *E. coli*: Rio Grande (Isleta Pueblo bnd to Alameda Street Bridge)

	FLOW CONDITIONS				
	High	Moist	Mid-Range	Dry	Low
TMDL	5.27 x 10¹²	1.65 x 10¹²	9.03 x 10¹¹	5.77 x 10¹¹	1.89 x 10¹¹
NM0022250	1.35 x 10 ¹¹	1.35 x 10 ¹¹	1.35 x 10 ¹¹	1.35 x 10 ¹¹	1.35 x 10 ¹¹
NM0027873	1.34 x 10 ⁷	1.34 x 10 ⁷	1.34 x 10 ⁷	1.34 x 10 ⁷	1.34 x 10 ⁷
NMS000101	3.36 x 10 ¹¹	8.41 x 10 ¹⁰	5.66 x 10 ¹⁰	2.09 x 10 ¹⁰	4.67 x 10 ⁹
NMR040000	3.73 x 10 ¹⁰	9.35 x 10 ⁹	6.29 x 10 ⁹	2.32 x 10 ⁹	5.19 x 10 ⁸
Total Waste Load Allocation	5.08 x 10¹¹	2.28 x 10¹¹	1.98 x 10¹¹	1.58 x 10¹¹	1.40 x 10¹¹
Load Allocation	3.36 x 10¹²	8.41 x 10¹¹	5.66 x 10¹¹	2.09 x 10¹¹	4.86 x 10¹⁰
Margin of Safety	1.40 x 10¹²	5.77 x 10¹¹	1.38 x 10¹¹	2.10 x 10¹¹	1.89 x 10⁹

Table 4.12. TMDLs for *E. coli*: Rio Grande (non-Pueblo Alameda Bridge to Angostura Div)

	FLOW CONDITIONS				
	High	Moist	Mid-Range	Dry	Low
TMDL	5.54 x 10¹²	1.61 x 10¹²	-	5.85 x 10¹¹	2.96 x 10¹¹
NM0023485	1.43 x 10 ⁹	1.43 x 10 ⁹	-	1.43 x 10 ⁹	1.43 x 10 ⁹
NM0027987	9.80 x 10 ⁹	9.80 x 10 ⁹	-	9.80 x 10 ⁹	9.80 x 10 ⁹
NM0029602	1.51 x 10 ⁹	1.51 x 10 ⁹	-	1.51 x 10 ⁹	1.51 x 10 ⁹
NMS000101	5.25 x 10 ¹⁰	1.52 x 10 ¹⁰	-	5.43 x 10 ⁹	2.80 x 10 ⁹
NMR040000	2.62 x 10 ¹¹	7.59 x 10 ¹⁰	-	2.71 x 10 ¹⁰	1.40 x 10 ¹⁰
Total Waste Load Allocation	3.28 x 10¹¹	1.04 x 10¹¹	-	4.53 x 10¹⁰	2.95 x 10¹⁰
Load Allocation	4.93 x 10¹²	1.43 x 10¹²	-	5.10 x 10¹¹	2.63 x 10¹¹
Margin of Safety	2.77 x 10¹¹	8.06 x 10¹⁰	-	2.92 x 10¹⁰	2.96 x 10⁹

The extensive data collection and analyses necessary to determine background *E. coli* loads for the Middle Rio Grande watershed were beyond the resources available for this study. It is therefore assumed that a portion of the load allocation is made up of natural background loads.

4.5 Identification and Description of Pollutant Sources

Based on measured loads and potential contributions from existing point sources, probable point and nonpoint pollutant sources that may be contributing to observed *E. coli* loads are displayed in Table 4.13.

Table 4.13. Pollutant Source Summary for *E. coli*

Pollutant Sources	Magnitude (cfu/day)	Assessment Unit	Probable Sources ^(a)
<u>Point:</u> ^(b)			
	6.21 x 10 ⁹	Rio Grande (San Marcial at USGS gage to Rio Puerco)	Municipal Point Sources Discharges
	1.66 x 10 ¹⁰	Rio Grande (Rio Puerco to Isleta Pueblo bnd)	Municipal Point Sources Discharges
	5.08 x 10 ¹¹ – 3.66 x 10 ¹⁰	Rio Grande (Isleta Pueblo bnd to Alameda Street Bridge)	Municipal Point Sources Discharges
	2.65 x 10 ¹¹ – 5.91 x 10 ¹⁰	Rio Grande (non-pueblo Alameda Bridge to Angostura Diversion)	Municipal Point Sources Discharges
<u>Nonpoint:</u>			
		Rio Grande (San Marcial at USGS gage to Rio Puerco)	Avian Sources (waterfowl and/or other), Impervious surface/parking lot runoff, municipal (urbanized high density area), natural sources, wastes from pets, On-site Treatment Systems (septic systems and similar decentralized systems).
		Rio Grande (Rio Puerco to Isleta Pueblo bnd)	Avian Sources (waterfowl and/or other), Impervious surface/parking lot runoff, municipal (urbanized high density area), wastes from pets, On-site Treatment Systems (septic systems and similar decentralized systems).
		Rio Grande (Isleta Pueblo bnd to Alameda Street Bridge)	Avian sources (waterfowl and/or other), Impervious surface/parking lot runoff, municipal (urbanized high density area), source unknown, wastes from pets, On-site Treatment Systems (septic systems and similar decentralized systems).
		Rio Grande (non-pueblo Alameda Bridge to Angostura Diversion)	Avian sources (waterfowl and/or other), Impervious surface/parking lot runoff, municipal (urbanized high density area), source unknown, wastes from pets, On-site Treatment Systems (septic systems and similar decentralized systems).

^(a) From the 2008-2010 Integrated CWA 303(d)/305(b) Report (NMED/SWQB 2008a). This list of probable sources is based on staff observation and known land use activities in the watershed. These sources are not confirmed or quantified at this time.

^(b) Current probable point source contributions (based on WLA calculations from NPDES permits)

4.6 Linkage Between Water Quality and Pollutant Sources

SWQB fieldwork includes an assessment of the probable sources of impairment. The Source Documentation Sheet provides a visual analysis of a pollutant source along an impaired reach. Although this procedure is subjective, SWQB feels that it provides the best available information for the identification of probable sources of impairment in this watershed. Table 4.17 (Pollutant Source Summary) identifies and quantifies probable sources of nonpoint source impairments along the reach as determined by field reconnaissance and assessment.

Among the probable sources of bacteria are municipal point sources discharges such as wastewater treatment facilities and storm water systems, poorly maintained or improperly installed (or missing) septic tanks, impervious surface/parking lot runoff, livestock grazing of valley pastures and riparian areas, upland livestock grazing, in addition to wastes from pets, waterfowl, and other wildlife. Very high *E. coli* concentrations have been measured in water sampled from SWQB monitoring stations along the Middle Rio Grande. Howell et. al. (1996) found that bacteria concentrations in underlying sediment increase when cattle (*Bos taurus*) have direct access to streams, such as may be the case in parts of the Middle Rio Grande valley. Natural sources of bacteria are also present in the form of other wildlife such as waterfowl, elk, deer, and any other warm-blooded mammals. *E. coli* concentrations may be subject to elevated levels as a result of re-suspension of bacteria laden sediment during storm events. Temperature can also play a role in *E. coli* concentrations. Howell et. al. (1996) observed that bacteria re-growth increases as water temperature increases.

***E. coli* Data**

E. coli data used during the development of this TMDL are shown in Appendix D. Rainfall measurements collected at the NOAA stations at South Bosque del Apache, Los Lunas, Albuquerque, NM were used to identify trends between elevated *E. coli* levels and rainfall. The Pearson correlation coefficient was used to assess whether a statistical association existed between *E. coli* and rainfall. The Pearson correlation coefficient, denoted by r , measures the strength and direction of a *linear* relationship between X and Y variables. Higher r -values indicate stronger correlations between the variables compared.

$$r = \frac{\sum_{i=1}^n (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^n (x_i - \bar{x})^2 \sum_{i=1}^n (y_i - \bar{y})^2}}$$

The available data for the Rio Grande (San Marcial at USGS gage to Rio Puerco), shows no relationship between *E. coli* and rainfall events (Figure 4.5, $r = -0.01$). Data in Table D.4 of Appendix D that show elevated *E. coli* levels occur during both rainfall and non-rainfall events. In fact, of the 63 water quality samples collected in this AU, rainfall was only recorded on four days. On two of those four days, the *E. coli* concentrations were 1000 cfu/100 mL and 520 cfu/100 mL, respectively.

The available data (Table D.3 of Appendix D) for the Rio Grande (Rio Puerco to Isleta Pueblo bnd) shows a positive association between *E. coli* and rainfall events ($r = 0.47$). This potentially shows that along this segment of the Rio Grande sources of bacteria are delivered to the river partially during rainfall events.

No rainfall was recorded for the day preceding the sampling events in the Rio Grande (Isleta Pueblo bnd to Alameda Street Bridge) AU. The four exceedences of the single sample criteria,

ranging from 730-1553 cfu/100 mL, all occurred during non-rainfall events. See Table D.2 of Appendix D for the associated data.

The available data (Table D.1 of Appendix D) for the Rio Grande (non-pueblo Alameda to Angostura Diversion) shows a positive association between *E. coli* and rainfall events ($r = 0.77$). This potentially shows that along this segment of the Rio Grande sources of bacteria are delivered to the river partially during rainfall events. The highest exceedence of the single sample *E.coli* criteria was 5300 cfu/100 mL and occurred on the one day when rainfall was recorded for the available samples.

SWQB collected *E.coli* samples from seven WWTPs that discharge into the Middle Rio Grande area from July – November 2005. Data in Appendix D show that there were no exceedences of the single sample *E.coli* criterion, except in October and November at Bosque Farms WWTP in the Rio Grande (Rio Puerco to Isleta bnd) AU.

Discussion

The bacteria loading probably originates from a combination of drought-related impacts, municipal wastewater treatment facilities, septic systems and similar decentralized systems, and livestock and wildlife wastes that are transported downstream during runoff events. Additionally, recent national studies show that bacteria concentrations in stormwater runoff are often above the contact recreation standard regardless of the land use in the watershed (Clary *et. al.*, 2008).

The duration curve method, by itself, is limited in the ability to track individual source loadings or relative source contributions within a watershed. Additional analysis is needed to identify pollutant contributions from different types of probable sources and activities (i.e., construction zone versus agricultural area) or individual sources of a similar source category (i.e., WWTF #1 versus WWTF #2). Practitioners interested in more precise source characterization should consider supplementing the duration curve framework with a separate analysis. An added analytical tool might aid in evaluating allocation scenarios and tracking individual sources or source categories. This could allow for improved targeting of restoration activities.

One method of characterizing sources of bacteria is a Bacterial Source Tracking (BST) study. In 2002 a BST study (Parsons, 2005), jointly funded by NMED, Bernalillo County, and Albuquerque Metropolitan Arroyo Flood Control Authority was conducted in the MRG basin from the Angostura Diversion to the Isleta Diversion Dam. The results of the extensive study showed that avian sources were the largest contributor to bacteria in this portion of the Rio Grande, followed by dogs and cats, other wildlife, humans, and livestock. This study has led agencies in the area to fund bacterial remediation projects, such as outreach campaigns designed to encourage pet owners to properly discard of pet waste and storm water quality projects.

4.7 Margin of Safety (MOS)

TMDLs should reflect a MOS based on the uncertainty or variability in the data, the point and nonpoint source load estimates, and the modeling analysis. For these bacteria TMDLs, the MOS was developed using a combination of conservative assumptions and explicit allocations. Therefore, this MOS is the sum of the following two elements:

Implicit Margin of Safety

Treating *E. coli* as a relatively conservative pollutant, that is a pollutant that does not readily degrade in the environment, was used as a conservative assumption in developing these loading limits.

A more conservative limit of the geometric mean value, rather than the current single sample criterion which allows for higher concentrations in individual grab samples, was used to calculate loading values.

Explicit Margin of Safety

Using a duration curve framework, an explicit MOS can be identified for each listed reach and corresponding set of flow zones. In this TMDL, the MOS was based on the difference between the loading capacity as calculated at the mid-point of each flow zones and the loading capacity calculated at the minimum flow in each zone. Given that the loading capacity is typically much less at the minimum flow of a zone as compared to the mid-point, a substantial MOS is provided. This explicit MOS ensures that allocations will not exceed the load associated with the minimum flow in each zone (USEPA 2006).

In some cases, the MOS for the dry and low flow zones was determined using a different method because the lowest flow recorded were very close to zero. If the MOS was calculated as described above, the MOS would constitute the majority of the target load. In other words, there would not be enough load to allocate to point and nonpoint sources under this flow regime. In particular, this was the case with all flow regimes in the Rio Grande (non-pueblo Alameda Street Bridge to Angostura Diversion) assessment unit. Similar to previous SWQB bacteria TMDLs which were based on 4Q3 low-flows, there is inherent error in all flow measurements. A conservative MOS of **5 percent** was therefore explicitly allocated to the low flow hydrologic zone.

An explicit MOS identified using a duration curve framework is basically unallocated assimilative capacity intended to account for uncertainty (e.g., loads from tributary streams, effectiveness of controls, etc). As new information becomes available, this unallocated capacity may be attributed to nonpoint sources including tributary streams (which could then be added to the load allocation); or it may be attributed to point sources (and become part of the waste load allocations).

4.8 Consideration of Seasonal Variability

Federal regulations (40 CFR §130.7(c)(1)) require that TMDLs take into consideration seasonal variation in watershed conditions and pollutant loading. Seasonal variation was accounted for in these TMDLs by using 25 years of USGS flow records when estimating flows to develop flow exceedence percentiles.

During the 2004 water quality survey, bacteria exceedences occurred during spring, summer, and fall months. Higher flows may flush more nonpoint source runoff containing *E. coli*. It is also possible the water quality criterion may be exceeded under a low flow condition when there is insufficient dilution of a point source. The use of duration curves provides a technical framework for identifying “*daily loads*” in TMDL development, which accounts for the variable nature of water quality associated with different stream flow rates during different seasons. Allocations within the TMDL are set in a way that reflects dominant concerns associated with appropriate hydrologic conditions.

4.9 Future Growth

Growth estimates by county are available from the New Mexico Bureau of Business and Economic Research. These estimates project growth to the year 2035. Table 4.14 shows the population estimates for the counties discussed in this TMDL.

Table 4.14 Population Estimates by County

County	2007*	2015	2025	2035	% Increase (2007-2035)
Sandoval	123,694	144,087	182,592	217,806	43
Bernalillo	644,023	811,861	993,650	1,166,590	45
Valencia	75,807	89, 045	107,294	123,212	38
Socorro	18,788	20,012	21, 167	21,837	14

**estimate revised 11/2008*

The MRG AUs experienced impacts from both point and nonpoint sources depending on the flow conditions. Estimates of future growth are not anticipated to lead to a significant increase in bacteria concentrations that cannot be controlled with BMP implementation and appropriate NPDES permit limits in this watershed. However, it is imperative that BMPs continue to be utilized and improved upon in this watershed while continuing to improve watershed conditions and adhering to SWPPP requirements related to construction and industrial activities covered under the general permit. The existing Middle Rio Grande-Albuquerque Reach Watershed Restoration Action Strategy (Middle Rio Grande-Albuquerque Reach Watershed Group, 2008) defines framework for design, implementation, and maintenance of BMPs in the northern portion of the watershed addressed by this TMDL. Section 6.0 provides details on this WRAS.

5.0 MONITORING PLAN

Pursuant to Section 106(e)(1) of the Federal CWA, the SWQB has established appropriate monitoring methods, systems and procedures in order to compile and analyze data on the quality of the surface waters of New Mexico. In accordance with the New Mexico Water Quality Act, the SWQB has developed and implemented a comprehensive water quality monitoring strategy for the surface waters of the State.

The monitoring strategy establishes methods for identifying and prioritizing water quality data needs, specifies procedures for acquiring and managing water quality data, and describes how these data are used to progress toward three basic monitoring objectives: to develop water quality-based controls, to evaluate the effectiveness of such controls, and to conduct water quality assessments.

The SWQB utilizes a rotating basin system approach to water quality monitoring. In this system, a select number of watersheds are monitored each year with an established return frequency of approximately every eight years. Based on an 8-year rotation throughout the state, the next tentatively scheduled monitoring date for the Middle Rio Grande watershed is 2013. The SWQB maintains current quality assurance and quality control plans for the respective sample year to cover all monitoring activities. This document, called the QAPP, is updated and certified annually by USEPA Region 6. In addition, the SWQB identifies the data quality objectives required to provide information of sufficient quality to meet the established goals of the program. Current priorities for monitoring in the SWQB are driven by the CWA Section 303(d) list of streams requiring TMDLs. Short-term efforts were directed toward those waters that are on the USEPA TMDL consent decree list (U.S. District Court for the District of New Mexico 1997), however NMED/SWQB completed the final remaining TMDL on the consent decree in December 2006 and USEPA approved this TMDL in August 2007. The U.S. District Court dismissed the Consent Decree on April 21, 2009.

Once assessment monitoring is completed, those reaches showing impacts and requiring a TMDL will be targeted for more intensive monitoring. The methods of data acquisition include fixed-station monitoring, water quality surveys of priority assessment units (including biological assessments), and compliance monitoring of industrial, federal, and municipal dischargers, as specified in the SWQB assessment protocols (NMED/SWQB 2008b).

Long-term monitoring for assessments will be accomplished through the establishment of sampling sites that are representative of the waterbody and which is revisited approximately every eight years. This information will provide time relevant information for use in CWA Section 303(d) listing and 305(b) report assessments and to support the need for developing TMDLs. The approach provides:

- a systematic, detailed review of water quality data which allows for a more efficient use of valuable monitoring resources;
- information at a scale where implementation of corrective activities is feasible;

-
- an established order of rotation and predictable sampling in each basin which allows for enhanced coordinated efforts with other programs; and
 - program efficiency and improvements in the basis for management decisions.

SWQB routinely develops a 10-year monitoring strategy and submits it to USEPA. The strategy details both the extent of monitoring that can be accomplished with existing resources plus expanded monitoring strategies that could be implemented given additional resources. According to the rotational cycle, which assumes the existing level of resources, the next time SWQB will sample the Middle Rio Grande watershed is during 2013.

It should be noted that a watershed would not be ignored during the years in between sampling. The rotating basin program will be supplemented with other data collection efforts such as the funding of long-term USGS water quality gaging stations for long-term trend data, and on-going studies being performed by USGS and USEPA. Data will be analyzed and field studies will be conducted to further characterize acknowledged problems and TMDLs will be developed and implemented accordingly. Both long-term monitoring and short-term water quality surveys can both contribute to the State's Integrated §303(d)/§305(b) listing process for waters requiring TMDLs.

6.0 IMPLEMENTATION OF TMDLS

6.1 WRAS and BMP Coordination

Watershed public awareness and involvement will be crucial to the successful implementation of these plans to improve water quality. Staff from SWQB have worked with stakeholders to develop a WRAS for the Middle Rio Grande Watershed north of Isleta Pueblo (MRG-Albuquerque Reach Watershed Group, 2008). The WRAS is a written plan intended to provide a long-range vision for various activities and management of resources in a watershed. It details opportunities for private landowners and public agencies to reduce and prevent impacts to water quality. This long-range strategy will become instrumental in coordinating and achieving constituent levels consistent with New Mexico's WQS, and will be used to prevent water quality impacts in the watershed. The WRAS is essentially the Implementation Plan, or Phase Two of the TMDL process. The completion of the TMDLs and WRAS leads directly to the development of on-the-ground projects to address surface water impairments in the watershed.

Specifically, a watershed group was formed consisting of technical experts, traditional, rural and urban water users, and members of surface water regulatory agencies. The watershed group utilized the *Middle Rio Grande Microbial Source Tracking Study* (Parsons, 2005) as a key reference in the planning and writing of the WRAS. Two other surface water quality studies utilized include the *Middle Rio Grande Total Maximum Daily Load (TMDL) for Fecal Coliform in Storm Water* (NMED/SWQB, 2002), and the *City of Albuquerque Antibiotic Resistance Analysis of Contamination in Storm Water Final Report* (City of Albuquerque, 2002).

The Watershed Group, using these studies and input from a broad range of stakeholders, developed a multi-phased and multi-tiered approach to reduce non-point source storm water pollution. The approach consists of a framework of four goals, listed below:

1. The 2002 TMDL for fecal coliform in storm water for the Albuquerque reach of the Rio Grande is being addressed through education, engineering, and enforcement.
2. There is increased public understanding of watershed approaches and increased participation in water quality improvement activities.
3. Water quality data is shared across jurisdictions to facilitate project implementation.
4. Regulations and local policies support watershed improvement initiatives.

The Watershed Group and NMED are developing a new 319-funded project that includes, among other tasks, revision of the WRAS to utilize information developed for this revised TMDL, and to more clearly address the planning elements identified by EPA in the *Nonpoint Source Program and Grants Guidelines for States and Territories* (EPA, 2003). SWQB staff will continue to assist with technical assistance such as selection and application of BMPs and estimating load reductions associated with BMPs needed to meet WRAS goals. Stakeholder public outreach and involvement in the implementation of this TMDL will be ongoing. Stakeholders in this process will include SWQB as well as land owners, and other agencies in the implementation of this TMDL.

Implementation of BMPs within the watershed to reduce pollutant loading from nonpoint sources will be encouraged. Any reductions from point sources will be addressed in revisions to NPDES discharge permits. SWQB will communicate to designated federal land management agencies the intent of the TMDL and desire that BMPs be developed through the above coordination process.

6.2 Clean Water Act §319(h) Funding Opportunities

The Watershed Protection Section of the SWQB manages a grant program of CWA §319(h) funding to assist in planning and implementation of BMPs to address water quality problems on reaches listed as Category 4 or 5 waters (ie: impaired waters) on the Integrated CWA §303(d)/§305(b) list. These monies are available to all private, for profit and nonprofit organizations that are authenticated legal entities, or governmental jurisdictions including: municipalities, counties, tribal entities, Federal agencies, or agencies of the State. Proposals are submitted by applicants at least once a year through a Request for Proposal (RFP) process and require a non-federal match of 40% of the total project cost consisting of funds and/or in-kind services. Funding is available for both projects to develop watershed plans and on-the-ground projects to implement those plans.

South of Isleta Pueblo, the Watershed Protection Section will begin with initial outreach to inform stakeholders of the significance of the TMDL, and will include the affected assessment units among eligible stream reaches in RFPs for watershed planning projects. Once a watershed plan meeting the nine elements identified in the *Nonpoint Source Program and Grants Guidelines for States and Territories* (USEPA, 2003) has been developed, projects to address the load allocation portions of the TMDL will be eligible for funding with Section 319 funds.

Further information on New Mexico's Nonpoint Source Management Program and funding from the CWA §319 (h) can be found at the SWQB website: <http://www.nmenv.state.nm.us/swqb>.

6.3 Other Funding Opportunities and Restoration Efforts in the Middle Rio Grande Basin

Development of a watershed plan is expected to increase eligibility for other funding sources as well. The New Mexico Nonpoint Source Management Program utilizes locally-driven stakeholder processes to develop watershed plans, and as such implementation of the watershed plan should have the support of staff of agencies and organizations with specific relevant responsibilities in the area. Several other sources of funding exist to address impairments discussed in this TMDL document. NMED's Construction Programs Bureau assists communities in need of funding for WWTP upgrades and improvements to septic tank configurations (such as the design of cluster systems). The Construction Programs Bureau can also provide matching funds for appropriate CWA §319(h) projects using state revolving fund monies. The United States Department of Agriculture (USDA) Environmental Quality Incentive Program (EQIP) program can provide assistance to agricultural producers in the basin. The Bureau of Land Management and USDA Forest Service align their missions to protect lands they manages with the TMDL process, and are additional potential sources of assistance.

Note: Section 6.4 is standardized language regarding MS4 allocations and MS4 permits added at the request of EPA Region 6. It is the responsibility of EPA Permit Writers to develop a permit that complies with the allocations provided in the TMDL. The exact manner in which this is implemented (specific BMPs, numeric effluent limits etc.) to achieve this goal is up to the discretion of the EPA permit writer and need not follow this implementation guidance.

6.4 Storm water permitting Requirements and Presumptive Best Management Practices (BMPs) Approach

A. Background

The National Pollutant Discharge Elimination System (NPDES) permitting program for stormwater discharges was established under the Clean Water Act as the result of a 1987 amendment. The Act specifies the level of control to be incorporated into the NPDES stormwater permitting program depending on the source (industrial versus municipal). These programs contain specific requirements for the regulated communities/facilities to establish a comprehensive stormwater management program (SWMP) or storm water pollution prevention plan (SWPPP) to implement any requirements of the total maximum daily load (TMDL) allocation. [See 40 CFR §130.]

Storm water discharges are highly variable both in terms of flow and pollutant concentration, and the relationships between discharges and water quality can be complex. For municipal stormwater discharges in particular, the current use of system-wide permits and a variety of jurisdiction-wide BMPs, including educational and programmatic BMPs, does not easily lend itself to the existing methodologies for deriving numeric water quality-based effluent limitations. These methodologies were designed primarily for process wastewater discharges which occur at predictable rates with predictable pollutant loadings under low flow conditions in receiving waters. EPA has recognized these problems and developed permitting guidance for stormwater permits. (USEPA, 1996)

Due to the nature of storm water discharges, and the typical lack of information on which to base numeric water quality-based effluent limitations (expressed as concentration and mass), EPA recommends an interim permitting approach for NPDES storm water permits which is based on BMPs. “The interim permitting approach uses best management practices (BMPs) in first-round storm water permits, and expanded or better-tailored BMPs in subsequent permits, where necessary, to provide for the attainment of water quality standards.” (*ibid.*)

A monitoring component is also included in the recommended BMP approach. “Each storm water permit should include a coordinated and cost-effective monitoring program to gather necessary information to determine the extent to which the permit provides for attainment of applicable water quality standards and to determine the appropriate conditions or limitations for subsequent permits.” (*ibid.*) This approach was further elaborated in an EPA guidance memo (USEPA, 2002): “The policy outlined in this memorandum affirms the appropriateness of an iterative, adaptive management BMP approach, whereby permits include effluent limits (e.g., a

combination of structural and nonstructural BMPs) that address storm water discharges, implement mechanisms to evaluate the performance of such controls, and make adjustments (i.e., more stringent controls or specific BMPs) as necessary to protect water quality. If it is determined that a BMP approach (including an iterative BMP approach) is appropriate to meet the storm water component of the TMDL, EPA recommends that the TMDL reflect this.” This BMP-based approach to stormwater sources in TMDLs is also recognized and described in the most recent EPA guidance (USEPA, 2008).

This TMDL adopts the EPA recommended approach and relies on appropriate BMPs for implementation. No numeric effluent limitations are required or anticipated for municipal stormwater discharge permits.

B. SPECIFIC SWMP/SWPPP REQUIREMENTS

As noted in Section 4.0 of the TMDL, National Pollutant Discharge Elimination System (NPDES)-permitted facilities and non-point sources (e.g., wildlife, agricultural activities and domesticated animals, urban runoff, failing onsite wastewater disposal system, and domestic pets) could contribute to exceedences of the water quality criteria. In particular, stormwater runoff from the Phase 1 and II municipal separate storm sewer systems (MS4s) is likely to contain elevated bacteria concentrations. Permits for these discharges must comply with the provisions of this TMDL. Table 4.7 provides a list of Phase 1 and II MS4s that are affected by this TMDL.

Agricultural activities and other nonpoint sources of bacteria are unregulated. Voluntary measures and incentives should be used and encouraged wherever possible and such sources should strive to attain the loads established in this TMDL.

To ensure compliance with the TMDL requirements under the permit, stormwater permittees must develop strategies designed to achieve progress toward meeting the loads established in the TMDL. Relying primarily upon a Best Management Practices (BMP) approach, permittees should take advantage of existing information on BMP performance and select a suite of BMPs appropriate to the local community that are expected to result in progress toward meeting the loads established in the TMDL. The permittee should provide guidance on BMP installation and maintenance, as well as a monitoring and/or inspection schedule.

After EPA approves the final TMDL, existing MS4 permittees will be notified of the TMDL provisions and schedule. Industrial stormwater permittees are not expected to be a significant source of bacteria but if any are identified, similar actions will be required. Compliance with the following provisions will constitute compliance with the WLA requirements of this TMDL.

1. Develop A Bacteria Reduction Plan

Permittees should consider submitting an approvable Bacteria Reduction Plan to the EPA within 12 months of notification. Unless disapproved within 60 days of submission, the

plan should be approved then implemented by the permittee. This plan shall, at a minimum, include the following:

- a. Consideration of ordinances or other regulatory mechanisms to require bacteria pollution control, as well enforcement procedures for noncompliance;
- b. Evaluation of the existing SWMP in relation to TMDL loads;
- c. An evaluation to identify potential significant sources of bacteria entering your MS4.
- d. Develop (or modify an existing program as necessary) and implement a program to reduce the discharge of bacteria in municipal storm water contributed by any other significant source identified in the source identification evaluation
- e. Educational programs directed at reducing bacterial pollution. Implement a public education program to reduce the discharge of bacteria in municipal storm water contributed (if applicable) by pets, recreational and exhibition livestock, and zoos;
- f. Investigation and implementation of BMPs that prevent additional storm water bacteria pollution associated with new development and re-development;
- g. Develop (or modify an existing program as necessary) and implement a program to reduce the discharge of bacteria in municipal storm water contributed by areas within your MS4 served by on-site wastewater treatment systems
- h. Implementation of BMPs applicable to bacteria. EPA can provide summary information on some BMPs that should be considered. Permittees are not limited to BMPs on this list and should select BMPs appropriate to the local community that are expected to result in progress toward meeting the loads established in the TMDL.
- i. Modifications to the dry weather field screening and illicit discharge detection and elimination provisions of the SWMP to consider storm water sampling and other measures intended to specifically identify bacterial pollution sources and high priority areas for bacteria reductions.
- j. Periodic evaluation of the effectiveness of the bacteria reduction plan to ensure progress toward attainment of water quality standards.
- k. An implementation schedule leading to modification of the SWMP and full implementation of the plan within 3 years of notification.

2. Develop Or Participate In A Bacteria Monitoring Program

Permittees may participate in a coordinated regional bacteria monitoring program or develop their own individual program. The monitoring program should be designed to establish the effectiveness of the selected BMPs and demonstrate progress toward achieving the loads of the TMDL and eventual attainment of water quality standards.

- a. Within 18 months of notification, the permittee should prepare and submit to the EPA either a TMDL monitoring plan or a commitment to participate in a coordinated regional monitoring program. Unless disapproved by the Director within 60 days of submission, the plan should be approved then implemented by the permittee. The plan or program should include:
- b. A detailed description of the goals, monitoring, and sampling and analytical methods;
- c. A list and map of the selected TMDL monitoring sites;
- d. The frequency of data collection to occur at each station or site;

-
- e. The parameters to be measured, as appropriate for and relevant to the TMDL;
 - f. A Quality Assurance Project Plan that complies with EPA requirements (EPA, 2001)
 - g. The monitoring program should be fully implemented within 3 years of notification.

3. Annual Reporting

The permittee should include a TMDL implementation report as part of their annual report. The TMDL implementation report should include the status and actions taken by the permittee to implement the Bacteria Reduction Plan and monitoring program. The TMDL implementation report should document relevant actions taken by the permittee that affect MS4 storm water discharges to the waterbody segment that is the subject of the TMDL. This TMDL implementation report also should identify the status of any applicable TMDL implementation schedule milestones.

7.0 ASSURANCES

New Mexico's Water Quality Act (Act) authorizes the WQCC to "promulgate and publish regulation to prevent or abate water pollution in the state" and to require permits. The Act authorizes a constituent agency to take enforcement action against any person who violates a water quality standard. (§74-6-10(A) NMSA 1978) Several statutory provisions on nuisance law could also be applied to nonpoint source water pollution. The Water Quality Act also states in §74-6-12(A):

The Water Quality Act (this article) does not grant to the commission or to any other entity the power to take away or modify the property rights in water, nor is it the intention of the Water Quality Act to take away or modify such rights.

In addition, the State of New Mexico Surface Water Quality Standards (see Subsection C of 20.6.4.62) (NMAC 2007) state:

Pursuant to Subsection A of Section 74-6-12 NMSA 1978, this part does not grant to the water quality control commission or to any other entity the power to take away or modify property rights in water.

New Mexico policies are in accordance with the federal Clean Water Act §101(g):

It is the policy of Congress that the authority of each State to allocate quantities of water within its jurisdiction shall not be superseded, abrogated or otherwise impaired by this Act. It is the further policy of Congress that nothing in this Act shall be construed to supersede or abrogate rights to quantities of water which have been established by any State. Federal agencies shall co-operate with State and local agencies to develop comprehensive solutions to prevent, reduce and eliminate pollution in concert with programs for managing water resources.

New Mexico's 319 Program has been developed in a coordinated manner with the State's 303(d) process. All 319 watersheds that are targeted in the annual RFP process coincide with the State's biennial impaired waters list as approved by USEPA. The State has given a high priority for funding, assessment, and restoration activities to these watersheds.

As a constituent agency, NMED has the authority under Chapter 74, Article 6-10 NMSA 1978 to issue a compliance order or commence civil action in district court for appropriate relief if NMED determines that actions of a "person" (as defined in the Act) have resulted in a violation of a water quality standard including a violation caused by a nonpoint source. Proving causation by a nonpoint source of a violation of a water quality standard would be very difficult, and to date NMED has not brought an enforcement action on this basis. Instead, the NMED nonpoint source water quality management program has historically strived for and will continue to promote voluntary compliance to nonpoint source water pollution concerns by utilizing a voluntary, cooperative approach. NMED believes this is the best and most effective approach to addressing impairment of streams as a result of nonpoint source issues. The State provides technical support and grant monies for implementation of BMPs and other nonpoint source

prevention mechanisms through §319 of the Clean Water Act. Since portions of this TMDL will be implemented through nonpoint source control mechanisms, the New Mexico Watershed Protection Program will target its efforts towards this and other watersheds with TMDLs.

In order to obtain reasonable assurances for implementation in watersheds with multiple landowners, including federal, State and private land, NMED has previously established Memoranda of Understanding (MOUs) with various federal agencies, in particular the USFS and the Bureau of Land Management. MOUs in the past have also been developed with other State agencies, such as the New Mexico State Highway and Transportation Department. These MOUs provided for coordination and consistency in dealing with nonpoint source issues.

The time required to attain standards for all reaches is estimated to be approximately 10-20 years. This estimate includes watershed projects that may not be starting immediately, and also contemplates response to earlier projects. This timeframe is intended to provide some measure of watershed response to projects but is not intended to be a fixed goal. Stakeholders in this process will include SWQB, and other stakeholders involved with the development and implementation of the WRAS. The cooperation of watershed stakeholders will be pivotal in the implementation of these TMDLs as well.

8.0 PUBLIC PARTICIPATION

Public participation was solicited in development of this TMDL (Figure 8.1). The draft TMDL will be made available for a 45-day comment period on September 16, 2009. The draft document notice of availability was extensively advertised via newsletters, email distribution lists, webpage postings (<http://www.nmenv.state.nm.us>), and press releases to the Albuquerque Journal, Santa Fe New Mexican, and El Defensor Chieftain. TMDL staff presented the TMDL to the Middle Rio Grande Water Quality Workgroup on Tuesday, September 22, 2009 at 9am. A public meeting was held on Tuesday, September 29, 2009 in Albuquerque, NM at the NMED District 1 Offices from 6-8pm. Eight sets of comments were received and the Response to Comments are included as Appendix E of this document.

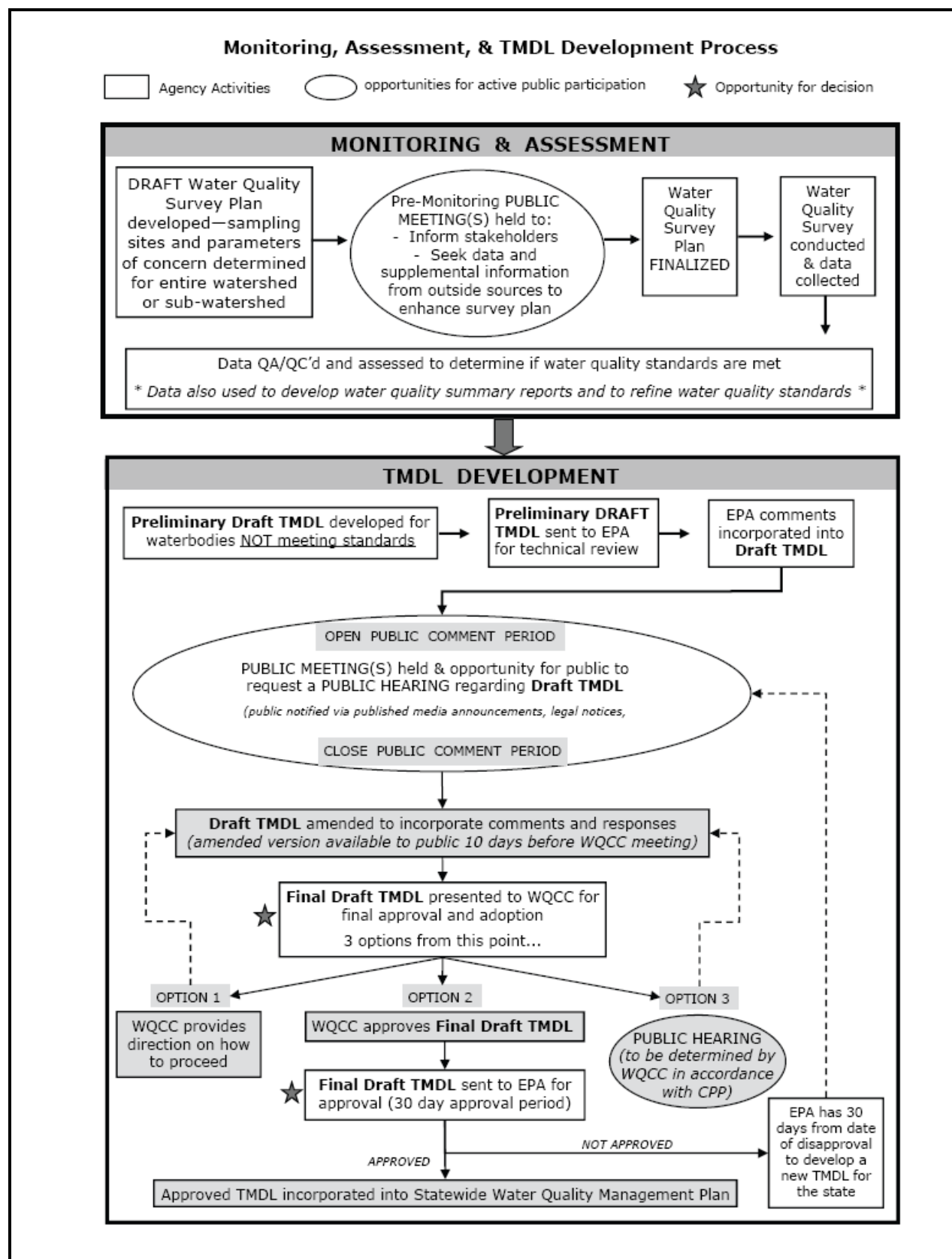


Figure 8.1. SWQB TMDL Public Participation Process

9.0 REFERENCES

- Chronic, Halka. 1987. Roadside Geology of New Mexico. Mountain Press Publishing Company, Missoula.
- City of Albuquerque, 2002. Antibiotic Resistance Analysis of Contamination in Stormwater Final Report. Prepared by CDM.
- Clary, J., J.E. Jones, B.R. Urbonas, M.M. Quigley, E. Strecker, T. Wagner. 2008. *Can Stormwater BMPs Remove Bacteria?* Stormwater Journal. May 2008.
- Cleland, B.R. November 2003. *TMDL Development from the “Bottom Up” -- Part III: Duration Curves and Wet-Weather Assessments*. National TMDL Science and Policy 2003 -- WEF Specialty Conference. Chicago, IL.
- Howell, J.M., M.S. Coyne and P.L. Cornelius. 1996. Effect of sediment particle size and temperature on fecal bacteria mortality rates and the fecal coliform/fecal streptococci ratio. *Journal Environmental Quality* 25:1216-1220.
- Middle Rio Grande-Albuquerque Reach Watershed Group. 2008. Middle Rio Grande-Albuquerque Reach Watershed Restoration Action Strategy (WRAS).
<ftp://ftp.nmenv.state.nm.us/www/swqb/WPS/WRAS/MiddleRioGrandeWRAS12-2008.pdf>
- Middle Rio Grande Endangered Species Collaborative Program (MRGESCP). July 2004. *Water Acquisition and Management Subcommittee Position Paper: Supplementing Middle Rio Grande Flows through Pumping from the Low Flow Conveyance Channell (LFCC)*. Online:
<http://www.middleriogrande.com/LinkClick.aspx?fileticket=N%2BBrw1KXbMh8%3D&tabid=276&mid=688>
- New Mexico Environment Department/Surface Water Quality Bureau (NMED/SWQB). 2002. Middle Rio Grande TMDL for Fecal Coliform. Santa Fe, NM.
- . 2007. *TMDL for the Rio Puerco Watershed- Part 2*. Surface Water Quality Bureau. Santa Fe, NM. <http://www.nmenv.state.nm.us/SWQB/RioPuerco2/index.html>
- . 2008a. *State of New Mexico 2008-20010 Integrated Clean Water Act §303(D)/ §305(B) List of Assessed Waters*.
- . 2008b. *State of New Mexico Procedures for Assessing Standards Attainment for the Integrated §303(d)/§305(b) Water Quality Monitoring and Assessment Report*. January.
- . 2009a. Quality Assurance Project Plan for Water Quality Management Programs. Surface Water Quality Bureau. Santa Fe, NM.

-
- . 2009b. *Water Quality Monitoring of the Middle Rio Grande: 2000-2007*. Surface Water Quality Bureau. Santa Fe, NM.
- New Mexico Administrative Code (NMAC). August 2007. *State of New Mexico Standards for Interstate and Intrastate Surface Waters*. 20.6.4. New Mexico Water Quality Control Commission.
- Parsons Water & Infrastructure, Inc, 2005. *Middle Rio Grande Microbial Source Tracking Assessment Report*. Available online:
http://www.nmenv.state.nm.us/swqb/Rio_Grande/Middle/MST/index.html
- Price, L.G, P.S. Johnson, and D. Bland. 2007. *Water Resources of the Middle Rio Grande-San Acacia to Elephant Butte*. Proceedings, Decision-Makers Field Conference, 2007.
- Pueblo of Isleta. 2002. *Pueblo of Isleta Surface Water Quality Standards*. Amended March 2002 (Tribal Resolution 02-064), USEPA approval July 2005. Online:
http://www.epa.gov/waterscience/standards/wqslibrary/tribes/isleta_6_wqs.pdf
- Pueblo of Sandia. 2008. *Pueblo of Sandia Water Quality Standards*. Revised January 31, 2008.
- Rivera, Jose A. 1999. *Water Democracies on the Upper Rio Grande: 1598-1998*. Proceedings from Rio Grande Ecosystems: Linking Land, Water, and People RMRS-P-7.
- Scurlock, Dan. 1998. *From the Rio to the Sierra: An Environmental History of the Middle Rio Grande Basin*. USDA General Technical Report RMRS-GTR-5, Fort Collins, Colorado. 440pp.
- U.S. District Court for the District of New Mexico. 1997. *Forest Guardians and Southwest Environmental Center (Plaintiffs) v. Carol Browner, in her official capacity as Administrator, EPA (Defendant): Joint Motion for Entry of Consent Decree*. April 29. Online at www.nmenv.state.nm.us/swqb/CDNM.html.
- U.S. Bureau of Reclamation (USBR). May 2007. *Middle Rio Grande River Maintenance Plan: Part 1 Report*. Online at:
<http://www.usbr.gov/uc/albuq/envdocs/reports/mrgRivMaint/MaintenancePlan-Pt1-Report.pdf>
- U.S. Environmental Protection Agency (USEPA). 1996. *Interim Permitting Approach for Water Quality-Based Effluent Limitations in Stormwater Permits (EPA-833-D-96-00)*.
- . 1999. *Draft Guidance for Water Quality-based Decisions: The TMDL Process (Second Edition)*. EPA 841-D-99-001. Office of Water, Washington, D.C. August.
- . 2001. *EPA Requirements for Quality Assurance Project Plans (EPA/240/B-01/003)*.
-

-
- . 2002. Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit requirements Based on Those WLAs.
 - . 2003. Nonpoint Source Program and Grants Guidelines for States and Territories. http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=2003_register&docid=fr23oc03-39.pdf.
 - . 2006. *DRAFT: An Approach for Using Load Duration Curves in Developing TMDLs*. U.S. Environmental Protection Agency, Office of Wetlands, Oceans, and Watersheds, Washington, D.C.
 - . 2007. An Approach for Using Load Duration Curves in the Development of TMDLs. (EPA 841-B-07-006) http://www.epa.gov/OWOW/TMDL/duration_curve_guide_aug2007.pdf
 - . 2008. TMDLs To Stormwater Permits Handbook” (DRAFT).
 - . 2009. “Procedures for Implementing National Pollutant Discharge Elimination System Permits in New Mexico”, July 23, 2009. Prepared by Permits Section, NPDES Permits Branch, Water Quality Protection Division, EPA Region 6. In consultation with the Surface Water Quality Bureau, New Mexico Environment Department.

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APPENDIX A

CONVERSION FACTOR DERIVATION

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Flow (as million gallons per day [MGD]) and concentration values (milligrams per liter [mg/L]) must be multiplied by a conversion factor in order to express the load in units “pounds per day.” The following expressions detail how the conversion factor was determined:

TMDL Calculation:

$$Flow (MG / day) \times Concentration \left(\frac{mg}{L} \right) \times CF \left(\frac{L - lb}{MG - mg} \right) = Load \left(\frac{lb}{day} \right)$$

Conversion Factor Derivation:

$$CF = 10^6 \text{ gal} / MG \times \frac{3.785 L}{gal} \times \frac{1 lb}{454,000 mg} = 8.34 \frac{L - lb}{MG - mg}$$

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APPENDIX B
SELECTIONS FROM 2008-2010 CWA §303 (d)/305(b) List

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Rio Grande (non-pueblo Alameda Bridge to Angostura Div)

Rio Grande-Albuquerque

Assessment Unit ID:	Size (mi or ac):	WQS reference:	Monitoring Schedule:	Cycle Last Assessed:	IR Category:
NM-2105.1_00	11.66	20.6.4.106	2013	2008	5/5C

Use Information:

Designated Use (s):

Attainment:

Irrigation	Fully Supporting
Livestock Watering	Fully Supporting
Marginal Warmwater Aquatic Life	Not Supporting
Secondary Contact	Not Supporting
Wildlife Habitat	Fully Supporting

Assessment Information:

Probable Causes of Impairment:

TMDL Schedule:

Ambient Bioassays – Acute Aquatic Toxicity	2009
E. coli	2009
Oxygen, Dissolved	2009

Probable Sources of Impairment:

Avian Sources (waterfowl and/or other)
 Impervious Surface/Parking Lot Runoff
 Municipal (Urbanized High Density Area)
 Municipal Point Source Discharges
 On-site Treatment Systems (Septic Systems and
 Similar Decentralized Systems)
 Source Unknown
 Wastes from Pets

Assessment Unit Comments:

TMDL for fecal coliform. De-listed for fecal coliform because this criteria was replaced with E. coli during the 2005 triennial. The dissolved oxygen impairment may indicate excessive nutrients. Protocols for nutrients in large rivers are under development.

NOTE (2/13/09): EPA's [Record of Decision](#) states that "EPA concludes that the public participation process regarding the listing of two assessment units/dissolved oxygen pollutant combinations, i.e., NM-2105_50 and NM-2105.1_00, is inconsistent with federal requirements and the New Mexico Water Quality Control Commission Continuing Planning Process (CPP) and Water Quality Management Plan (WQMP). ...Consequently, EPA is taking a disapproval action and de-listing these assessment units/dissolved oxygen pollutant-combinations." EPA requested that NMED Public Notice the addition of these assessment units/dissolved oxygen pollutant-combination to the New Mexico § 303(d) List during either an addendum to the 2008 Integrated List or during the New Mexico 2010 Integrated List submission.

Rio Grande (Isleta Pueblo bnd to Alameda Bridge)			Rio Grande-Albuquerque		
Assessment Unit ID:	Size (mi or ac):	WQS reference:	Monitoring Schedule:	Cycle Last Assessed:	IR Category:
NM-2105_50	20.4	20.6.4.105	2013	2008	5/5B

Use Information:

Designated Use (s):	Attainment:
Irrigation	Fully Supporting
Livestock Watering	Fully Supporting
Marginal Warmwater Aquatic Life	Not Supporting
Secondary Contact	Not Supporting
Wildlife Habitat	Fully Supporting

Assessment Information:

Probable Causes of Impairment:	TMDL Schedule:
E. coli	2009
Oxygen, Dissolved	2009

Probable Sources of Impairment:

Avian Sources (waterfowl and/or other)
 Impervious Surface/Parking Lot Runoff
 Municipal (Urbanized High Density Area)
 Municipal Point Source Discharges
 On-site Treatment Systems (Septic Systems and Similar Decentralized Systems)
 Source Unknown
 Wastes from Pets

Assessment Unit Comments:

TMDL for fecal coliform. De-listed for fecal coliform because this criteria was replaced with E. coli during the 2005 triennial. The dissolved oxygen impairment may indicate excessive nutrients. Protocols for nutrients in large rivers are under development.

NOTE (2/13/09): EPA's [Record of Decision](#) states that "EPA concludes that the *public participation process* regarding the listing of two assessment units/dissolved oxygen pollutant combinations, i.e., NM-2105_50 and NM-2105_1_00, is inconsistent with federal requirements and the New Mexico Water Quality Control Commission Continuing Planning Process (CPP) and Water Quality Management Plan (WQMP). ... Consequently, EPA is taking a disapproval action and de-listing these assessment units/dissolved oxygen pollutant-combinations." EPA requested that NMED Public Notice the addition of these assessment units/dissolved oxygen pollutant-combination to the New Mexico § 303(d) List during either an addendum to the 2008 Integrated List or during the New Mexico 2010 Integrated List submission.

Rio Grande (Rio Puerco to Isleta Pueblo bnd)

Rio Grande-Albuquerque

Assessment Unit ID:	Size (mi or ac):	WQS reference:	Monitoring Schedule:	Cycle Last Assessed:	IR Category:
NM-2105_40	35.4	20.6.4.105	2013	2008	5

Use Information:

Designated Use (s):

Attainment:

Irrigation	Fully Supporting
Livestock Watering	Fully Supporting
Marginal Warmwater Aquatic Life	Fully Supporting
Secondary Contact	Not Supporting
Wildlife Habitat	Fully Supporting

Assessment Information:

Probable Causes of Impairment:

TMDL Schedule:

E. coli	2009

Probable Sources of Impairment:

Avian Sources (waterfowl and/or other)
 Impervious Surface/Parking Lot Runoff
 Municipal (Urbanized High Density Area)
 Municipal Point Source Discharges
 On-site Treatment Systems (Septic Systems and
 Similar Decentralized Systems)
 Wastes from Pets

Assessment Unit Comments:

Rio Grande (San Marcial at USGS gage to Río Puerco)

Rio Grande-Albuquerque

Assessment Unit ID:	Size (mi or ac):	WQS reference:	Monitoring Schedule:	Cycle Last Assessed:	IR Category:
NM-2105_10	59.39	20.6.4.105	2013	2008	5

Use Information:

Designated Use (s):

Attainment:

Irrigation	Fully Supporting
Livestock Watering	Fully Supporting
Marginal Warmwater Aquatic Life	Not Supporting
Secondary Contact	Not Supporting
Wildlife Habitat	Fully Supporting

Assessment Information:

Probable Causes of Impairment:

TMDL Schedule:

Aluminum	2009
E. coli	2009

Probable Sources of Impairment:

Avian Sources (waterfowl and/or other)
 Impervious Surface/Parking Lot Runoff
 Municipal (Urbanized High Density Area)
 Municipal Point Source Discharges
 Natural Sources
 On-site Treatment Systems (Septic Systems and
 Similar Decentralized Systems)
 Wastes from Pels

Assessment Unit Comments:

APPENDIX C
Aluminum Data

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Table F.1- Rio Grande (San Marcial to Rio Puerco)

Station	Date	Result (mg/L)	Flow (cfs) ¹
32RGrand323.4	3/30/2005	0.02	608
32RGrand341.2	3/30/2005	0.03	608
32RGrand292.1	3/30/2005	0.02	608
32RGrand341.2	4/28/2005	0.06	3880
32RGrand323.4	4/28/2005	0.21	3880
32RGrand292.1	4/28/2005	0.16	3880
32RGrand323.4	5/17/2005	0.09	4190
32RGrand341.2	5/17/2005	0.13	4190
32RGrand292.1	5/18/2005	0.02	4170
32RGrand292.1c	5/18/2005	0.07	4170
32RGrand258.0	6/21/2005	0.06	3290
32RGrand292.1	6/21/2005	0.07	3290
32RGrand292.1c	6/21/2005	0.1	3290
32RGrand323.4	6/21/2005	0.08	3290
32RGrand341.2	6/22/2005	1.7	3200
32RGrand292.1	7/26/2005	0.01	0.0001
32RGrand292.1c	7/26/2005	0.01	0.0001
32RGrand323.4	7/26/2005	<0.01	0.0001
32RGrand341.2	7/26/2005	0.2	0.0001
32RGrand258.0	8/23/2005	0.8	108
32RGrand323.4	8/23/2005	<0.01	108
32RGrand341.2	8/23/2005	0.01	108
32RGrand292.1	9/27/2005	<0.01	0.001
32RGrand323.4	9/27/2005	<0.01	0.001
32RGrand341.2	9/27/2005	<0.02	0.001
32RGrand258.0	10/25/2005	1.5	188
32RGrand323.4	10/25/2005	0.02	188
32RGrand341.2	10/25/2005	0.01	188

Red values indicate those above the water quality standard.

¹ USGS Gage 8358400-Rio Grande Floodway at San Marcial, NM

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APPENDIX D
***E.coli* Data**

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Table D.1- Rio Grande (non-Pueblo Alameda Bridge to Angostura Diversion)

Station	Date	Result (cfu/100mL)	Flow (cfs)¹	Rainfall (inches)²
USGS 8329918	2/18/2004	480	408	0
USGS 8329918	4/26/2004	110	953	0
USGS 8329918	7/20/2004	50	528	0
USGS 8329918	11/9/2004	>5300	504	0.03
30RGrand473.7	3/23/2005	10.8	928	0
32RGrand464.2	3/23/2005	11	928	0
32RGrand458.0	3/23/2005	13.4	928	0
32RGrand445.4	3/23/2005	41.4	928	0
USGS 8329918	5/5/2005	<8	4070	0
30RGrand473.7	5/26/2005	27.5	5580	0
32RGrand464.2c	5/26/2005	32.7	5580	0
32RGrand464.2	5/26/2005	42.8	5580	0
32RGrand458.0	5/26/2005	42.6	5580	0
32RGrand445.4c	5/26/2005	40.4	5580	0
32RGrand445.4	5/26/2005	47.3	5580	0
30RGrand473.7	6/23/2005	13.4	4300	0
32RGrand464.2c	6/23/2005	23.1	4300	0
32RGrand464.2	6/23/2005	22.6	4300	0
32RGrand458.0	6/23/2005	35	4300	0
32RGrand445.4c	6/23/2005	81.3	4300	0
32RGrand445.4	6/23/2005	249.5	4300	0
30RGrand473.7	7/27/2005	98.5	463	0
32RGrand464.2	7/27/2005	488.4	463	0
32RGrand464.2c	7/27/2005	325.5	463	0
32RGrand458.0	7/27/2005	41.1	463	0
32RGrand445.4	7/27/2005	62.2	463	0
32RGrand445.4c	7/27/2005	41.7	463	0
USGS 8329918	8/24/2005	<100	474	0
30RGrand473.7	8/24/2005	52.1	474	0
32RGrand464.2c	8/24/2005	50.4	474	0
32RGrand458.0	8/24/2005	7.2	474	0
32RGrand445.4c	8/24/2005	77.6	474	0
32RGrand445.4	9/28/2005	149.7	541	0
32RGrand458.0	9/28/2005	90.9	541	0
32RGrand464.2	9/28/2005	95.9	541	0
30RGrand473.7	9/28/2005	90.9	541	0
32RGrand445.4	10/26/2005	231	299	0
32RGrand458.0	10/26/2005	133.4	299	0
32RGrand464.2	10/26/2005	153.9	299	0
30RGrand473.7	10/26/2005	63.1	299	0
USGS 8329918	12/12/2005	1000	518	0
USGS 8329918	4/25/2006	670	555	0
USGS 8329918	8/15/2006	4100	1980	0
USGS 8329918	12/5/2006	<1	825	0
USGS 8329918	5/4/2007	>180	2280	0

Red values indicate those above the State and Tribal water quality standard.

Blue values indicate those above the Tribal water quality standards.

¹ USGS gage 0829928

² Angostura NMSU weather site. Rainfall data for the previous day was used.

Table D.2- Rio Grande (Isleta Pueblo bnd to Alameda Bridge)

Station	Date	Result (cfu/100mL)	Flow (cfs) ¹	Rainfall (inches) ²
USGS 8330000	12/8/2004	1000	859	0
32RGrand419.7	3/23/2005	43.5	873	0
USGS 8330000	4/8/2005	<47	1100	0
32RGrand419.7	5/26/2005	40.4	5610	0
32RGrand419.7	6/22/2005	1553.1	4230	0
USGS 8330000	7/7/2005	20	1290	0
32RGrand419.7	7/27/2005	245.3	392	0
USGS 8330000	8/12/2005	1000	486	0
32RGrand419.7	8/24/2005	290.9	363	0
32RGrand419.7	9/28/2005	275.5	393	0
32RGrand419.7	10/26/2005	290.9	281	0
USGS 8330000	2/22/2006	>2	570	0
USGS 8330000	5/17/2006	28	554	0
USGS 8330000	7/19/2006	>1	498	0
USGS 8330000	5/8/2007	120	2530	0
USGS 8330000	6/25/2007	730	674	0

Red values indicate those above the State and Tribal water quality standard.

Blue values indicate those above the Tribal water quality standards.

¹ USGS gage 08330000

² Albuquerque International Airport weather site. Rainfall data for the previous day was used

Table D.3- Rio Grande (Rio Puerco to Isleta Pueblo bnd)

Station	Date	Result (cfu/100mL)	Flow (cfs)¹	Rainfall (inches)²
32RGrand385.5	3/23/2005	143.9	983	0
32RGrand361.7	3/23/2005	101.4	983	0
32RGrand394.8	3/24/2005	41	895	0
32RGrand394.8	5/25/2005	44.3	5500	0
32RGrand361.7	5/25/2005	59.1	5500	0
32RGrand385.5c	5/25/2005	64.5	5500	0
32RGrand385.5	5/25/2005	26.6	5500	0
32RGrand394.8c	5/26/2005	38.4	5650	0
32RGrand361.7	6/21/2005	52.1	3790	0
32RGrand385.5c	6/22/2005	118.7	3520	0.24
32RGrand385.5	6/22/2005	116.2	3520	0.24
32RGrand394.8	6/22/2005	1413.6	3520	0.24
32RGrand385.5c	7/26/2005	47.6	97	0
32RGrand394.8	7/26/2005	34.1	97	0
32RGrand394.8c	7/26/2005	25.6	97	0
32RGrand361.7	7/27/2005	9.7	87	0
32RGrand361.7	8/23/2005	115.3	133	0
32RGrand385.5c	8/24/2005	143.9	99	0.01
32RGrand394.8c	8/24/2005	71.7	99	0.01
32RGrand361.7	9/27/2005	101.7	42	0
32RGrand385.5	9/28/2005	261.3	41	0.02
32RGrand394.8	9/28/2005	133.4	41	0.02
32RGrand361.7	10/25/2005	285.1	263	0
32RGrand385.5	10/26/2005	461.1	210	0
32RGrand394.8	10/26/2005	613.1	210	0

Red values indicate those above the water quality standard.

¹ USGS gage 08358900

² Los Lunas NMSU weather site. Rainfall data for the previous day was used.

Table D.4- Rio Grande (San Marcial to Rio Pueco)

Station	Date	Result (cfu/100mL)	Flow (cfs)¹	Rainfall (inches)²
USGS 8354900	11/14/2002	370	350	0
USGS 8358400	12/2/2002	200	278	0.01
USGS 8354900	3/25/2003	<6	306	0
USGS 8358400	4/24/2003	130	237	0
USGS 8354900	4/28/2003	620	210	0
USGS 8358400	6/4/2003	270	228	0
USGS 8354900	7/14/2003	53	23	0
USGS 8358400	7/16/2003	>60	19	0
USGS 8358400	12/17/2003	<17	342	0
USGS 8354900	12/19/2003	>4	309	0
USGS 8358400	4/15/2004	3200	2320	0
USGS 8354900	4/16/2004	>16000	1710	0
USGS 8358400	6/17/2004	300	47	0
USGS 8354900	6/18/2004	>5300	44	0
USGS 8354900	8/5/2004	1000	155	0
USGS 8358400	8/5/2004	130	155	0
USGS 8358400	12/2/2004	700	603	0
USGS 8354900	12/7/2004	1000	511	0.22
32RGrand258.0	3/24/2005	61.3	720	0
32RGrand292.1	3/24/2005	64.4	720	0
32RGrand323.4	3/24/2005	93.4	720	0
USGS 8354900	4/6/2005	76	445	0
USGS 8358400	4/21/2005	<16	2320	0.12
32RGrand292.1c	5/25/2005	214.3	4380	0
32RGrand292.1	5/25/2005	214.3	4380	0
32RGrand323.4	5/25/2005	816.4	4380	0
32RGrand341.2	5/25/2005	18.5	4380	0
32RGrand292.1	6/21/2005	70.3	3290	0
32RGrand292.1c	6/21/2005	48.8	3290	0
32RGrand323.4	6/21/2005	62	3290	0
32RGrand341.2	6/22/2005	63.1	3200	0
USGS 8354900	7/8/2005	83	698	0
USGS 8358400	7/14/2005	14	261	0
32RGrand292.1	7/26/2005	59.8	0.001	0
32RGrand292.1c	7/26/2005	55.6	0.001	0
32RGrand323.4	7/26/2005	16.9	0.001	0
32RGrand341.2	7/26/2005	83.9	0.001	0
32RGrand258.0	8/23/2005	218.7	108	0
32RGrand292.1c	8/23/2005	206.4	108	0
32RGrand323.4	8/23/2005	27.9	108	0
32RGrand341.2	8/23/2005	178.2	108	0
USGS 8354900	9/27/2005	77	0.001	0
32RGrand292.1	9/27/2005	201.4	0.001	0
32RGrand323.4	9/27/2005	191.8	0.001	0
32RGrand341.2	9/27/2005	461.1	0.001	0
USGS 8358400	10/12/2005	1700	168	0
32RGrand258.0	10/25/2005	920.8	188	0
32RGrand292.1	10/25/2005	172.7	188	0

Station	Date	Result (cfu/100mL)	Flow (cfs) ¹	Rainfall (inches) ²
32RGrand323.4	10/25/2005	233.3	188	0
32RGrand341.2	10/25/2005	517.2	188	0
USGS 8358400	11/30/2005	>4000	437	0
USGS 8358400	2/13/2006	32	425	0
USGS 8354900	2/14/2006	220	412	0
USGS 8358400	3/14/2006	110	230	0
USGS 8354900	5/12/2006	<6	34	0
USGS 8358400	5/23/2006	>1	30	0
USGS 8354900	7/10/2006	4000	1330	0
USGS 8354900	8/29/2006	5100	1440	0
USGS 8358400	11/13/2006	620	1180	0
USGS 8358400	2/12/2007	520	658	0.03
USGS 8354900	4/26/2007	46	481	0
USGS 8358400	5/22/2007	340	2260	0
USGS 8354900	6/19/2007	150	343	0

Red values indicate those above the water quality standard.

¹ USGS gage 08358400

² South Bosque del Apache NMSU weather station. Rainfall data for the previous day was used.

Table E.5- MRG WWTP samples

WWTP Station	Date	Result (cfu/100mL)
Albuquerque	7/27/2005	38.4
Belen	7/26/2005	131.4
Bernalillo	7/27/2005	6.3
Bosque Farms	7/27/2005	25.9
Los Lunas at Rio Grande	7/26/2005	52.8
Los Lunas WWTP	7/26/2005	7.5
Rio Rancho #2 at Rio Grande	7/27/2005	127.4
Rio Rancho #2 WWTP	7/27/2005	2
Socorro	none	none
Albuquerque	8/24/2005	28.8
Belen	8/23/2005	140.1
Bernalillo	8/24/2005	2
Bosque Farms	8/24/2005	81.3
Los Lunas at Rio Grande	8/23/2005	23.5
Los Lunas WWTP	8/23/2005	167
Rio Rancho #2 at Rio Grande	8/24/2005	307.6
Rio Rancho #2 WWTP	8/24/2005	2
Socorro	8/23/2005	1
Albuquerque	9/28/2005	48
Belen	9/27/2005	40.2
Bernalillo	9/28/2005	193.5
Bosque Farms	none	none
Los Lunas at Rio Grande	9/27/2005	59.8
Los Lunas WWTP	9/27/2005	30.1
Rio Rancho #2 at Rio Grande	9/28/2005	28.8
Rio Rancho #2 WWTP	9/28/2005	1
Socorro	9/27/2005	45.7
Albuquerque	10/26/2005	24.1
Belen	10/25/2005	9.7
Bernalillo	10/26/2005	19.2
Bosque Farms	10/26/2005	1986.3
Los Lunas at Rio Grande	10/25/2005	52
Los Lunas WWTP	10/25/2005	10.8
Rio Rancho #2 at Rio Grande	10/26/2005	11
Rio Rancho #2 WWTP	10/26/2005	3.1
Socorro	10/25/2005	35.5
Albuquerque	11/30/2005	6.3
Belen	11/29/2005	15.8
Bernalillo	11/30/2005	365.4
Bosque Farms	11/30/2005	>2419.6
Los Lunas at Rio Grande	11/29/2005	166.4
Los Lunas WWTP	11/29/2005	28.8
Rio Rancho #2 at Rio Grande	11/30/2005	5.2
Rio Rancho #2 WWTP	11/30/2005	1
Socorro	11/29/2005	110.6

Red values indicate those above the State water quality standard.

APPENDIX E
RESPONSE TO COMMENTS

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SWQB hosted a public meeting in Albuquerque, NM on September 29, 2009 to discuss the Public Comment Draft Middle Rio Grande Watershed TMDL. The following changes were made to the Final Draft document in response to public comment received at the meeting and afterwards:

1. Questions were raised during the public meeting regarding the references to the State water quality standards in Section 2.3. SWQB agreed to simplify Section 2.3 so that it only lists the water quality standards directly related to the TMDL, specifically dissolved aluminum and *E.coli*.
2. Questions were raised by a number of MS4 permittees during the public meeting regarding the strict language in Section 6.4. Comment Sets A, D, F, and G also questions the use of the chosen language. SWQB had discussions with EPA R6 following the public meeting and agreed to change the language from phrases such as “shall” to “should” and “should consider.”
3. EPA R6 requested that flows be provided in Table 2.3 for USGS gages upstream of the study area.
4. Appendix F was added based on public comment.

Written comments received during the 45-day public comment period:

- A. Bernalillo County Public Works
- B. Andy Smith
- C. Pueblo of Sandia
- D. City of Albuquerque Aviation Department
- E. Southern Sandoval County Arroyo Flood Control Authority
- F. Albuquerque Metropolitan Arroyo Flood Control Authority
- G. Middle Rio Grande Stormwater Quality Team

Written comments received after the 45-day public comment period:

- H. Pueblo of Santa Ana

Comment Set A:

County of Bernalillo

State of New Mexico

BOARD OF COUNTY COMMISSIONERS

ALAN B. ARMIJO, CHAIR

DISTRICT 1,

ART DE LA CRUZ, VICE CHAIR

DISTRICT 2

MAGGIE HART STEBBINS, MEMBER

DISTRICT 3

MICHAEL C. WIENER, MEMBER

DISTRICT 4

MICHAEL BRASHER, MEMBER

DISTRICT 5

THADDEUS LUCERO, COUNTY MANAGER



Bernalillo County Public Works

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Albuquerque, NM 87102

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KAREN L. MONTOYA, ASSESSOR

MAGGIE TOULOUSE OLIVER, CLERK

MERRI RUDD, PROBATE JUDGE

DARREN P. WHITE, SHERIFF

PATRICK J. PADILLA, TREASURER

September 29, 2009

Ms. Heidi Henderson, TMDL Coordinator
New Mexico Environment Department
Surface Water Quality Bureau
1190 St. Francis Drive
Santa Fe, NM 87505

Re: Comments about public comment draft, TMDL for the Middle Rio Grande Watershed

Dear Ms. Henderson:

The Bernalillo County Public Works Division, Water Resources Program, has reviewed the September 16, 2009 Public Comment Draft of the Total Maximum Daily Load (TMDL) for the Middle Rio Grande Watershed, and submits the following comments.

In general, Bernalillo County applauds the Environment Department for their use of the flow duration approach to evaluating pollutant loads. The approach effectively addresses the difficulty of determining target and actual pollutant loads over the broad range of streamflow regimes observed for surface water bodies in New Mexico.

Bernalillo County has particular concerns about the projection in Section 4.4.2 that the *E. coli* load for the Rio Grande (Isleta Pueblo bnd to Alameda Street bridge) assessment unit (AU) must be reduced by more than 80% to achieve the target load under most flow conditions. This level of reduction is nearly impossible, given that over 46% of fecal bacteria originate from wildlife beyond human control.

Further, we are concerned about the comparison of arithmetic means for measured *E. coli* loads against geometric means from *E. coli* water quality criteria in Section 4.4.2, possibly overestimating measured loads and needed reductions to achieve target loads.

Finally, we are concerned about the inclusion in Section 6.4 of proscriptive language that appears to impose regulatory requirements under this TMDL for stormwater discharge permittees in the watershed.

Please see our specific comments about these issues below.

The following are specific comments from Bernalillo County, arranged by section of the draft TMDL.

- **Executive Summary, Page 1, Paragraph 1.** For clarity we recommend appending the following formula to the end of the paragraph: “[TMDL = WLA + LA + ~~W~~OS]”. *MLM*

SWQB Response: *Thank you for the comments. The addition has been made to the document.*

- **Executive Summary, TMDL summary sheets**
 - Page numbers for the summary sheets are out of order with the remainder of the document.
 - For each assessment unit, the scope/size of the sub-watershed shown on the summary sheet ($>17,000 \text{ mi}^2$) exceeds the size of the entire watershed ($3,204 \text{ mi}^2$ for USGS HUC 13020203) cited in *Description and Land Ownership* (Page 3, Section 2.1, Paragraph 2). Please clarify this apparent discrepancy.
 - For each assessment unit, the percent forest shown under the Land Use/Cover heading ($>90\%$) exceeds the percent forest for the entire watershed (9%) cited in *Description and Land Ownership* (Page 3, Section 2.1, Paragraph 2). Please clarify this apparent discrepancy.

SWQB Response: *It is noted that the page numbers are incorrect and will be addressed in the final version of the TMDL document. The entire watershed described in the Executive Summary tables for each Assessment Unit (AU) is calculated as the watershed from the most downstream point of the AU to the Rio Grande headwaters. The values in Section 2.1 describe only the USGS HUC 13020203. It is for these reasons that the percent forest land cover differs as well. Clarifying language has been added to make clear were values apply to the entire upstream watershed versus the 8-digit HUC watershed.*

- **Section 2.0 Background**
 - The “2005 MRG Tributary study” is mentioned in the first paragraph on Page 3, but is not included in the References (Section 9.0). Is the “MRG Tributary study” different from the March to October 2005 watershed sampling performed by NMED? If so, is a copy of the “MRG Tributary study” available for review?

SWQB Response: *SWQB sampled both the mainstem of the Middle Rio Grande as well as tributaries to the Middle Rio Grande in 2005. The MRG tributary report is not yet available. However, the results of water quality assessments performed following the MRG tributary survey are available on the 2008-2010 State of New Mexico CWA §303(d)/§305(b) Integrated List.*

- **Section 2.1 Description and Land Ownership**
 - In Paragraph 3 of Section 2.1 on Page 3, Natural Heritage New Mexico is cited, but the role of this agency in the preparation of the TMDL is not defined. What was their role?

SWQB Response: *A statement has been added to this section of the document to clarify the citation of Natural Heritage New Mexico.*

- **Section 2.2 History and Geology**
 - In Paragraph 2 of Section 2.2 on Page 4, it is stated that the Sandia Mountains “reach to over 11,000 feet,” while the highest point in the Sandia Mountains is Sandia Peak at 10,378 feet.

SWQB Response: *The citation is from Roadside Geology of New Mexico (Chronic, 1987). Upon further research, a number of values were found that describe the highest point of the Sandia Mountains. To be conservative, the statement has been changed to “reach over 10,000 feet”.*

- **Section 2.3 Water Quality Standards**

- In the fourth paragraph on Page 10, it is stated that “The appropriate tribal WQS will be used in the TMDL calculations in this document.” Please expand this statement to clarify that the appropriate state OR tribal WQS is used for TMDL calculations, depending on the affected assessment unit, and the rationale for using different standards for different assessment units.

SWQB Response: *Per oral public comment at the TMDL public meeting on September 29, 2009, SWQB agreed to remove discussions of Water Quality Standards (WQS) other than those directly related to the TMDL document, ie: dissolved aluminum and E.coli. These changes have been made to Section 2.3. Language has also been added to the end of Section 2.3 to clarify the use of Tribal WQS.*

- **Section 2.4.1 Survey Design**

- In Paragraph 1 of Section 2.4.1 on Page 11, it is stated that “Surface water grab samples were analyzed for a variety of chemical/physical parameters.” In Table 2.2 of Section 2.4.1 on Page 11, footnote (a) cites “Grab and composite samples collected throughout 2005.” Please clarify or correct this apparent discrepancy.
- Please provide a list of the chemical/physical parameters for which water samples were analyzed (perhaps as an appendix to the TMDL).

SWQB Response: *Both grab and composite samples were collected and analyzed during the 2005 water quality survey. The statement in Section 2.4.1 has been clarified. A list of the water chemistry parameters that were sampled for in 2005 is listed in Section 4.0 of Water Quality Monitoring of the Middle Rio Grande, 2000-2007 Annual Report (NMED/SWQB, 2008) available online at: http://www.nmenv.state.nm.us/swqb/Rio_Grande/Middle/2008Report.pdf*

- **Section 2.4.2 Hydrologic Conditions**

- In Table 2.3 of Section 2.4.2 on Page 13, please indicate which of the listed USGS gages were used to determine streamflows in TMDL calculations.
- In Figure 2.7 of Section 2.4.2 on Page 15, there is a nearly 10-year gap in streamflow data. We are concerned about the reliability of the streamflow data used for TMDL calculations in this

assessment unit. Please add language addressing this concern.

SWQB Response: *Table 2.3 is included in order to present all active gages in the MRG area; Figures 2.4-2.7 represent the flow for the four USGS gages used in the load duration curves in the TMDL. SWQB has confirmed with USGS staff that there is no flow data available for USGS Gage 08329928 from October 1995 to June 2003 due to lack of funding for data collection at that site. According to An Approach for Using Load Duration Curves in the Development of TMDLs (USEPA, 2007),*

“The lack of instream flow data at most water quality monitoring locations would typically be identified as a significant data gap for application of watershed and water quality models. However, since the incremental watershed LDC approach makes use of drainage area ratio-based flow estimates, the lack of flow information at these locations is not limiting.”

There were also no E.coli sampling events used in this TMDL prior to 2004 and therefore there were flow data available at this gage for all of the E.coli samples.

- **Section 3.1 Target Loading Capacity (for aluminum)**

- In Paragraph 2 of Section 3.1 on Page 16 it is stated that “The chronic criterion was exceeded 4 of 8 times on the Rio Grande (San Marcial at USGS gage to Rio Puerco) AU.” In contrast, Table C.1 of Appendix C shows that the chronic criterion for dissolved aluminum was exceeded in 8 of 28 samples taken in the Rio Grande (San Marcial at USGS gage to Rio Puerco) AU. Please explain or correct this apparent discrepancy.

SWQB Response: *The impairments addressed in this TMDL document are included on the 2008-2010 State of New Mexico CWA §303(d)/§305(b) Integrated List. The determination of these impairments was based on the application of the Procedures for Assessing Use Attainment for the State of New Mexico Integrated Clean Water Act §303(d)/§305(b) Water Quality Monitoring and Assessment Report (January 2008). Section 3.0 of the 2008 AP reads:*

“When data from multiple stations are used to assess a single AU, the data should be from stations and sampling events that are 1) spatially independent (generally more than 200 meters apart), and 2) temporally independent (generally collected at least seven days apart). If one or both of these conditions are not met, the data from the non-independent stations should be averaged before application of the assessment procedures.”

Thus, the samples that were not spatially or temporally independent were averaged. The Assessment Protocols were then applied to the averaged value. The statement in the TMDL regarding 4 of 8 exceedences reflects the fact that averaging of the non-independent samples occurred. Details of the assessments are available on the Assessment Summary Sheets, which are made available for public inspection as part of the 2008-2010 State of New Mexico CWA §303(d)/§305(b) Integrated List public record. A statement of clarification has been added to Sections 3.1 and 4.1.

- **Section 3.2 Flow (for aluminum)**

- In Figure 3.1 of Section 3.2 on Page 17, please identify the USGS gage by number in the figure. In addition, the term “moist conditions” is a misnomer for conditions in which streamflow exceeds the “mid-range flows” condition. Perhaps the terms “moist conditions” and “mid-range flows” can be reversed throughout the TMDL document for better reader understanding.
- In the second paragraph on Page 17, it will be helpful to include a more detailed explanation of the computational method used to produce the Aluminum Load Duration Curve in Figure 3.2 on Page 18. Assuming that the Aluminum Loading Duration Curve (Figure 3.2) was produced with values from the Flow Duration Curve (Figure 3.1) and a water quality standard for aluminum from 20.6.4.900 NMAC, please indicate whether the acute or the chronic WQS for dissolved aluminum was used in the calculations.

SWQB Response: *The USGS Gage number was added to the title of Figure 3.1. SWQB staff attended a training with Bruce Cleland and EPA R6 in February 2007. The development of the flow and load duration curves in this TMDL was based on this training as well as a research article by Bruce Cleland and guidance from the EPA Office of Wetlands, Oceans, and Watersheds. The use of “moist” and “mid-range” in the TMDL is consistent with the literature research. Language was added to Section 3.2 regarding the use of the chronic dissolved aluminum WQS in the development of the load duration curve. References to the EPA document have been added to Section 3.2 as well as Section 9.0. The Cleland (2003) reference remains in Section 3.2. Both references provide detailed explanations of both flow and load duration curve development.*

- **Section 3.3 Calculations (for aluminum)**
 - In Equation 1 of Section 3.3 on Page 19, we recommend inserting the units “(MG/gal)” after the 10^{-6} factor, and revising the units of “flow” to “(MGD)”.
 - In Equation 2 of Section 3.3 on Page 19, we recommend revising the units of “critical flow” to “(MGD)”.
 - In Table 3.1 of Section 3.3 on Page 19, we recommend indicating that the cited chronic water quality criterion is for *dissolved* aluminum.
 - In Table 3.1 of Section 3.3 on Page 19, the superscripts and footnotes use different conventions.

SWQB Response: *The requested changes have been made to Section 3.3.*

- **Section 3.4.1 Waste Load Allocation (for aluminum)**
 - In Paragraph 1 of Section 3.4.1 on Page 19, we recommend inserting the word “dissolved” between “chronic” and “aluminum” in the fifth sentence.
 - In Paragraph 1 of Section 3.4.1 on Page 20, we recommend inserting the words “based on design flow and the chronic water quality standard for dissolved aluminum from 20.6.4.900 NMAC” after the word “assigned” in the last sentence.
 - In Paragraph 2 of Section 3.4.1 on Page 20, we recommend inserting the words “based on design flow and the chronic water quality standard for dissolved aluminum from 20.6.4.900 NMAC” after the word “assigned” in the last sentence.

SWQB Response: *The requested changes have been made to Section 3.4.1.*

- **Section 3.4.2 Load Allocation (for aluminum)**
 - The reference to “table 4.4” in the first sentence of Paragraph 1 in Section 3.4.2 on Page 21 is apparently a typographical error. Perhaps the reference should be to Table 3.2.
 - Equation 3 should be rearranged as follows to correspond with the computational method described in the preceding sentence: $LA = TMDL - WLA - MOS$.

SWQB Response: *The reference to Table 4.4 was corrected and a statement of clarification was added to Equation 3.*

- In Table 3.2 of Section 3.4.2 on Page 21, the preface “WLA:” should be added to each NPDES permit cited, so that the summation in the “Total Waste Load Allocation” row is clearly understood. In addition, we recommend moving the “Load Allocation” row to the bottom of Table 3.2 to better correspond with the computational method described in the first sentence of Section 3.4.2. Finally the word “Dissolved” should be inserted before “Aluminum” in the title of Table 3.2.

SWQB Response: *The “Load Allocation” row was moved and the word “dissolved” was inserted into the title of Table 3.2.*

- We recommend creating a new **Section 3.4.3** entitled **Load Reductions Computation**, beginning with the last sentence of the first paragraph on Page 22.
- In Table 3.3 of Section 3.4.2 (future Section 3.4.3) on Page 22, we recommend inserting the units abbreviation “(lbs/day)” after “Measured Loads” and “Target Loads” labels in the table. In addition, footnote (a) to Table 3.3 does not clearly describe which measured values (all values vs. values exceeding WQS) were used to compute the arithmetic mean of Measured Aluminum concentration. Please clarify.
- At the end of Section 3.4.2 (future Section 3.4.3), please add a statement (similar to the one included for *E. coli* in Section 4.4.2 on Page 45) regarding the application of calculated percent reduction values for aluminum.

SWQB Response: *In reviewing this section in response to this comment as well as the comments of others NMED recognizes that for this TMDL calculating a percent reduction is particularly challenging. This is largely for the reasons noted in the comments above – the samples collected and the impairment determinations are based on exceedences of the State’s single sample criterion and the TMDL is written to the address the monthly geometric mean standard of Sandia and Isleta Pueblos. As such any simple comparison of these numbers is fraught with challenge and, in this case, will result in an over estimation of the actual reduction necessary.*

Furthermore, neither Section 303 of the Clean Water Act nor Title 40, Part 130.7 of the Code of Federal Regulations requires states to include discussions of percent reductions in TMDL documents. Although NMED believes that it is often useful to discuss the magnitude of water quality exceedences in the TMDL, the “percent reduction” value is can both be calculated in multiple ways and as a result can often misinterpreted. This is clearly the case in this situation. Table 3.3 and the associated discussion have been removed.

- **Section 3.5 Identification and Description of Pollutant Source(s) (for aluminum)**
 - In Table 3.4 of Section 3.5 on Page 23, the magnitude of aluminum discharges from nonpoint sources is shown to be 590-9150 lbs/day. In contrast, Table 3.2 in Section 3.4.2 on Page 21 shows calculated Load Allocations (from nonpoint sources) of 38.8 – 1171 lbs/day for aluminum. Please explain or correct this apparent discrepancy.

SWQB Response: *The values listed in Table 3.4 are the values for “measured load” presented in Table 3.3. The references to these values have been removed from Table 3.4.*

- **Section 3.6 Linkage of Water Quality and Pollutant Sources(for aluminum)**
 - We recommend revising the last sentence of Paragraph 3 in Section 3.6 on Page 24 to read “The February 2005 sample exceeds the chronic WQS of 0.87 mg/l for dissolved aluminum.”
 - In order for the reader to be able to corroborate the last sentence of Paragraph 4 in Section 3.6 on Page 24, Appendix C of the TMDL must be revised to include streamflows measured when samples for aluminum analysis were collected.

SWQB Response: *The last sentence in Paragraph 3 was edited based on your suggestion. Additionally, streamflow from USGS gage 08358400 has been added to Appendix C.*

- **Section 3.7 Margin of Safety (for aluminum)**

- In the second paragraph under the heading “*Explicit Margin of Safety*” in Section 3.7 on Page 25, it is not clear if the alternative MOS of 5 percent was applied to the dry flow hydrologic zone (as stated in the first sentence) or to the low flow hydrologic zone (as stated in the last sentence). Please clarify.

SWQB Response: *The language in Section 3.7 was changed to reflect that the paragraph should discuss “dry flow” rather than “low flow.”*

- **Section 3.9 Future Growth (for aluminum)**

- In Paragraph 2 of Section 3.9 on Page 26 it is stated that “According to the calculations, the overwhelming source of aluminum loading is from nonpoint sources.” In fact, it is not intuitively obvious which calculations support this statement. Please include a reference to Table 3.2 to assist the reader in evaluating the comparative load calculations.
- We recommend adding the following sentences to the end of Paragraph 2 of Section 3.9 on Page 26: “The existing Middle Rio Grande-Albuquerque Reach Watershed Restoration Action Strategy (Albuquerque Reach Watershed Group, 2008) defines a framework for design, implementation and maintenance of BMPs in the northern portion of the watershed addressed by this TMDL. See Section 6.0 for details.”

SWQB Response: *A reference to Table 3.2 has been added to Section 3.9 along with the suggested language regarding the MRG-Albuquerque Reach WRAS.*

- **Section 4.0 Bacteria**

- Paragraph 4 of Section 4.0 on Page 27 seems like a generic statement that would be better placed in the Introduction to the TMDL.
- In Table 4.1 of Section 4.0 on Page 27, three of the four exceedence frequencies shown for *E. coli* do not correspond to the monitoring data provided in Appendix D. Table D.1 of Appendix D for Rio Grande (non-Pueblo Alameda to Angostura Diversion) shows 6 exceedences over 45 samples, while Table 4.1 shows 6 exceedences over 17 samples for the same AU. Table D.3 of Appendix D for Rio Grande (Rio Puerco to Isleta Pueblo bnd) shows 3 exceedences over 25 samples, while Table 4.1 shows 2 exceedences over 7 samples for the same AU. Table D.4 of Appendix D for Rio Grande (San Marcial at USGS gage to Rio Puerco) show 17 exceedences over 63 samples, while Table 4.1 shows 14 exceedences over 35 samples for the same AU. Please explain or correct these apparent discrepancies.

SWQB Response: *The statement referred to in the first comment has been moved into the first paragraph of Section 4.0. The impairments addressed in this TMDL document are included on the 2008-2010 State of New Mexico CWA §303(d)/§305(b) Integrated List. The determination of these impairments was based on the application of the Procedures for Assessing Use Attainment for the State of New Mexico Integrated Clean Water Act §303(d)/§305(b) Water Quality Monitoring and Assessment Report (January 2008). Section 3.0 of the 2008 AP reads:*

“When data from multiple stations are used to assess a single AU, the data should be from stations and sampling events that are 1) spatially independent (generally more than 200 meters apart), and 2) temporally independent (generally collected at least seven days apart). If one or both of these conditions are not met, the data from the non-independent stations should be averaged before application of the assessment procedures.”

Thus, the samples that were not spatially or temporally independent were averaged. The Assessment Protocols were then applied to the averaged value. The statement in the TMDL regarding exceedences reflects the fact that averaging of the non-independent samples occurred.

Details of the assessments are available on the Assessment Summary Sheets, which are made available for public inspection as part of the 2008-2010 State of New Mexico CWA §303(d)/§305(b) Integrated List public record. A statement of clarification has been added to Sections 3.1 and 4.1.

- **Section 4.1 Target Loading Capacity (for bacteria)**
 - In Paragraph 2 of Section 4.1 on Page 28, we recommend adding language explaining the Clean Water Act requirement for protecting downstream water quality standards that is the basis for the decision to use Pueblo of Sandia or Pueblo of Isleta WQS in certain AUs.

SWQB Response: *The regulations concerning the protection of downstream water quality criteria and designated uses is found in 40 CFR §131.10(b). It reads:*

(b) In designating uses of a water body and the appropriate criteria for those uses, the State shall take into consideration the water quality standards of downstream waters and shall ensure that its water quality standards provide for the attainment and maintenance of the water quality standards of downstream waters.

Additionally, 40 CFR §122.4(d) prohibits the issuance of NPDES permits that do not comply with the affected States' water quality standards. It reads:

No permit may be issued:...(d)When the imposition of conditions cannot ensure compliance with the applicable water quality requirements of all affected States.

The State of New Mexico, the Pueblo of Sandia, and the Pueblo of Isleta have water quality standards for E.coli and the Tribal standards are lower than the State of New Mexico water quality standards. The regulations in 40 CFR §131.10(b) require the development of the TMDL using the tribal standards in order to be protective of the downstream standards. The regulations in 40 CFR §122.4(d) require allocations and effluent limits to be developed using the tribal standards in order to be protective of the downstream waters. A statement addressing this issue has been added to Section 2.3.

- **Section 4.2 Flow (for bacteria)**
 - For Figures 4.5 - 4.7 in Section 4.2 on Pages 31-33, a more detailed explanation of the methodology used to produce the criterion curves would be helpful. (The last paragraph on Page 33 provides a good starting point.)

SWQB Response: *Just as in Section 3.2, references to the EPA document have been added to Section 4.2 as well as Section 9.0. The Cleland (2003) reference remains in Section 4.2. Both references provide detailed explanations of both flow and load duration curve development.*

- **Section 4.3 Calculations (for bacteria)**
 - We recommend inserting the words “geometric mean” before the words “*E. coli*” in the second sentence of Paragraph 1 of Section 4.3 on Page 33. Please replace the word “and” with the word “through” between the words “Tables 4.2” and “4.5” in the same sentence.
 - We recommend revising Equation 1 of Section 4.3 on Page 33 as follows:

$$C \text{ as cfu/100mL} * 1,000 \text{ mL/L} * 1 \text{ L/0.264 gallons} * 10^6 \text{ gallons/MG} * Q \text{ as MG/day} = \text{cfu/day}$$
 - For internal consistency, Equation 1 of Section 4.3 on Page 33 should be renumbered throughout the TMDL document as Equation 4.
 - In Paragraph 2 of Section 4.3 on Page 33, we recommend inserting the phrase “and the numerical criterion for *E. coli*” at the end of the second sentence.
 - In Tables 4.2 – 4.5 of Section 4.3 on Pages 34-35, we recommend adding footnotes indicating the specific WQS from which the *E. coli* geometric mean criterion for each table was drawn.
 - In Table 4.3 of Section 4.3 on Page 34, the statement made in footnote (b) cannot be corroborated from the monitoring results provided in Table D.3 of Appendix D. Measured flows should be added to Table D.3 of Appendix D to permit corroboration by the reader.

SWQB Response: *The requested changes have been made to Section 4.3.*

- **Section 4.4.1 Waste Load Allocation (for bacteria)**
 - In Table 4.6 of Section 4.4.1 on Page 36, footnotes (1) and (2) have no corresponding superscripts in the table.
 - In Table 4.7 of Section 4.4.1 on Page 37, NM DOT Dist 3 is listed as a Phase II Permittee, although NM DOT Dist 3 is one of four agencies jointly issued a Phase I Stormwater Discharge Permit by EPA Region 6. We recommend removing NM DOT Dist 3 from Table 4.7. In addition, Kirtland AFB is misspelled in Table 4.7.
 - In the third sentence of the last paragraph on Page 38 of Section 4.4.1, we recommend removing the phrase “In addition, the current” from the beginning of the sentence.
 - In Table 4.8 of Section 4.4.1 on Page 40, it appears that Waste Load Allocations have been omitted for Rio Grande (Rio Puerco to Isleta Pueblo bnd) and Rio Grande (San Marcial at USGS gage to Rio Puerco). Further, the (a), (b) and (c) superscripts do not match any footnotes in Table 4.8. Finally, the WLA results for permit NM0027863 should be moved down two lines to match the row header. (It should be noted that Page 41 is missing, suggesting that part of Table 4.8 has been omitted from the document.)
 - In Table 4.8 of Section 4.4.1 on Page 40, we question the classification of discharges under Phase I and Phase II stormwater permits as “point sources” to which waste load allocations can be assigned. Please clarify the regulatory justification for this approach.

SWQB Response: *The suggested grammatical changes have been made to Section 4.4.1. Unfortunately, a page was omitted in the Public Comment Draft of the TMDL document and a portion of Table 4.8 was indeed missing. The comments regarding Table 4.8 are clarified when the entire table is included.*

As stated in Section 4.4.1, the Phase 1 permit covers all areas within the incorporated limits of the City of Albuquerque and the permittees include the City of Albuquerque, UNM, AMAFCA, and NM Department of Transportation District 3. Per EPA, NM DoT District 3 is also a Phase 2

permittee and would also be responsible for those areas outside the incorporated limits of the City of Albuquerque under the Phase 2 permit.

In November 2002, the EPA Office of Wetlands, Oceans, and Watersheds and the Office of Wastewater Management issued a memo to all the Regional Water Division Directors (available online: <http://www.epa.gov/npdes/pubs/final-wwtmdl.pdf>) that specifically addressed the issue of the assignment of WLA to storm water discharges. The memo states that NPDES-regulated storm water discharges must be addressed by the wasteload allocation component of a TMDL (40 CFR §130.2(h)). The memo also states that storm water discharges that are regulated under Phase I and Phase II of the NPDES storm water program are point sources that must be included in the WLA portion of the TMDL (40 CFR §130.2(h)).

- **Section 4.4.2 Load Allocation (for bacteria)**

- We recommend that Equation 2 of Section 4.4.2 on Page 42 be reformatted as follows, to better correlate with the explanatory text preceding it: $LA = TMDL - WLA - WOS$. In addition, for internal consistency, Equation 2 should be renumbered as Equation 5 throughout the document.
- In Table 4.9 of Section 4.4.2 on Page 42, the NPDES permit cited in footnote (a) is not shown in Table 4.8 of Section 4.4.1 on Page 40. Please correct or clarify this apparent discrepancy.
- In Table 4.10 of Section 4.4.2 on Page 42, we recommend adding the preface “WLA:” before each NPDES permit number so that the Total Waste Load Allocation summation is easily understood. Also, none of the NPDES permits cited in Table 4.10 are shown in Table 4.8 of Section 4.4.1 on page 40. Please correct or clarify this apparent discrepancy.
- In Table 4.11 of Section 4.4.2 on Page 43, we recommend adding the preface “WLA:” before each NPDES permit number so that the Total Waste Load Allocation summation is easily understood. In addition, it is not clear how the WLA values for NPDES permits NMS000101 and NMR040000 were determined. WLAs for these permits are shown as “Variable” in Table 4.8 of Section 4.4.1 on Page 40. Please clarify.
- In Table 4.12 of Section 4.4.2 on Page 43, we recommend adding the preface “WLA:” before each NPDES permit number so that the Total Waste Load Allocation summation is easily understood. In addition, it is not clear how the WLA values for NPDES permits NMS000101 and NMR040000 were determined. WLAs for these permits are shown as “Variable” in Table 4.8 of Section 4.4.1 on Page 40. Please clarify.
- In Tables 4.9 – 4.12 of Section 4.4.2, we recommend moving the Load Allocation row to the bottom of each table to better correlate with the explanation of LA derivation at the beginning of the Section.

SWQB Response: The suggested grammatical changes have been made to Section 4.4.2. The footnote below Table 4.9 and the permits in Table 4.10 are referenced in Table 4.8, which as noted previously was unfortunately missing from the Public Comment Draft of the TMDL document. The WLA for the NMR040000 and NMS000101 permits is listed as “variable” for the sake of space in Table 4.8. The details of the WLA for these permits are detailed in Tables 4.11 and 4.12. A footnote has been added to Table 4.8 for clarification. The location of the LA rows in Tables 4.10-4.12 has been moved.

- Beginning with the last paragraph of Section 4.4.2 on Page 43, we recommend starting a new **Section 4.4.3** entitled **Load Calculations**. In this last paragraph, it is not clear which specific measured *E. coli* concentrations were used in Equation 1 (future Equation 4) to determine actual loading. Please add an explanatory statement similar to the one included for aluminum in the first paragraph on Page 22 of Section 3.4.2 (future Section 3.4.3).
- In Tables 4.13 – 4.16 of Section 4.4.2 (future Section 4.4.3) on Pages 44-45, we recommend citing the applicable Appendix D table number in the appropriate footnote for each table. In addition, each table in Appendix D should be expanded to include measured flows, to allow reader corroboration of mean *E. coli* concentration for each flow condition shown in Tables 4.13 – 4.16 with raw data in Appendix D. Finally, we recommend adding the units abbreviation “(cfu/day)” after “Measured Loads” and “Target Loads” in each table.
- In Tables 4.13 – 4.16 of Section 4.4.2 (future Section 4.4.3) on Pages 44-45, we are concerned that **arithmetic** means for measured *E. coli* concentrations are compared against **geometric** means for *E. coli* water quality criteria when determining load reduction percentages. Because arithmetic means are generally higher than geometric means for *E. coli*, we are concerned that using arithmetic means for measured *E. coli* concentrations may overestimate measured loads, resulting in higher computed percent reductions needed to achieve target loads. Please provide justification for using arithmetic rather than geometric means for measured *E. coli* concentrations in these computations.
- Bernalillo County has particular concerns about the projection in Table 4.15 of Section 4.4.2 on Page 45 that the *E. coli* load for the Rio Grande (Isleta Pueblo bnd to Alameda Street bridge) AU must be reduced by more than 80% to achieve the target load under most flow conditions. This level of reduction is nearly impossible, given the finding from the October 2005 *Middle Rio Grande Microbial Source Tracking Report* that 46.4% of fecal bacteria present in the Rio Grande originate from wildlife beyond human control. We request that NMED add a statement acknowledging this reality to the last paragraph in Section 4.4.2 on Page 45, similar to the statement included for aluminum in Section 3.3 on Page 19.

SWQB Response: *In reviewing this section in response to this comment as well as the comments of others NMED recognizes that for this TMDL calculating a percent reduction is particularly challenging. This is largely for the reasons noted in the comments above – the samples collected and the impairment determinations are based on exceedences of the State’s single sample criterion and the TMDL is written to the address the monthly geometric mean standard of Sandia and Isleta Pueblos. As such any simple comparison of these numbers is fraught with challenge and, in this case, will result in an over estimation of the actual reduction necessary.*

Furthermore, neither Section 303 of the Clean Water Act nor Title 40, Part 130.7 of the Code of Federal Regulations requires states to include discussions of percent reductions in TMDL documents. Although NMED believes that it is often useful to discuss the magnitude of water quality exceedences in the TMDL, the “percent reduction” value is can both be calculated in multiple ways and as a result can often misinterpreted. This is clearly the case in this situation.

For these reasons Tables 4.13-4.16 and the associated discussion have been removed. Statements in Section 3.3 have been duplicated in Section 4.3.

- **Section 4.5 Identification and Description of Pollutant Sources** (*for bacteria*)
 - For Point pollutant sources in Table 4.17 of Section 4.5 on Page 46, the computation methodology for the magnitude (cfu/day) for each AU is not clearly defined. Please clarify how these values were determined.
 - In Table 4.17 of Section 4.5 on Page 46, footnote (a) discusses point source and nonpoint source percentage calculations, although the table itself shows no percentages for point and nonpoint sources. Please clarify.

SWQB Response: *The magnitude values in Table 4.17 (now Table 4.13) were derived from the measured load values displayed in Tables 4.12-4.16. These values have been removed from Table 4.17 (now Table 4.13). The Point Source values are derived from the NPDES permits. Clarification has been added to footnote (a) and footnote (c) has been removed.*

- **Section 4.6 Linkage Between Water Quality and Pollutant Sources** (*for bacteria*)
 - We recommend adding the following statement at the end of the first paragraph in the subsection entitled “*E. coli* Data” in Section 4.6 on Page 47: “Higher r-values indicate stronger correlations between the variables compared.”
 - In the second sentence of the second paragraph in the subsection entitled “*E. coli* Data” in Section 4.6 on Page 47, we recommend adding the words “Table D.4 of” after the words “Data in”. In the same sentence, the statement that “elevated *E. coli* levels occur during both rainfall and non-rainfall events” cannot be corroborated by the reader from information presented in Table D.4 of Appendix D. Appendix D should be expanded to include measured rainfall associated with each sampling event.
 - In the third sentence of the second paragraph in the subsection entitled “*E. coli* Data” in Section 4.6 on Page 47, the described number of samples collected (43) in the Rio Grande (San Marcial gage to Rio Puerco) does not correspond to the number of samples shown in Table D.4 of Appendix D (63) for the same AU. Please clarify or correct this apparent discrepancy.
 - For the first through third paragraphs on Page 48 in Section 4.6, we recommend providing citations to the applicable Appendix D table in each paragraph, showing the actual correlation computations, and clearly identifying which samples were used to determine the correlation between rainfall and *E. coli* concentration for each AU.
 - In the third paragraph on Page 48 in Section 4.6, a correlation coefficient of $r = 0.77$ is described although the paragraph states that, in the Rio Grande (non-pueblo Alameda to Angostura Diversion) AU, the “highest exceedence ... occurred on **the one day** when rainfall was recorded ...”. We are concerned about the determination of a correlation between rainfall and *E. coli* concentration for this AU based on a single observation. Please explain.

SWQB Response: *The suggested grammatical changes have been made to Section 4.6. The notation in Section 4.6 about 43 *E.coli* samples has been corrected to read 63. Rainfall data has been added to the tables in Appendix D.*

The Pearson correlation coefficient was calculated using all available data as provided in Appendix D. The observation made regarding the exceedences in the Rio Grande (non-pueblo Alameda to Angostura Diversion) assessment unit merely intends to point out that the highest exceedence (5300 cfu/100 mL) occurred on the only sampling event where rainfall occurred the previous day.

- **Section 4.9 Future Growth** *(for bacteria)*

- We recommend adding the following sentences at the end of the final paragraph on Section 4.9 on Page 50: “The existing Middle Rio Grande-Albuquerque Reach Watershed Restoration Strategy (Albuquerque Reach Watershed Group, 2008) defines a framework for design, installation and maintenance of BMPs in the northern portions of this watershed. See Section 6.0 for details.”

SWQB Response: *The suggested grammatical changes have been made to Section 4.9.*

- **Section 6.2 Clean Water Act §319(h) Funding Opportunities**

- We recommend adding the word “(impaired)” after the words “category 4 or 5” in Paragraph 1 of Section 6.2 on Page 54.

SWQB Response: *The suggested grammatical changes have been made to Section 6.2.*

- **Subsection 6.4(B) Specific SWMP/SWPP Requirements**

- In Paragraph 4 of Subsection 6.4(B) on Page 56, it is stated that “Compliance with the following provisions will constitute compliance with the requirements of this TMDL.” According to the NMED website (<http://www.nmenv.state.nm.us/swqb/TMDL/>), “TMDLs are not regulatory documents, but they can be used to issue or modify permits for point sources.” Because TMDLs are non-regulatory, it concerns us that there is a reference to “the requirements of this TMDL” in the document. Please clarify.
- In Item 1 of Subsection 6.4(B) on Page 56, it is stated that “Permittees **shall** submit an approvable Bacteria Reduction Plan to the EPA within 12 months of notification [that the TMDL has been approved by EPA].” In Item 2 of Subsection 6.4(b) on Page 57, it is stated that “Within 18 months of notification [that the TMDL has been approved by EPA], the permittee **shall** prepare and submit to the EPA either a TMDL monitoring plan or a commitment to participate in a coordinated regional monitoring plan.” Including such mandatory language leaves the impression that the TMDL itself creates regulatory requirements for NPDES permittees in the watershed, which conflicts with the non-regulatory nature of TMDLs as described by NMED. Please correct or clarify this apparent discrepancy.

SWQB Response: *The abbreviation “WLA” has been added to the statement in Paragraph 4 of Subsection 6.4(B) in order to clarify that “requirements” referred to are in reference specifically to the WLAs assigned in the TMDL. The term “shall” in Items 1 and 2 of Subsection 6.4(B) has been replaced with the terms “should” and “should consider.” As noted in the paragraph immediately preceding Subsection 6.4, the language in Subsection 6.4 was submitted for inclusion by EPA R6 and the ultimate decision about TMDL implementation will be decided during the NPDES permit process. EPA does not have the authority to approve Implementation Plans in TMDLs and states that fact in every TMDL approval letter we receive from EPA R6. For example, the approval letter for the Jemez River TMDLs (September 2009) reads:*

“Included in this TMDL submittal was a TMDL Implementation Plan. Presently, EPA has no duty to approve or disapprove implementation plans under Section 303(d) of the Clean Water Act (CWA). Therefore, EPA is taking no action to approve or disapprove the TMDL Implementation Plan submitted by NMED.”

The Implementation Section is merely a suggested guide for future permit development or other relevant watershed activities.

- **Appendix A: Conversion Factor Derivation**

- We recommend revising the calculations shown in Appendix A to read as follows:

Flow (MG/day) x Concentration (mg/L) x CF (L – lb/MG – mg) = Load (lb/day)

CF = 10^6 gal/MG x 3.785 L/gal x 1 lb/454,000 mg = 8.34 L – lb/MG – mg

SWQB Response: *The suggested changes have been made to Appendix A.*

- **Appendix C: Aluminum Data**

- Table C.1 of Appendix C should be expanded to include a streamflow measurement for each sampling event, to allow reader corroboration of statements made in the TMDL.

- **Appendix D: E. coli Data**

- Tables D.1, D.2, D.3 and D.4 should be expanded to include a streamflow measurement and a rainfall measurement for each sampling event, to allow reader corroboration of statements made in the TMDL.
- Table D.4 should be reformatted to fit on a single page or relabeled to clarify that it is continued on a second page.

SWQB Response: *Flow data have been added to Appendix C and Appendix D now includes both flow and rainfall data.*

Thank you for this opportunity to review and comment on the "Public Comment Draft Total Maximum Daily Load (TMDL) for the Middle Rio Grande Watershed." Please contact me at (505) 848-1507 with questions or comments.

Best regards,



Mary Murnane
Program Manager
Water Resources Program
Public Works Division

CC: Tom Zdunek, Deputy County Manager for Public Works
Steve Miller, Director, Infrastructure Planning and Geo-Resources Department

Comment Set B:

From: Andy Smith [cofam5@yahoo.com]

Sent: Tuesday, October 20, 2009 3:53 PM

To: Henderson, Heidi, NMENV

Subject: TMDL Comments

COMMENTS ON THE TMDL DRAFT, SUBMITTED 20 OCTOBER 2009, IN RESPONSE TO THE NMED REQUEST

The quality and depth of the draft TMDL are appreciated and it is good to see the attention NMED is paying to our drinking water quality and to see excellent young people getting involved in the crusade.

The TMDL purpose was well stated in the introductory letters and it includes identifying possible pollutants and sources and finding ways to limit the extents of any releases. However, the limited scope of this draft is of great concern, because the Middle Rio Grande river is now being used as a drinking water (DW) source for about a half-million people. Of greatest concern is the fact that most of the 70 or so potential drinking water pollutants which are listed by the EPA are not addressed. This may be because the river is not yet classified by the State as such a major DW source and because the existing Source Water Assessment document does not include this use.

Micro-organisms

Of special concern is the large number of micro-organisms that are recognized by the EPA and are not covered. Most are much smaller than the E-coli, which is covered. In addition, the Rio Rancho and other city waste water treatment plant discharge pipes are just upstream of the intake to our drinking water plant and those discharges include a wide variety of industrial, agricultural, medical and other possible chemical, biological and other pollutants. All of these possible pollutants should be addressed to properly characterize the source water and because the drinking water treatment plant seems to have limited filtration capabilities (in the nano-meter to pico-meter range) because it only uses particle flocculation and charcoal filtration.

For disinfection, it uses ozone and chlorine and some of the potential emerging biological contaminants may be practically indestructable (highly resistant to heat, chemicals, etc.). The prions, that cause brain disintegration, are a good example of such pollutants and they are now being studied as possible water pollutants, because their infections have been found among some of the game animals. Conversations with Stanley Prusiner, who received the Nobel Prize for his contributions to the prion discovery, made this disinfection resistance point very clear and all of the subsequent disinfection tests have proven this disturbing fact to be true. The prion is a deformed protein which the body can reproduce. It is chemically identical to one of our natural chemicals but it is configured differently and the difference is deadly.

Emerging Pollutants

In addition to the prion, there are a number of emerging pollutants that should be addressed, by us, even though they are not yet on the main EPA

list, because we and the public are becoming increasingly aware of their danger. An ongoing new news feature, in the New York Times, is evidence of this, as it addresses some of the hazardous materials that are now present in our treated drinking water. A good example of that group of newly recognized contaminants is the pharmaceuticals. The NM Amigos Bravos group and many others have expressed concerns about these. Also, we have a few unique contaminant candidates, in this New Mexico area, which should be considered, by all of us, because we are downstream of the large national nuclear research and production labs. Plutonium is on this list and one of our community volunteer study groups (AVAT) has suggested that the protection limits should be lower than they presently are, based on the outstanding work that has been done by Arjun Makhijani.

The NMED is at the center of the activities of concern to many of us, as they are related to our drinking water quality, and we would appreciate a priority effort aimed at the updating of the MRG Source Water Assessment, the expansion of this and other TMDL documents to include these potential hazards and the correction of the NM Surface Water Quality Standards (NMAC 20.6.4), to reflect the present and extremely important new use of this water, for drinking. Perhaps our greatest concern, with these documents is the lack of proper attention to the possible biological contaminants, as discussed, and the detailed and frequent sampling and testing that they require.

Albuquerque has enjoyed some of the purest drinking water in the World, for most of its history, and this water quality may, in some way, have contributed to the fact that we have among the lowest rates of heart disease, cancer and stroke in the country. Test data has shown us to have only small fractions of many of the allowable concentrations of the EPA pollutants, in the past - and many were never found in our deep-well water. Our new addition of river water to the DW mix has changed all of that and it is important for us to upgrade our standards, testing, treatment, etc. to properly meet this new challenge and we hope that the NMED and the DoH will do all they can to help us.

We recognize that the important effort expansions, in this area, may require additional NMED funding and we will be happy to do all we can to encourage our legislators to support such targeted increases. We will also be happy to urge EPA support, so that the needed tests, data, standards, etc. can be provided. We would like to see a complete EPA baseline chemical, biological and radiological contaminant profile of the river water, as soon as possible.

Andy Smith
Public Health Advocate

SWQB Response: *Thank you for the comments and your continued interest in the water quality of the Middle Rio Grande. SWQB recognizes your concern for the drinking water supply of the Albuquerque area.*

The impairments addressed in this TMDL are included on the 2008-2010 State of New Mexico CWA §303(d)/§305(b) Integrated List. Water quality data collected during SWQB surveys is compared to the existing Standards for Interstate and Intrastate Surface Waters (NMAC, 2007). Determination of impairment of a waterbody is based on the application of the Procedures for Assessing Use Attainment for the State of New Mexico Integrated Clean Water Act §303(d)/§305(b) Water Quality Monitoring and Assessment Report (January 2008). As you noted, there are currently no existing surface water quality standards for some chemicals. SWQB cannot assess impairment of a waterbody for a certain chemical if there is no water quality standard to which it can be compared.

The NMED Department of Energy-Oversight Bureau is currently collecting radionuclide samples in the Rio Grande. The data available for the development of the 2008-2010 State of New Mexico CWA §303(d)/§305(b) Integrated List indicated no impairment for radionuclide parameters.

NMED has proposed to add the public water supply use to the Albuquerque reach of the Rio Grande and radionuclide criteria for an upstream reach of the Rio Grande in the current triennial review rulemaking. The Department's proposal would not add criteria for other pollutants at this time.

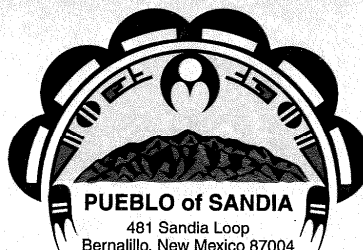
Bacterial criteria are established under the Clean Water Act for recreational contact, but not for drinking water. As for other emerging contaminants, such as pharmaceuticals and personal care products (PPCPs), EPA has not yet recommended water quality criteria at the national level, though monitoring and research are ongoing. EPA discusses PPCPs on its website at <http://www.epa.gov/ppcp/faq.html>. The risks posed by low levels of these contaminants in water to aquatic life and human health remain uncertain.

Most of SWQB's surface water quality efforts, such as monitoring, certifying NPDES permits, establishing TMDLs, and implementing restoration efforts, are triggered by the water quality standards. Developing water quality criteria is a scientifically rigorous process that culminates in a formal rulemaking. Any person may petition to amend the water quality standards with documentation to support new or revised criteria.

Comment Set C:

Joe M. Lujan
Governor

E. Scott Paisano
Lt. Governor



(505) 867-3317
Fax (505) 867-9235

www.sandiapueblo.nsn.us

October 20, 2009

Heidi Henderson, TMDL Coordinator
NEW MEXICO ENVIRONMENT DEPARTMENT
Surface Water Quality Bureau
P.O. Box 5469
Santa Fe, NM 87502

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OCT 26 2009
SURFACE WATER
QUALITY BUREAU

RE: Total Maximum Daily Load (TMDL) for the Middle Rio Grande Watershed

Dear Ms. Henderson:

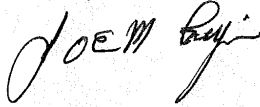
On behalf of the Pueblo of Sandia, please extend our appreciation to the New Mexico Environment Department for acknowledging our tribal waters in the development of the Middle Rio Grande Watershed Total Maximum Daily Load (TMDL).

Our environment department has reviewed the TMDL and has the following comments and/or insertions:

1. The Executive Summary states that an "A TMDL documents the amount of a pollutant a waterbody can assimilate without violating a state's water quality standard". The Pueblo of Sandia would like to have the following inserted "or a tribe's water quality standard".
2. The Executive Summary states that a "pre-survey public meeting in Albuquerque" was held. The Pueblo of Sandia would like to have the date of this meeting inserted into the text. This would benefit anyone who would like to reference this public meeting.
3. The 1.0 Introduction states that an "A TMDL documents the amount of a pollutant a waterbody can assimilate without violating a state's water quality standard". The Pueblo of Sandia again, would like to have the following inserted "or a tribe's water quality standard".
4. The Pueblo of Sandia would like to request a copy of the 2005 survey data for the Rio Grande (non-Pueblo Alameda Street Bridge to Angostura Diversion) that was collected for dissolved aluminum even though it was determined not to be an impairment for this stretch.

Once again, thank you for the continued consultation with our environment department and assistance on this project. If you have any questions or concerns, please contact Frank Chaves, environment director, or Scott Bulgrin, water quality manager of my staff at (505) 867-4533.

Sincerely,

A handwritten signature in black ink, appearing to read "Joe M. Lujan". The signature is fluid and cursive, with the first name "Joe" being the most prominent.

Joe M. Lujan
Governor

SJB/

cc: Curry Jones, USEPA Region 6TMDL Team Leader
Linda Adams, USEPA Region 6NM TMDL Coordinato,
Marcy Leavitt, NMED Water & Wastewater Division Director
Glenn Saums, NMED Acting Surface Water Bureau Chief
Frank Chaves, Pueblo of Sandia Environment Department
Scott Bulgrin, Pueblo of Sandia Environment Department
File

P:\09letters\scottbulgrin\09sjb074.plh

SWQB Response: *Thank you for the comments and your continued support of SWQB sampling efforts in the Middle Rio Grande. The requested changes have been made to the Executive Summary and Section 1.0. Per your request, the dissolved aluminum data for the Rio Grande (non-Pueblo Alameda Street Bridge to Angostura Diversion) was submitted to Mr. Joe Lujan, Mr. Scott Bulgrin, and Mr. Milton Bluehouse on October 29, 2009.*

Comment Set D:

CITY OF ALBUQUERQUE



October 27, 2009

Martin J. Chávez
Mayor

Nicholas S. Bakas
Director of Aviation

Heidi Henderson
New Mexico Environment Department
Surface Water Quality Bureau
P.O. Box 5469
Santa Fe, NM, 87502

Re: Comments on the Draft Total Maximum Daily Load (TMDL) for the Middle Rio Grande Watershed, September 16, 2009

Dear Ms. Henderson,

The City of Albuquerque Aviation Department is pleased to have an opportunity to comment on the Public Comment Draft Total Maximum Daily Load (TMDL) for the Middle Rio Grande Watershed (September 16, 2009).

P.O. Box 9948

Albuquerque

New Mexico

87119-1048

www.cabq.gov

- Table 2-2: The TMDL should include a map showing the individual segments and the locations of the 2005 surface water sampling stations within those segments. The maps of the entire middle Rio Grande good for an overview, but not useful on a segment-specific basis to see where sampling stations were located.
- Page 37-38: The application of the “jurisdictional approach” should be more comprehensively described. While it is clear that the area of the watershed is being divided by segment, it is not clear how that is applied in terms of discharging storm water. Is the percentage of the jurisdiction used to determine a volume of discharge or responsible for a reduction of *e coli*?
- Page 56: The TMDL states “After EPA approves the final TMDL, existing MS4 permittees will be notified of the TMDL provisions and schedule. Industrial stormwater permittees are not expected to be a significant source of bacteria but if any are identified, similar actions will be required.” The industrial storm water permittees that are located within the MS4 should not be individually responsible for developing a Bacterial Reduction Plan, developing or participating in a bacterial monitoring plan, and annual reporting. If necessary, the MS4 permittee should have the responsibility of working with industrial storm water permittees for these requirements. To require that individual industrial storm water permittees complete the same requirements as the MS4 could result in expensive duplicative efforts that do not provide appreciable benefit to reducing the impairment.

If you have any questions about these comments, please contact me at 244-7836 (office) or email me at calbrecht@cabq.gov.

Sincerely,

Christopher P. Albrecht, Environmental Manager
City of Albuquerque Aviation Department
Planning and Development



SWQB Response: Thank you for the comments.

Comment 1:

Figures 2.1-2.3 display each Assessment Unit as well as the enumerated sampling locations as detailed in Table 2.2. SWQB can provide detailed information to interested parties regarding specific site locations. Additionally, the NMED –New Mexico Atlas website (<http://www.nmenv.state.nm.us/NMAtlas/index.html>) is a useful tool for mapping sites of environmental interest, including SWQB sampling locations state-wide.

Comment 2:

Details of the jurisdictional area approach were removed from the main document for simplicity and readability of the document. SWQB developed the MS4 portion of the WLA based on discussions with EPA R6, recommendations from the TMDLs to Stormwater Permits Handbook (USEPA, 2008), and previously developed SWQB MS4 TMDLs. Section 4.4.1 of the TMDLs to Stormwater Handbook discusses the approach used in the Draft Middle Rio Grande TMDL, i.e. aggregated WLA for all stormwater sources. Section 4.3.2.2 discussed the Load Duration Approach and states:

“TMDLs developed using the load duration approach most often identify the portion of the loading capacity for the stormwater WLA(s) on the basis of jurisdictional area... Because a load duration curve establishes a flow-variable loading capacity, the framework allows for source-specific allocations to be adjusted by flow zone. To target loading controls and put the load duration results in a more digestible format, the load duration curve is usually divided into different flow zones representing different conditions (e.g., low flow, high flow).”

For the Draft MRG TMDL, separate WLA were assigned to both the Phase I and Phase II permittees. These allocations were further divided between the two affected Assessment Units; Rio Grande (Isleta Pueblo boundary to Alameda Street Bridge) and Rio Grande (non-Pueblo Alameda to Angostura Diversion). First, the contributing watershed was determined to begin at Cochiti Reservoir as displayed in Figure 4.9. Second, the watershed area from the Isleta Pueblo boundary to Cochiti Reservoir was determined along with the watershed area from Alameda Street Bridge to Cochiti Reservoir. The jurisdictional area of the Phase I permit encompasses the incorporated areas of the City of Albuquerque, however this incorporated area falls within both affected Assessment Units. As a result, the incorporated area of the City of Albuquerque was divided at the Alameda Street Bridge in order to account for the Assessment Unit break at the bridge. The percentage of the incorporated area of the City of Albuquerque that fell into each AU was then determined to be a percentage of the whole watershed. The Phase I WLA percentages are discussed in Section 4.4.1 of the Draft TMDL. A similar approach was taken for the Phase II permittees. The percentage of urbanized areas (as described in the Phase II permit) were similarly determined as a percentage of the whole watershed. The Phase II WLA percentages are also discussed in Section 4.4.1.

Appendix F was also added to the Final TMDL for further explanation of this approach.

Comment 3:

The Multi-Sector General Permit for Stormwater Discharges Associated with Industrial Activity (MSGP) became effective on September 29, 2008. This permit authorizes operators of stormwater discharges associated with industrial activity located in an area where EPA is the permitting authority to discharge to waters of the United States.

Section 2.2.1 of the MSGP reads:

“If at any time you become aware, or EPA determines, that your discharge causes or contributes to an exceedance of applicable water quality standards, you must take corrective action as required in Part 3.1, document the corrective actions as required in Parts 3.4 and 5.4, and report the corrective actions to EPA as required in Part 7.2.”

Section 2.2.2.1 of the MSGP reads:

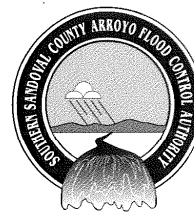
“Existing Discharge to an Impaired Water with an EPA Approved or Established TMDL. If you discharge to an impaired water with an EPA approved or established TMDL, EPA will inform you if any additional limits or controls are necessary for your discharge to be consistent with the assumptions of any available wasteload allocation in the TMDL, or if coverage under an individual permit is necessary in accordance with Part 1.6.1.”

As noted in the paragraph immediately preceding Section 6.4 in the Public Comment Draft TMDL, the language in Section 6.4 was provided to SWQB by EPA R6. This language was provided so that the permittees have an opportunity to be aware of potential future permit requirements. As stated in the Public Comment Draft TMDL:

“It is the responsibility of EPA Permit Writers to develop a permit that complies with the allocations provided in the TMDL. The exact manner in which this is implemented (specific BMPs, numeric effluent limits etc.) to achieve this goal is up to the discretion of the EPA permit writer and need not follow this implementation guidance.”

Comment Set E:

***Southern Sandoval County
Arroyo Flood Control Authority***



BOARD OF DIRECTORS

John Chaney
Mark Conkling
Steven M. House
Donald A. Rudy
Wm. C. "Dub" Yarbrough

David Stoliker, P.E.
Executive Director

October 27, 2009

Heidi Henderson
New Mexico Environment Department SWQB
P.O. Box 5469
Santa Fe, New Mexico 87502

Subject: SSACFCA Review of Public Comment Draft - TMDL of the Middle Rio Grande Watershed

Dear Ms. Henderson:

I am in receipt of the proposed TMDL for the middle Rio Grande and appreciate the ability to comment. Thank you.

In reviewing this information, SSACFCA is struck by the potential impacts that may result and the uncertainty that we have in the information provided. We have explored other information that appears to contradict or negate some of the information that is contained in the document. One example of our uncertainty is the variability of the results as seen in Table D.1. Specifically, the testing data for 7/27/05 in the upper reach of the Rio Grande between the Alameda Bridge and Angostura Diversion shows that the variation in the reported information is from 488.4 to 41.1 cfu/100 ml. Said another way, the variation is from non-compliance to compliance. Two samples appear to be analyzed at Hwy 550 with two different results; one out of compliance with a result of 488.4 cfu's/100 ml and one in compliance with a result of 325.5 cfu's/100 ml. Two other samples taken at the Alameda Bridge on the same day have similar regulatory outcomes of compliance with results of 41.7 cfu's/ml and 62.2 cfu's/ml respectively. Given the potential impact of this rule, this variation is unacceptable. Rather than proceed down a path of uncertainty, I would ask that you withdraw this proposed TMDL and allow further scientific investigation to flush out technical uncertainties and irregularities. This further investigation should include addressing additional technical comments provided by the Storm Water Quality Team of which SSACFCA is a signatory. It has been my experience that cooperative partnerships work when addressing tough issues. SSACFCA is willing to form a cooperative partnership to address this issue of bacteria in the Rio Grande.

SSACFCA is committed to doing our part in protecting the environment. We have established regulatory requirements for all development to treat the "first flush" of storm water run-off. We are designing and constructing storm water quality facilities in every

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www.ssacfca.com**

facility that we have. We are extremely proud of our wetlands water quality facility in Haynes Park and our recently completed water quality facilities located in the Venada Arroyo (at the Rio Grande in the Rio Rancho Bosque), in the Black Arroyo (located in AMAFCA's Black Dam) and in the Montoyas Arroyo (located in the Sportsplex Dam).

If you have any questions or comments, please call me.

Sincerely,

A handwritten signature in black ink, appearing to read "D. Stoliker", written over a horizontal line.

David Stoliker, PE
Executive Engineer

SWQB Response: *Thank you for the comments.*

That E.coli data available in Appendix D shows results ranging from 41.1 cfu/100 mL to 488.4 cfu/100 mL. These samples were collected throughout the Rio Grande (non-Pueblo Alameda Street Bridge to Angostura Diversion) by SWQB staff operating under the NMED/SWQB Standard Operating Procedures for Data Collection. There were two discrete samples each taken at the Highway 550 bridge (32RGrand464.2) and Alameda Bridge (32RGrand445.4) sites on July 27, 2005. The samples denoted with a “c” following the STORET ID indicate a composite sample that was collected using the method described in Section 7.6 of the 2007 NMED/SWQB Standard Operating Procedures for Data Collection and the samples without a “c” indicate a grab sample.

SWQB recognizes that the data is variable due to the dynamic nature of the Rio Grande and is also typical of E coli impairments throughout the state. The data collected in this Assessment Unit was applied to the Procedures for Assessing Use Attainment for the State of New Mexico Integrated Clean Water Act §303(d)/§305(b) Water Quality Monitoring and Assessment Report (January 2008) and based on the application of this protocol, the Assessment Unit was determined to be impaired for E.coli and is included on the 2008-2010 State of New Mexico CWA §303(d)/§305(b) Integrated List. This AU had been continuously listed for fecal coliform at least prior to the 1998-2000 CWA §303(d)/§305(b) Integrated List. SWQB developed a fecal coliform TMDL for this AU in 2002.

As discussed in Sections 3.3 and 4.3, the TMDL is calculated by multiplying the applicable water quality standard, the flow, and a conversion factor. Water quality data is not used in the calculation of the TMDL. Water quality data is used in the determination of impairment during the development of the CWA §303(d)/§305(b) Integrated List. 40 CFR 130.7 requires states to develop TMDLs for impaired, or water quality-limited, segments. SSCAFCA comments relate to the development of Watershed Based Plans that could include tools such as source identification to implement this TMDL.

SWQB is in receipt of the comments submitted by the Mid Rio Grande Storm Water Quality Team and has responded to those comments in Comment Set G. SWQB appreciates SSCAFCA’s continued efforts to improve water quality through numerous structural and wetland projects in the Middle Rio Grande watershed.

Comment Set F:

Ronald D. Brown, Chairman
Janet Saiers, Vice Chair
Danny Hernandez, Secretary Treasurer
Tim Eichenberg, Asst. Secretary Treasurer
Daniel F. Lyon, Director

John P. Kelly, P.E.
Executive Engineer



Albuquerque
Metropolitan
Arroyo
Flood
Control
Authority

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OCT 30 2009

SURFACE WATER
QUALITY BUREAU

October 27, 2009

Heidi Henderson
Surface Water Quality Bureau, NM Environment Department
P.O. Box 5469
Santa Fe, NM, 87502

Subject: Comments on Draft TMDL for the Middle Rio Grande Watershed

Dear Ms. Henderson:

This letter contains comments on the Draft Total Maximum Daily Load (TMDL) for the Middle Rio Grande Watershed that are being submitted by the Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA) as requested in your Notice of a 45-Day Public Comment Period and Community Meeting. Briefly, AMAFCA objects to the proposed TMDL for E coli in the Middle Rio Grande for the following reasons:

1. There is a large natural source of E coli bacteria in the river as documented by New Mexico Environment Department (NMED) Surface Water Quality Bureau (SWQB) monitoring data.
2. No data or information has been presented to show that a high natural concentration of E coli bacteria has impacted the river or human health in any way.
3. An alternative calculation of E coli concentrations in the proposed TMDL suggests that the NMED has overstated the degree of non-compliance with the stream standard, supports the position that the coliform loads are due to natural phenomenon and leads to questions regarding load calculations in the document.

Our concerns are discussed below. Because the North Diversion Channel (NDC) joins the river upstream from the Alameda Bridge, our comments are principally focused on the reach of the river from the Alameda Bridge to the Angostura dam.

Point 1 – Large Natural Sources of Coliform Are Present.

Our most strident objection to the TMDL deals with the lack of recognition of natural sources of E coli bacteria in the river. Figure 4.8 in the TMDL appears to show that the highest exceedance of the stream standard for E coli above the Alameda Bridge occurs during low flow conditions. The document attributes high concentrations of E coli under low flow conditions to point sources (page 21).

Above the Alameda Bridge, there are only three small permitted discharges: one for the town of Bernalillo and two for Rio Rancho. The permit conditions for point sources in the middle Rio Grande for flow and coliform criteria are summarized in Table 1. Your monitoring data showed that these discharges are in compliance with their permit criteria. During the “Dry Conditions” ($Q < 647$ cfs) and “Low Flow Conditions” ($Q < 359$ cfs) the principal source of coliforms must therefore be attributed to natural sources. We examined the monitoring data from the TMDL report (Appendix D) and noted numerous instances of high E coli concentrations at sampling locations above the NDC on days with little or no flow in this channel ($Q \leq 2$ cfs) and presumably little or no rainfall in the watershed.

Table 1. NPDES permit values for flow and coliform bacteria for discharges to the Middle Rio Grande.

Wastewater Treatment Plant	Qmax (Mgal/d & cfs))	Parameter	30 d Average	Daily Maximum
Albuquerque	76 (118)	F. coli	100	200
Belen	1.2 (1.86)	E. coli	126	410
Bernalillo	0.8 (1.24)	F. coli	100	200
Los Lunas	0.9 (1.39)	E. coli	126	410
Rio Rancho Plt 2	5.5 (8.51)	F. coli	100	200
Rio Rancho Plt. 3	.85 (1.32)	F. coli	100	200
Bosque Farms	.5 (.77)	E. coli	126	410
Socorro	-	E. coli	126	410

The NMED coliform data supports the conclusion that natural sources are the principal cause of high concentrations of E coli in the river under low flow conditions. There is a large and growing body of literature on natural sources of E coli that include mammalian and avian populations, sediments, and even regrowth of coliform organisms in sediments and soils in warm climates. Based on our observation of large permanent populations of water fowl (especially geese and ducks) and aquatic mammals (beaver and muskrat), we believe that these organisms are the most likely sources of E coli in this reach of the river, and therefore, high concentrations should be considered to be natural.

SWQB Response: *Thank you for your comments.*

Section 3.2 of the Draft MRG TMDL states:

“The pattern of impairment can be examined to see if it occurs across all flow conditions, corresponds strictly to high flow events, or conversely, only to low flows. Impairments observed in the low flow zone typically indicate the influence of point sources, while those further left generally reflect probable nonpoint source contributions.”

This statement is included as a general statement related to load duration curves. Figure 4.8 shows exceedences of both the single sample and geometric mean criterion across most flow regimes. The TMDL does not negate the non-point source contribution of E.coli bacteria nor does it attempt to explain each E.coli exceedence noted in the water quality monitoring data. The fact that these data seem to contradict a general rule of load duration curve interpretation is an issue to be addressed during permit implementation.

SWQB recognizes that there are natural sources of E.coli bacteria in the Middle Rio Grande watershed (Parsons, 2005). However, the fact that NPDES and MS4 permittees discharge to the Rio Grande (non-Pueblo Alameda Street Bridge to Angostura Diversion) AU, requires SWQB to assign a WLA to those permittees, regardless of whether they are contributing to the impairment of the waterbody or not.

40 CFR § 130.2(i) defines a TMDL as follows:

“Total maximum daily load (TMDL). The sum of the individual WLAs for point sources and LAs for nonpoint sources and natural background. If a receiving water has only one point source discharger, the TMDL is the sum of that point source WLA plus the LAs for any nonpoint sources of pollution and natural background sources, tributaries, or adjacent segments. TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate measure...”

40 CFR § 130.2(h) defines a WLA as follows:

“Wasteload allocation (WLA). The portion of a receiving water's loading capacity that is allocated to one of its existing or future point sources of pollution. WLAs constitute a type of water quality-based effluent limitation.”

The limited monitoring results in Appendix E.5 for the facilities in the Rio Grande (non-Pueblo Alameda Street Bridge to Angostura Diversion) may not indicate a permit violation, however, it should be noted that a number of samples exceed the Pueblo of Sandia single sample E.coli criterion.

Point 2 – Impact of High Coliform Concentrations.

The NMED data shows that coliform bacteria are consistently present in the Middle Rio Grande above the Alameda Bridge. The geometric mean concentration for the data reported in the proposed TMDL was 72 cfu/100 mL for E coli. AMAFCA is not aware of any data or studies that have shown impairment of the river or human health problems as a result of these high concentrations. While AMAFCA recognizes that E coli is a very useful indicator of the possible presence of pathogenic bacteria in drinking water, we believe it is a very poor indicator of potential threats to the environment or human health in the Middle Rio Grande where it is clear

that natural sources of E coli and related bacteria are present. Before a costly TMDL is issued, AMAFCA insists that the NMED justify its implementation by demonstrating this impairment or threat.

SWQB Response: *States are required to develop TMDLs for segments that do not meet applicable water quality standards.*

40 CFR § 130.7(c)(1) reads:

“Each State shall establish TMDLs for the water quality limited segments identified in paragraph (b)(1) of this section, and in accordance with the priority ranking. For pollutants other than heat, TMDLs shall be established at levels necessary to attain and maintain the applicable narrative and numerical WQS with seasonal variations and a margin of safety which takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality. Determinations of TMDLs shall take into account critical conditions for stream flow, loading, and water quality parameters.”

40 CFR § 130.7(c)(1)(ii) reads:

“TMDLs shall be established for all pollutants preventing or expected to prevent attainment of water quality standards as identified pursuant to paragraph (b)(1) of this section...”

NMED proposed water quality standards for Escherichia coli (E.coli) during the 2005 Triennial Review. E.coli water quality standards were approved by the WQCC and EPA and have been effective since August 2007. The rationale for the establishment of these E.coli standards is based on the Final EPA Rule- Water Quality Standards for Coastal and Great Lakes Recreation Waters (40 CFR § 131). 40 CFR § 131 states that the recommended values apply to enterococci regardless of origin unless a sanitary survey shows that sources of the indicator bacteria are non-human and an epidemiological study shows that the indicator densities are not indicative of a human health risk.

The Executive Summary of Implementation Guidance for Ambient Water Quality Criteria for Bacteria (EPA, 2004) states:

“Although there have been few studies investigating the impact of fecal contamination from animal source, it is inappropriate to conclude that these sources present no risk to human health from waterborne pathogens, particularly when the animals in question are likely to have had frequent contact with humans and may harbor and shed human pathogens.”

Additionally, Section 3.2 discusses recent evidence that warm-blooded animals other than humans may be responsible for transmitting pathogens capable of causing illness in humans.

Point 3 – Alternative Analysis of E coli Concentrations.

The waste loads presented in the TMDL for the river above the Alameda Bridge are calculated using flows measured at the Alameda Bridge. However, during the SWQB study E coli concentrations were measured at several locations upstream from this point. Under low flow conditions there are no significant tributaries above this point (the aggregate maximum flows from the Rio Rancho and Bernalillo wastewater treatment plants represent less than 3% of the minimum flow in the river during any of the sampling events for the study), hence, this assumption is reasonable and introduces little error. Therefore, AMAFCA believes that the same reasoning can be applied to the E coli data, so that instead of calculating loads based on individual coliform concentrations, the mean geometric concentration should be used in the load calculations. This is justified because there are no point sources between the uppermost sampling point (the Angostura dam) and the Alameda bridge under low flow conditions except the three wastewater plants which contribute a negligible load (less than 3 %). We also argue that geometric means of E coli concentrations are justified when Rio Grande flows are high but NDC flows are negligible (≤ 2 cfs), as again, the sole sources of coliform bacteria are natural sources and the three permitted point source discharges.

The events in which multiple E coli samples were collected are presented in Table 2 (page 5) along with the daily mean flows of the Rio Grande at the Alameda bridge and in the NDC. This data shows that the geometric mean E coli concentrations for each of the multiple sampling events was less than the NM state stream standard of 126 cfu/100 mL except the samples collected on 10/28/5 which slightly exceeded the standard at 131 cfu/100 mL.

Examination of this data shows no apparent relationship between E coli concentrations in the river and sample location. On some days (i.e. 7/27/5), the highest E coli concentrations are near the upper end of the reach while on others (i.e. 10/26/5) they are at the lowest end of the reach. This observation is consistent with AMAFCA's interpretation that the sources of coliform bacteria in this reach of the river are primarily natural.

Finally, an even closer examination of the data suggests a possible error in NMED's analysis. Reference to Figure 4.8 in the draft TMDL document shows a sequence of samples collected under very low flow conditions, $Q < 359$ cfs. However, according to USGS data, the lowest daily average flows measured at the Alameda Bridge during any of the sampling events was 383 cfs on 10/26/5. Use of erroneously low flow values will result in correspondingly low loads. The NMED should explain the source of flow data used in their load calculations.

AMAFCA is deeply committed to protection of the environment and human health. In the past 10 years we have spent more than \$20,000,000 to achieve this goal on projects that have resulted in cleaner urban runoff, development of environmental sanctuaries for wildlife and plants, and providing open space for public use and recreation. We support the objective of the TMDL

Heidi Henderson
Surface Water Quality Bureau, NM Environment Department
October 27, 2009
Page 4

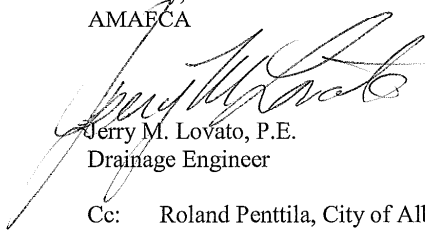
process which states that "Management of the load to improve stream water quality should be a goal to be attained." However, the proposed TMDL and supporting data does not:

1. Demonstrate that there is any environmental impairment of the middle reach of the Rio Grande by enteric coliform bacteria.
2. Document that elevated concentrations of this parameter is caused by anthropogenic activities.

Furthermore, because the high concentrations of E coli appear to be caused by natural sources, we do not believe there are any control strategies that can be undertaken to reduce their concentrations. Therefore, we strongly object to implementation of this TMDL.

AMAFCA looks forward to working with the NMED on all of its projects to protect the water quality of the Middle Rio Grande. Please contact us if you would like to discuss this or other topics.

Sincerely,
AMAFCA



Jerry M. Lovato, P.E.
Drainage Engineer

Cc: Roland Penttila, City of Albuquerque
Kathy Trujillo, New Mexico Department of Transportation
Vern Hershberger, University of New Mexico
AMAFCA File 028 060000

Heidi Henderson
 Surface Water Quality Bureau, NM Environment Department
 October 27, 2009
 Page 5

Table 2. Summary of E coli and flow data for days in which multiple samples were collected on the Rio Grande upstream from the Alameda Bridge.

Location	Date	E coli (cfu/100mL)		Q (cfs)		Load (cfu/d)
		Data	G. Mean	Alameda	NDC	
Rio Grande Below Angostura Diversion Works - 30RGrand473.7	3/23/2005	10.8		963	2	
Rio Grande abv Hwy 550 Bridge - 32RGrand464.2	3/23/2005	11		963	2	
Rio Grande above Rio Rancho WWTF #3 - 32RGrand458.0	3/23/2005	13.4		963	2	
Rio Grande above Alameda Bridge - 32RGrand445.4	3/23/2005	41.4	16.0	963	2	5.84E+11
Rio Grande Below Angostura Diversion Works - 30RGrand473.7	5/26/2005	27.5		5730	2.8	
Rio Grande abv Hwy 550 Bridge - c - 32RGrand464.2c	5/26/2005	32.7		5730	2.8	
Rio Grande abv Hwy 550 Bridge - 32RGrand464.2	5/26/2005	42.8		5730	2.8	
Rio Grande above Rio Rancho WWTF #3 - 32RGrand458.0	5/26/2005	42.6		5730	2.8	
Rio Grande above Alameda Bridge - c - 32RGrand445.4c	5/26/2005	40.4		5730	2.8	
Rio Grande above Alameda Bridge - 32RGrand445.4	5/26/2005	47.3	38.3	5730	2.8	8.30E+12
Rio Grande Below Angostura Diversion Works - 30RGrand473.7	6/23/2005	13.4		4430	1.4	
Rio Grande abv Hwy 550 Bridge - c - 32RGrand464.2c	6/23/2005	23.1		4430	1.4	
Rio Grande abv Hwy 550 Bridge - 32RGrand464.2	6/23/2005	22.6		4430	1.4	
Rio Grande above Rio Rancho WWTF #3 - 32RGrand458.0	6/23/2005	35		4430	1.4	
Rio Grande above Alameda Bridge - c - 32RGrand445.4c	6/23/2005	81.3		4430	1.4	
Rio Grande above Alameda Bridge - 32RGrand445.4	6/23/2005	249.5	41.3	4430	1.4	6.93E+12
Rio Grande Below Angostura Diversion Works - 30RGrand473.7	7/27/2005	98.5		481	0.38	
Rio Grande abv Hwy 550 Bridge - 32RGrand464.2	7/27/2005	488.4		481	0.38	
Rio Grande abv Hwy 550 Bridge - c - 32RGrand464.2c	7/27/2005	325.5		481	0.38	
Rio Grande above Rio Rancho WWTF #3 - 32RGrand458.0	7/27/2005	41.1		481	0.38	
Rio Grande above Alameda Bridge - 32RGrand445.4	7/27/2005	62.2		481	0.38	
Rio Grande above Alameda Bridge - c - 32RGrand445.4c	7/27/2005	41.7	108.9	481	0.38	1.98E+12
USGS 8329918-Rio Grande at Alameda Bridge	8/24/2005	100		472	2	
Rio Grande Below Angostura Diversion Works - 30RGrand473.7	8/24/2005	52.1		472	2	
Rio Grande abv Hwy 550 Bridge - c - 32RGrand464.2c	8/24/2005	50.4		472	2	
Rio Grande above Rio Rancho WWTF #3 - 32RGrand458.0	8/24/2005	7.2		472	2	
Rio Grande above Alameda Bridge - c - 32RGrand445.4c	8/24/2005	77.6	43.0	472	2	7.69E+11
Rio Grande above Alameda Bridge - 32RGrand445.4	9/28/2005	149.7		553	92	
Rio Grande above Rio Rancho WWTF #3 - 32RGrand458.0	9/28/2005	90.9		553	92	
Rio Grande abv Hwy 550 Bridge - 32RGrand464.2	9/28/2005	95.9		553	92	
Rio Grande Below Angostura Diversion Works - 30RGrand473.7	9/28/2005	90.9	104.4	553	92	2.19E+12
Rio Grande above Alameda Bridge - 32RGrand445.4	10/26/2005	231		383	1.2	
Rio Grande above Rio Rancho WWTF #3 - 32RGrand458.0	10/26/2005	133.4		383	1.2	
Rio Grande abv Hwy 550 Bridge - 32RGrand464.2	10/26/2005	153.9		383	1.2	
Rio Grande Below Angostura Diversion Works - 30RGrand473.7	10/26/2005	63.1	131.5	383	1.2	1.91E+12

SWQB Response: *Section 3.0 of the Procedures for Assessing Use Attainment for the State of New Mexico Integrated Clean Water Act §303(d)/§305(b) Water Quality Monitoring and Assessment Report (January 2008) discusses the use of spatially and temporally independent samples; samples that are not spatially or temporally independent are averaged. Details of the assessments are available on the Assessment Summary Sheets, which are made available for public inspection as part of the 2008-2010 State of New Mexico CWA §303(d)/§305(b) Integrated List public record. SWQB generally does not have enough independent samples to calculate a monthly geometric mean for assessment purposes. Section 3.3 and Table 3.7 of the Assessment Protocol addresses the procedure for assessing primary and secondary contact uses. Additionally, 20.6.4.14 NMAC reads:*

B. Bacteriological Surveys: The monthly geometric mean shall be used in assessing attainment of criteria when a minimum of five samples is collected in a 30-day period.

Therefore, at this time, SWQB can only apply the single sample E.coli criterion to the available E.coli data for assessment purposes. .

As displayed in Figure 2.7 and Figure 4.4, USGS gage 08329928 was used for the development of the flow and load duration curves. The flow at the Rio Grande near Alameda (08329928) USGS gage was 299 cfs on 10/26/2005. Figure E.1 displays the data downloaded from the USGS website for this gage and date. AMAFCA correctly notes the discharge from USGS gage 08329918 (Rio Grande at Alameda Bridge) was 383 cfs on 10/26/2005. The title of Figure 4.4 has been edited to clarify which USGS gage data was used.

SWQB appreciates the continued work by AMAFCA toward improved water quality in the Middle Rio Grande watershed. However, regardless of whether the sources are anthropogenic or natural, SWQB is obligated to develop a TMDL for impaired waterbodies per federal regulations.

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# ----- WARNING -----
# The data you have obtained from this automated U.S. Geological Survey database
# have not received Director's approval and as such are provisional and subject to
# revision. The data are released on the condition that neither the USGS nor the
# United States Government may be held liable for any damages resulting from its use.
# Additional info: http://waterdata.usgs.gov/nwis/help/?provisional
#
# File-format description: http://waterdata.usgs.gov/nwis/?tab_delimited_format_info
# Automated-retrieval info: http://waterdata.usgs.gov/nwis/?automated_retrieval_info
#
# Contact: gs-w_support_nwisweb@usgs.gov
# retrieved: 2009-03-16 15:36:04 EDT
#
# Data for the following site(s) are contained in this file
# USGS 08329928 RIO GRANDE NR ALAMEDA, NM
# -----
#
# Data provided for site 08329928
# DD parameter statistic Description
# 02 00060 00003 Discharge, cubic feet per second (Mean)
#
# Data-value qualification codes included in this output:
# A Approved for publication -- Processing and review completed.
# P Provisional data subject to revision.
# e Value has been estimated.
#
agency_cd site_no datetime 02_00060_00003 02_00060_00003_cd
5s 15s 16d 14n 10s
USGS 08329928 10/24/2005 365 A
USGS 08329928 10/25/2005 313 A
USGS 08329928 10/26/2005 299 A
USGS 08329928 10/27/2005 292 A
USGS 08329928 10/28/2005 296 A
USGS 08329928 10/29/2005 380 A

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Figure E.1 Selected USGS discharge data for USGS gage 08329928

Comment Set G:



2400 Cimarron Avenue SE
Albuquerque, NM 87107
(505) 224-3215
Fax (505) 224-0718

STORMWATER QUALITY TEAM PARTNERS

Albuquerque Metropolitan Area Water Control Authority • Bernalillo County
City of Albuquerque • Industrial & Water Conservation Bureau • NM Department of Transportation
Southern National Growth Strategy Board • Santa Fe County • University of New Mexico

October 28, 2009

New Mexico Environment Department
P.O. BOX 5469
Santa Fe, NM 87502
Attn: Heidi Henderson, TMDL Coordinator

RE: Comments to the **Public Comment Draft TMDL for the Middle Rio Grande Watershed** dated September 16, 2009

Dear Ms. Henderson,

This letter is an official public comment to the **Public Comment Draft TMDL for the Middle Rio Grande Watershed** dated September 16, 2009. These comments are the combined efforts of the joint members of the Middle Rio Grande Stormwater Quality Team which represent the technical and educational outreach organization in the Middle Rio Grande watershed. We appreciate the opportunity to comment on this very important issue. The signatures of the representatives of the respective contributing organizations are at the end of this letter.

Collectively, we have significant concerns regarding both the technical basis and philosophical approach of the proposed E.coli TMDL for the Middle Rio Grande. We understand that establishing TMDLs is not easy, and we believe that bacterial TMDLs may be particularly complex. In our experience based on USGS data for the Rio Grande, the proposed TMDL will be impossible for MS4 permittees to consistently meet, regardless of the amount of money or effort expended. Much of what controls enteric bacterial concentrations in the river we cannot alter, and stormwater often has little to no predictable effect upon.

Variables including sampling locations in a shifting river, weather, water temperature, solar radiation, sediment scour/turbidity levels, sample handling & storage, imprecise lab analytical techniques and the level of wildlife populations are some of the host of factors creating unpredictable effects on the enteric bacterial concentrations. Since adopted TMDLs get incorporated into NPDES permit conditions, we feel we have a significant stake in this matter. Our concerns are at such level that we feel the NMED needs to withdraw the pending TMDL proposal for re-evaluation. In this letter we will attempt to identify many of our concerns below.

General Comments

We have graphically compared bacterial densities of E.coli and fecal coliform from 180 storm samples, 9 samples at Rio Grande at Central Bridge, 9 samples at Rio Grande at Alameda Bridge, 15 samples at Rio Grande at San Felipe, and 96 samples at the Rio Grande at Otowi Bridge. None of these comparisons show more than a very loose correlation between the two indicator bacteria. This is disturbing considering that E. coli densities should theoretically be less than fecal coliform densities from the same sample. We believe that this means the test methods currently being employed are inaccurate enough to be unusable in this investigation. See Attachment 1: "Comparisons of E.coli to Fecal Coliform Analyzed from the Same Sample"

Tests taken by USGS at the Otowi bridge since 1997 show that river water is already over the TMDL standard before the water gets to the Middle Rio Grande MS4 outfalls. The impairment of the river occurs before any effect of stormwater from the Urban Area. See Attachment 2: "Otowi E.coli Exceedences".

SWQB Response: *Thank you for your comments. First, SWQB feels many of the general concerns expressed by the MRG Stormwater Quality Team are outside of the scope of the TMDL development process. Many of the concerns should be addressed during the NPDES permit process and permit implementation.*

SWQB E.coli samples were collected by SWQB staff operating under the NMED/SWQB Standard Operating Procedures for Data Collection and analyzed per IDEXX Laboratories, Inc and Colilert[®]-18 procedures as described in Standard Methods for the Examination of Water and Wastewater, protocol 8310 B. The USGS E.coli data were collected by USGS staff operating under the National Field Manual for the Collection of Water-Quality Data (Chapter A.7). The data from both agencies is publically available and collected with EPA-approved methods and is therefore eligible to be included in water quality assessments.

The E.coli data available from the Rio Grande at Otowi Bridge, NM USGS gage (8313000) show results that range from 1800 cfu/100 mL to less than 1 cfu/100 mL from May 1997 to November 2009. The sources of the bacteria contributions to this watershed have not been quantified, however, the source of impairment in a waterbody is irrelevant when it comes to the requirement for the development of a TMDL (40 CFR § 130.7).

In a comparison of E.coli versus storm flows in the North Diversion Channel, there seems to be no relation between storm discharges and bacteria densities. There seems to be evidence that stormwater runoff from impervious surfaces (parking lot runoff), municipal, urbanized high-density areas, municipal point source discharges, onsite treatment systems (septic systems and similar decentralized systems) and waste from pets is not a significant cause of the bacterial impairment in the Middle Rio Grande. See Attachment 3: "Bacterial Densities at Alameda versus flows in the North Diversion Channel"

Most days of higher flows in the Rio Grande at Alameda do not correlate with storm flows. Dam discharges from Cochiti as well as other influences such as Jemez River have a greater influence on river flows than stormwater. Therefore, it would be incorrect to correlate bacteria counts to high flows and then make the conclusion that this is related to stormwater contributions. See Attachment 4 (a modification of NMED's Table D.1 by AMAFCA): "Summary of E.coli and Flow Data" and "Rio Grande Flows at Alameda versus North Diversion Channel inflows"

SWQB Response: *SWQB does not assert to what extent storm flows contribute to the flow volume or E.coli concentrations of the Rio Grande. The list of sources listed in the MRG Stormwater Quality Team comments reflect a list of probable sources noted by field staff during water quality surveys and merely serves to present a list of sources that could be contributing to the impairment of the waterbody. The Probable Source list is included on the 2008-2010 State of New Mexico CWA §303(d)/§305(b) Integrated List and has not been quantified. The compiled data in Attachment 3 and 4 could be useful during the NPDES permit process.*

Are the samples being taken at the same place in the river each time? For instance, samples taken in the shallows might produce markedly different bacterial results than samples taken the middle of the river. This could explain the differences between the SWQB samples and the USGS samples. We request that the sampling methodology be standardized to properly represent the river should the NMED go forward with a modified TMDL.

SWQB Response: *SWQB samples denoted with a "c" following the STORET ID indicate a composite sample that was collected using the method described in Section 7.6 of the 2007 NMED/SWQB Standard Operating Procedures for Data Collection while those without a "c" are grab samples. The location of grab sample collection generally did not vary between sampling events. The USGS data collections were collected by USGS staff operating under the National Field Manual for the Collection of Water-Quality Data (Chapter A.4). The site selection and data collection by both agencies conforms with EPA approved methods and is therefore sufficient in order that the data can be used for the water quality assessments.*

Figure 3.1 Flow Duration Curve; *USGS Rio Grande Floodway at San Marcial, New Mexico 1974-2009 (Page 17) - For categories of the flow duration analysis, the two classifications of moist conditions and dry conditions should be changed. A flow duration curve does not relate to dry and wet (or moist) years. The correct terminology is high or low flows.*

SWQB Response: SWQB staff attended a training with Bruce Cleland and EPA R6 in February 2007. The development of the flow and load duration curves in this TMDL was based on this training as well as a research article by Bruce Cleland and guidance from the EPA Office of Wetlands, Oceans, and Watersheds. The use of “moist” and “dry” in the TMDL is consistent with the literature research. References to the EPA document have been added to Section 3.2, 4.2 and Section 9.0. The Cleland (2003) reference remains in Sections 3.2 and 4.2. Both references provide detailed explanations of both flow and load duration curve development.

Section 4.4.2 **Load Allocation** (pages 44 and 45) – It should be noted that using an arithmetic mean for E.coli densities may overstate loading. The geometric mean is more appropriate as it is the basis for the criterion for the river. NMED should consider using the geometric mean of measured loads to compare against stream criteria when calculating load reduction targets.

SWQB Response: Section 3.0 of the Procedures for Assessing Use Attainment for the State of New Mexico Integrated Clean Water Act §303(d)/§305(b) Water Quality Monitoring and Assessment Report (January 2008) discusses the use of spatially and temporally independent samples; samples that are not spatially or temporally independent are averaged. Details of the assessments are available on the Assessment Summary Sheets, which are made available for public inspection as part of the 2008-2010 State of New Mexico CWA §303(d)/§305(b) Integrated List public record. SWQB generally does not have enough independent samples to calculate a geometric mean for assessment purposes. Section 3.3 and Table 3.7 of the Assessment Protocol addresses the procedure for assessing primary and secondary contact uses. Additionally, 20.6.4.14 NMAC reads:

B. Bacteriological Surveys: The monthly geometric mean shall be used in assessing attainment of criteria when a minimum of five samples is collected in a 30-day period.

Therefore, at this time, SWQB can only apply the single sample E.coli criterion to the available E.coli data for assessment purposes.

As far as the calculation of measured loads in the TMDL, in reviewing this section in response to this comment as well as the comments of others, NMED recognizes that for this TMDL calculating a percent reduction is particularly challenging. This is largely because the samples collected and the impairment determinations are based on exceedences of the State’s single sample criterion and the TMDL is written to address the monthly geometric mean standard of Sandia and Isleta Pueblos. As such any simple comparison of these numbers is fraught with challenge and, in this case, will result in an over estimation of the actual reduction necessary.

Furthermore, neither Section 303 of the Clean Water Act nor Title 40, Part 130.7 of the Code of Federal Regulations requires states to include discussions of percent reductions in TMDL documents. Although NMED believes that it is often useful to discuss the magnitude of water quality exceedences in the TMDL, the “percent reduction” value is can both be calculated in multiple ways and as a result can often misinterpreted. This is clearly the case in this situation.

For these reasons Tables 4.13-4.16 and the associated discussion have been removed. Statements in Section 3.3 have been duplicated in Section 4.3.

Section 4.6 Linkage between Water Quality and Pollutant Sources (Page 47 and 48) - We believe that it is statistically incorrect to apply the Pearson Coefficient to data that is not normally distributed (i.e. there is no correlation between rainfall and bacterial densities). We would like the NMED to provide the Kurtosis of the data to support the assumption of "normality" of the data.

Section 4.6 Linkage Between Water Quality and Pollutant Sources Discussion (Page 48) - Regarding the Bacterial Source Tracking Study, it should be noted that the consultant that created the study used wastewater inflows to the treatment plant as the model for their "human" contribution. As these inflows include many other sources than solely human sewage, only a portion of that 16% human can be reduced by best management practices.

SWQB Response: *SWQB TMDL documents commonly discuss the Pearson Coefficient as it relates to data in the TMDL. The Kurtosis of the data has also been calculated and the results for each of the four Assessment Units are positive, indicating a relatively peaked distribution.*

Thank you for the clarification regarding the Middle Rio Grande Microbial Source Tracking Study (Parsons, 2005). The TMDL document does not indicate the magnitude of E.coli loadings that may be addressed through Best Management Practices. However, this information may be useful during the NPDES permit process.

Section 4.7 Margin of Safety (MOS) (Page 49) - E.coli bacteria is not a "conservative" pollutant that does not degrade readily in the environment. Day-after reductions in densities in stormwater in a Texas study showed bacterial reductions in the original 15,000 colonies per 100 milliliters of 27%, 88%, and 96% in successive days after the storm. Lower water temperatures have lower bacterial densities but daily reductions are also less dramatic. Although bacterial densities can be used to compute loading, at worst, the loading is only temporary. This also makes bacteria different in terms of loading. In the normal mixing with the receiving water, the lower densities of the falling storm flows, and the naturally occurring die-off for several days after the storm rainfall, all tend to naturally reduce the impact to the receiving water in a short period of time. (See "Bacteria Die-Off Study" by Houston-Galveston Area Council dated August 31, 2005 and "Persistence of enteric bacteria in alluvial streams" by R.C. Jamieson et al published in the Journal of Environmental and Engineering Science dated May 14, 2004.)

SWQB Response: *SWQB appreciates the references to bacteria studies in relation to the longevity of bacteria in the environment. Language reflecting this distinction has been added to Section 4.7.*

Section 6.4 Stormwater Permitting Requirements and Presumptive Best Management Practices Approach (pages 55 to 58) - NMED has stated that the TMDL is not a regulatory document. Therefore, the word "shall" should not be used anywhere in the TMDL document. However, the Middle Rio Grande MS4 permittees are concerned that TMDL "goals" will be converted into hard "maxima" and placed in our compliance requirements for future permits. In addition, the EPA cannot approve a permit that negatively impacts either cultural resources or listed species. This means that if, for example, AMAFCA reduces flows to the river because it's treating bacteria, USF&WS could argue that this contributes to decline of the endangered RGSM or Southwestern Willow Flycatcher. This could limit the actions of the permittees under the TMDL.

Any reduction in runoff to the river could impact the permittees obligations under the biological opinion of USF&WS. It could also impact compliance with Office of State Engineer Interstate Stream Commission obligations under the RG Compact.

SWQB Response: *Based on numerous public comments, the term "shall" in Items 1 and 2 of Subsection 6.4(B) has been replaced with the terms "should" and "should consider." As noted in the paragraph immediately preceding Subsection 6.4, the language in Subsection 6.4 was submitted for inclusion by EPA R6 and the ultimate decision about TMDL implementation will be decided during the NPDES permit process. EPA does not have the authority to approve Implementation Plans in TMDLs and states that fact in every TMDL approval letter we receive from EPA R6. For example, the approval letter for the Jemez River TMDLs (September 2009) reads:*

"Included in this TMDL submittal was a TMDL Implementation Plan. Presently, EPA has no duty to approve or disapprove implementation plans under Section 303(d) of the Clean Water Act (CWA). Therefore, EPA is taking no action to approve or disapprove the TMDL Implementation Plan submitted by NMED."

The Implementation Section is merely a suggested guide for future permit development or other relevant watershed activities. Considerations regarding Endangered Species issues, Rio Grande Compact obligations, and other permit requirements will be addressed during the NPDES permit process.

Appendix D E.coli Data (Table D.1) – In this reach of “non-Pueblo Alameda Bridge to Angostura Diversion”, samples were collected by both the NMSWQB and USGS. The densities of E.coli sampled by NMSWQB were significantly different than the densities in samples collected by the USGS. It should be noted that there was only 1 exceedence in 36 samples (3%) collected by the NMSWQB versus 5 exceedences in the 9 samples (56%) collected by the USGS. These were evaluated by the Mann-Whitney rank order test. Can NMED explain this variation in these diverse results? According to page 28 of the TMDL, “Overall, the target values for the bacteria TMDLs will be determined...(3) the ability to easily monitor and produce quantifiable and reproducible results.”

Table D.2 shows only the exceedences of the State standards. This table should be corrected to show exceedences for Pueblo standards for the appropriate reaches. (See also Tables 4.4 and 4.5 as well as Figures 4.7 and 4.8 on pages 34 and 35.)

Sincerely,



Roland Penttila, P.E.
Stormwater Management Section
City of Albuquerque



Mary Murnane
Water Resources Program Manager
Bernalillo County

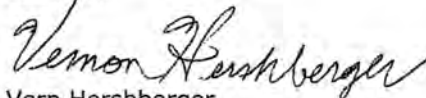


Tom Allen, Vice-Chair
Board of Supervisors
Ciudad Soil and Conservation District

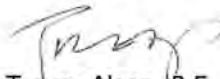
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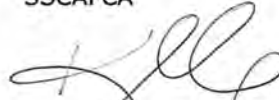
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Environmental Engineer
AMAFCA



Vern Hershberger
Environmental Engineer
University of New Mexico



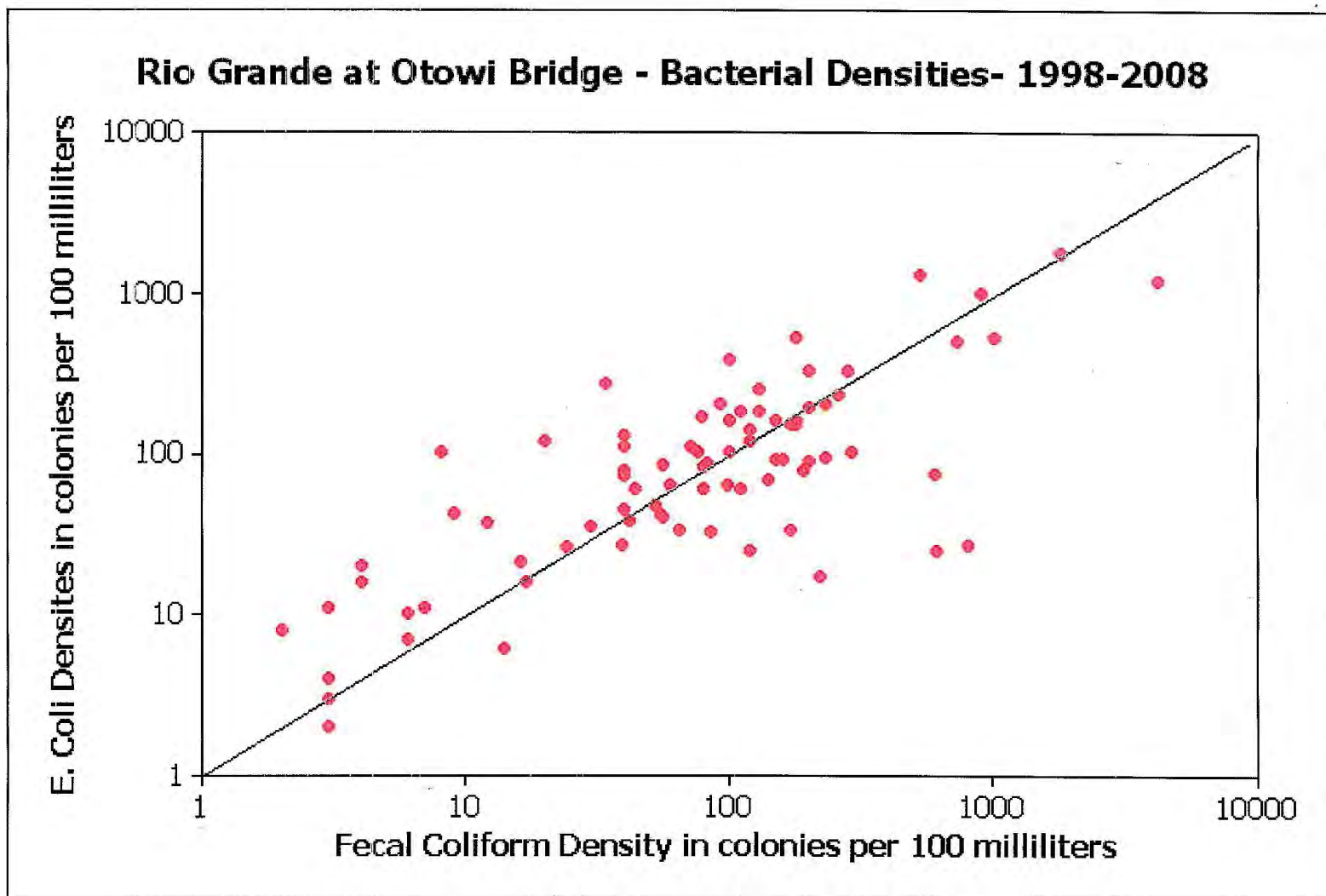
Trevor Alsop, P.E.
Drainage/Environmental Engineer
SSCAFCA

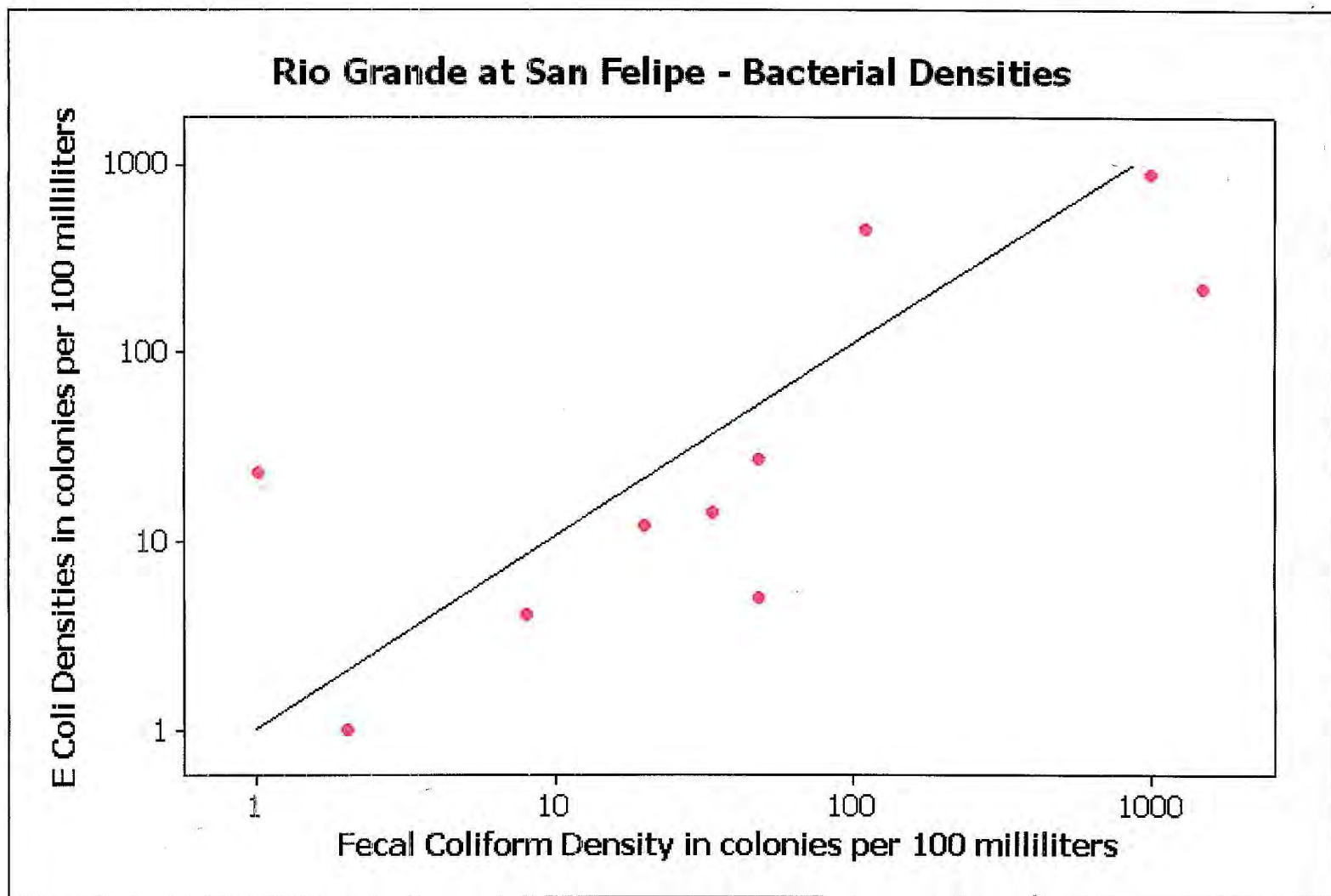


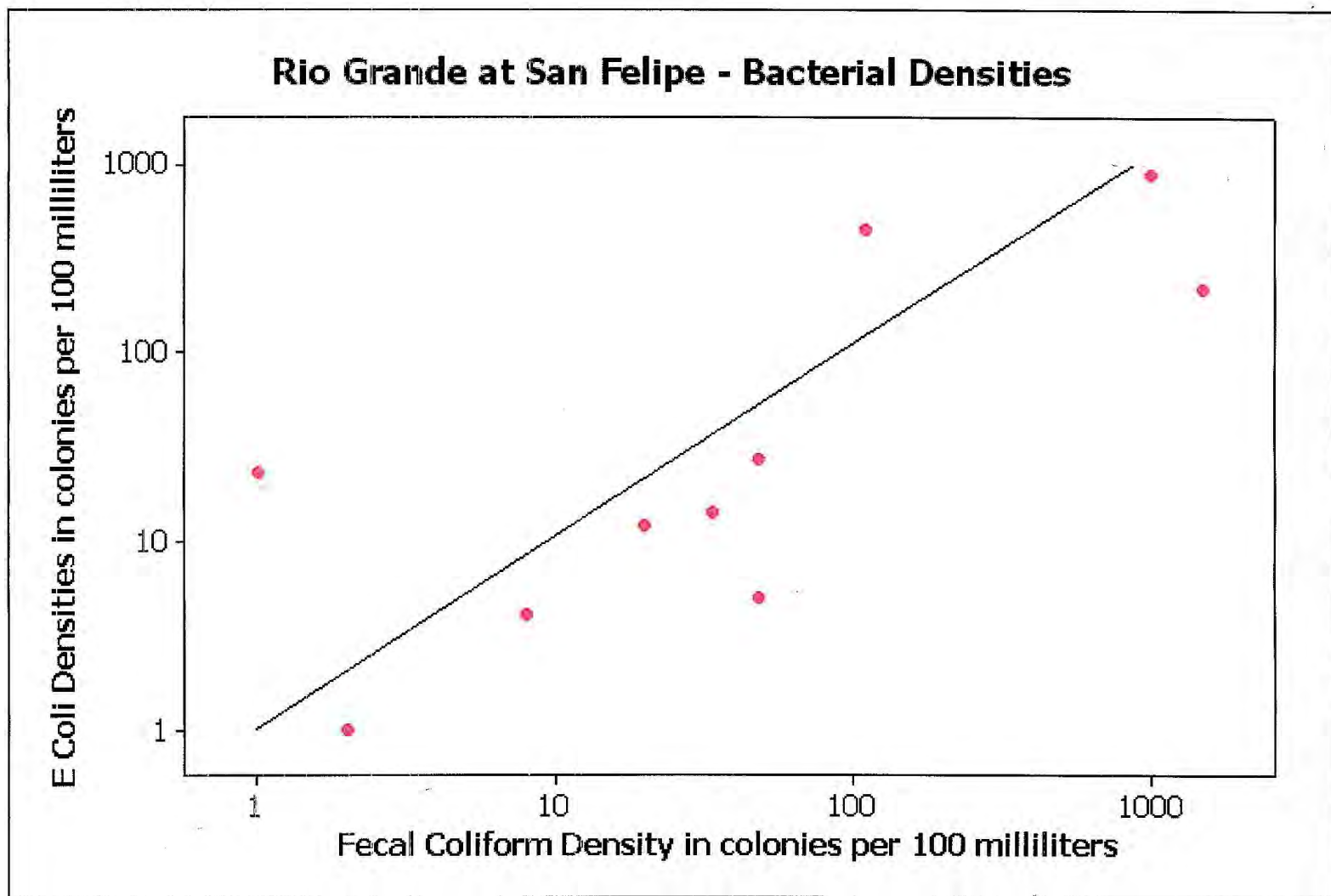
Katherine Trujillo, P.E.
Assistant District Engineer
NMDOT, District Three

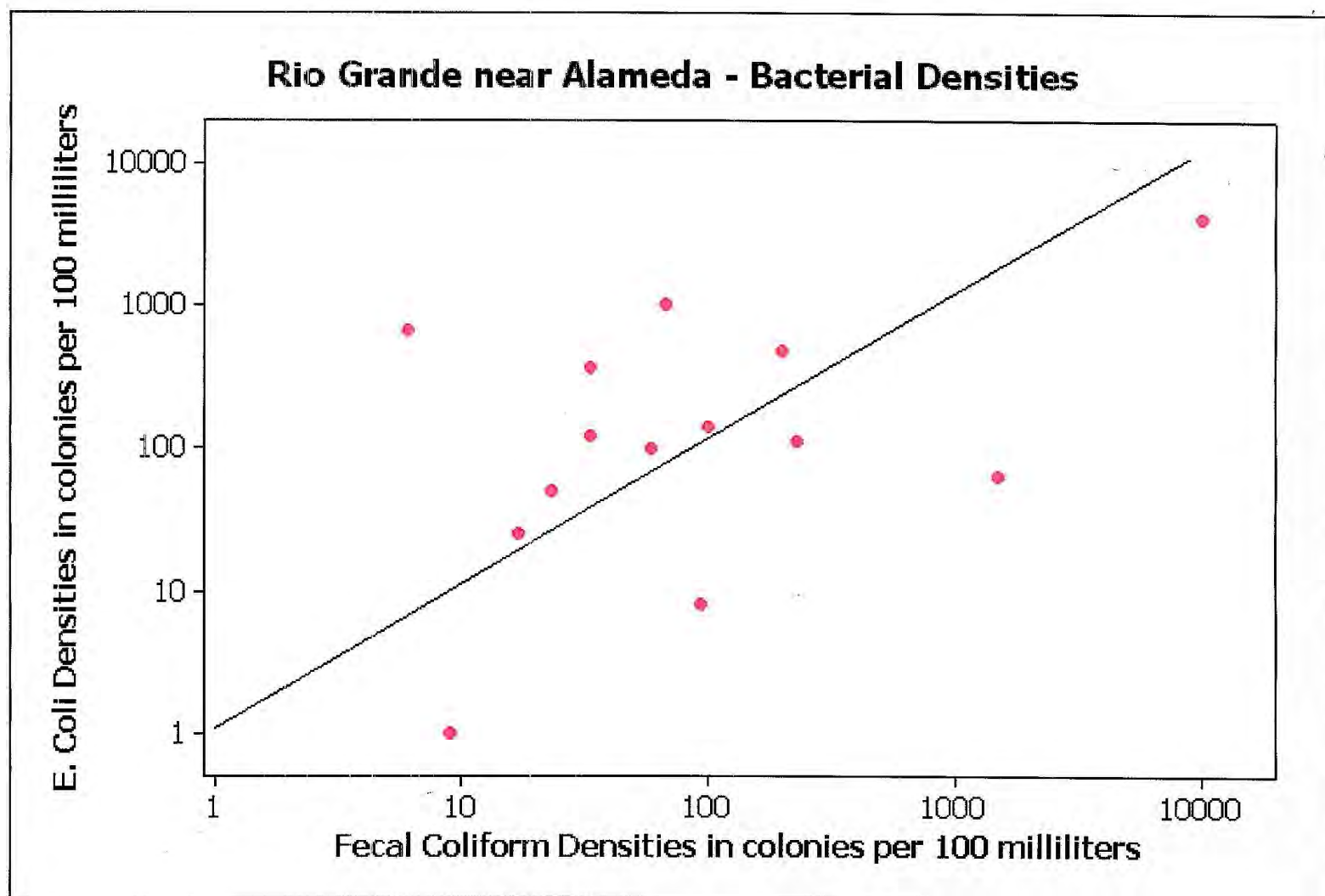
SWQB Response: *As previously noted, SWQB E.coli samples were collected by SWQB staff operating under the NMED/SWQB Standard Operating Procedures for Data Collection and analyzed per IDEXX Laboratories, Inc and Colilert[®] -18 procedures as described in Standard Methods for the Examination of Water and Wastewater, protocol 8310 B. The USGS E.coli data were collected by USGS staff operating under the National Field Manual for the Collection of Water-Quality Data (Chapter A.7). The data from both agencies is publically available and collected with EPA-approved methods and is therefore eligible to be included in water quality assessments. SWQB noted the differences in the E.coli data during the assessment process, but had no reason to discard either dataset as invalid. Due to the dynamic nature of the Rio Grande, varying E.coli results across a given time period are not atypical.*

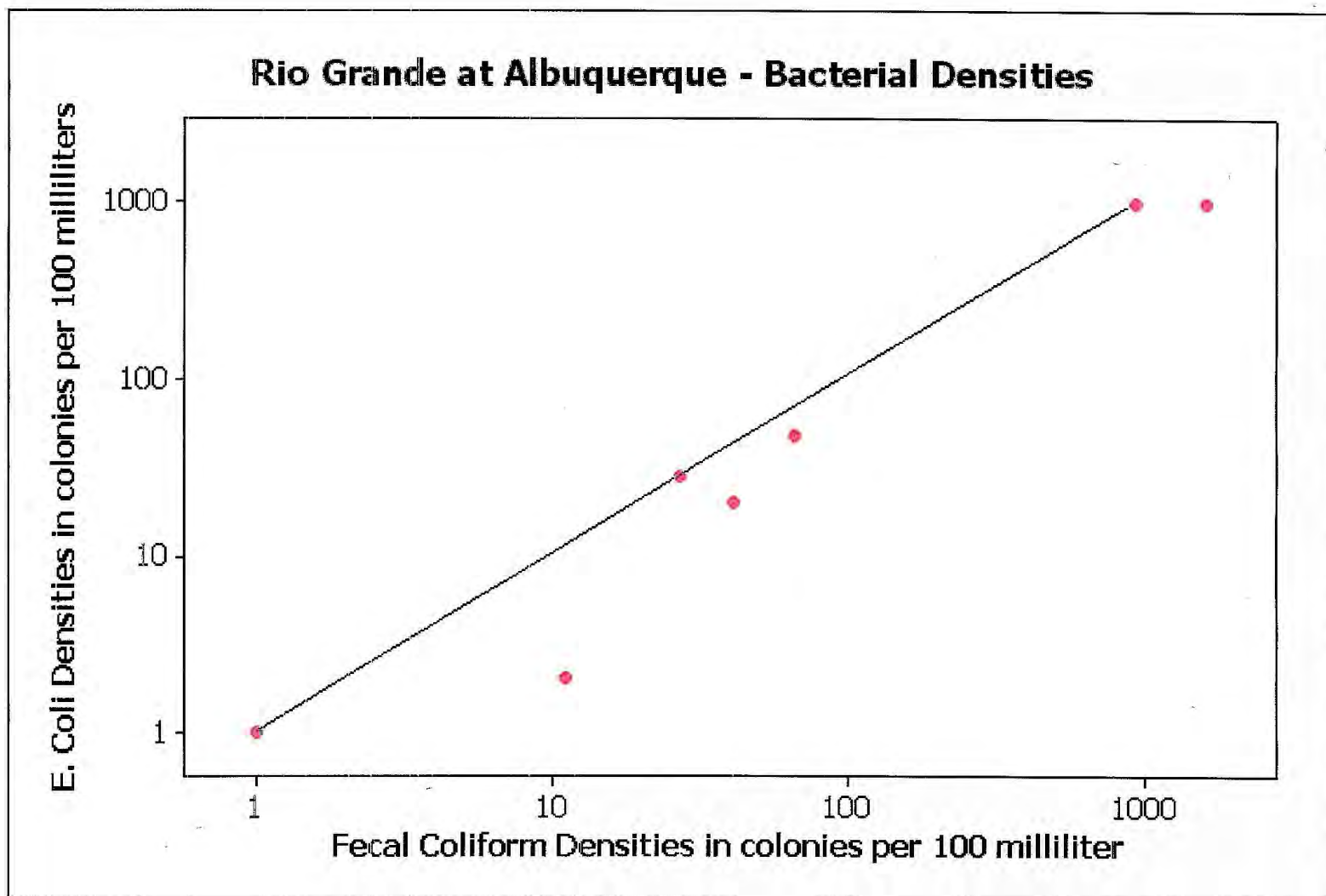
A footnote has been added to Tables D.1 and D.2 to indicate those samples that have exceeded the Tribal single sample E.coli criterion.

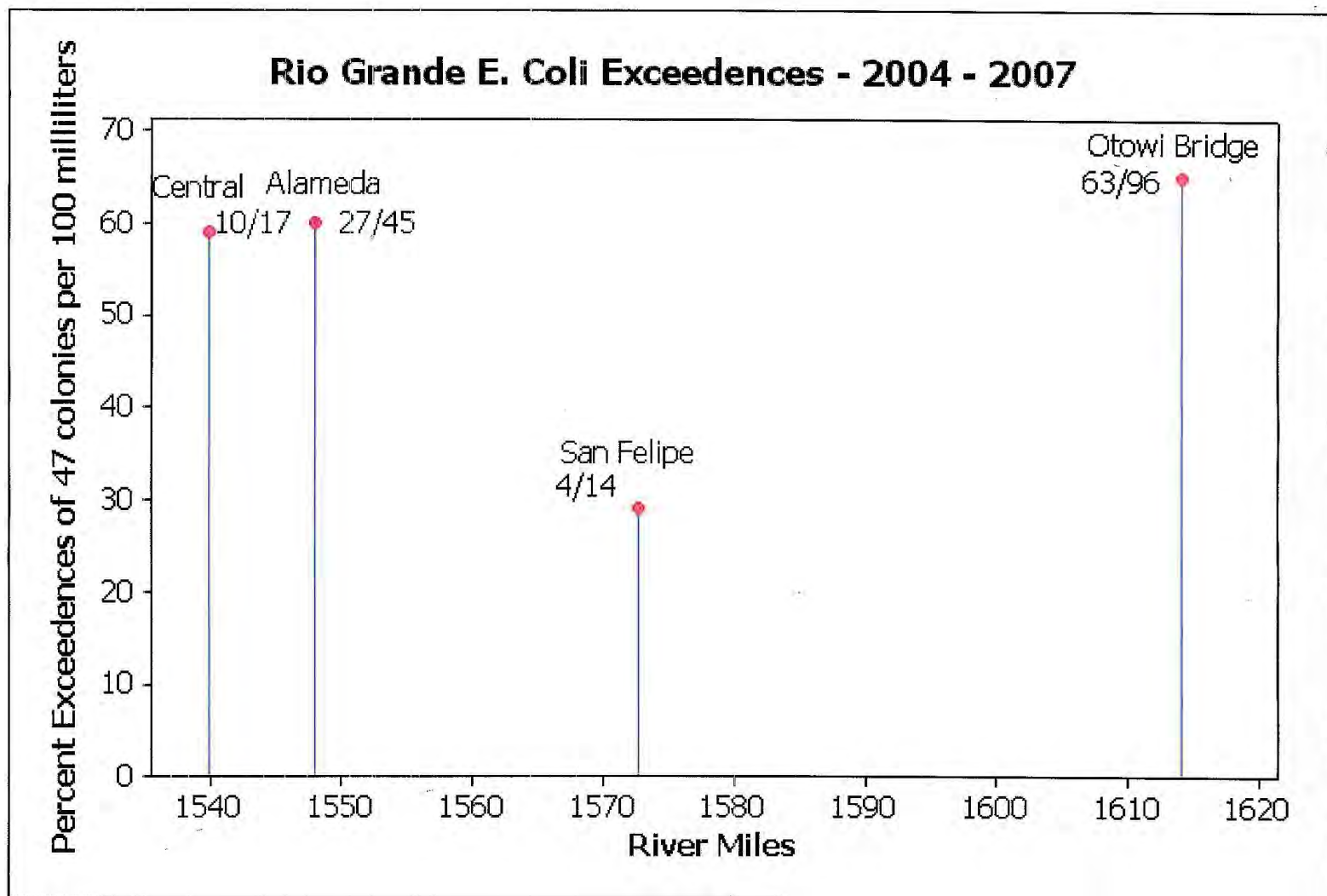


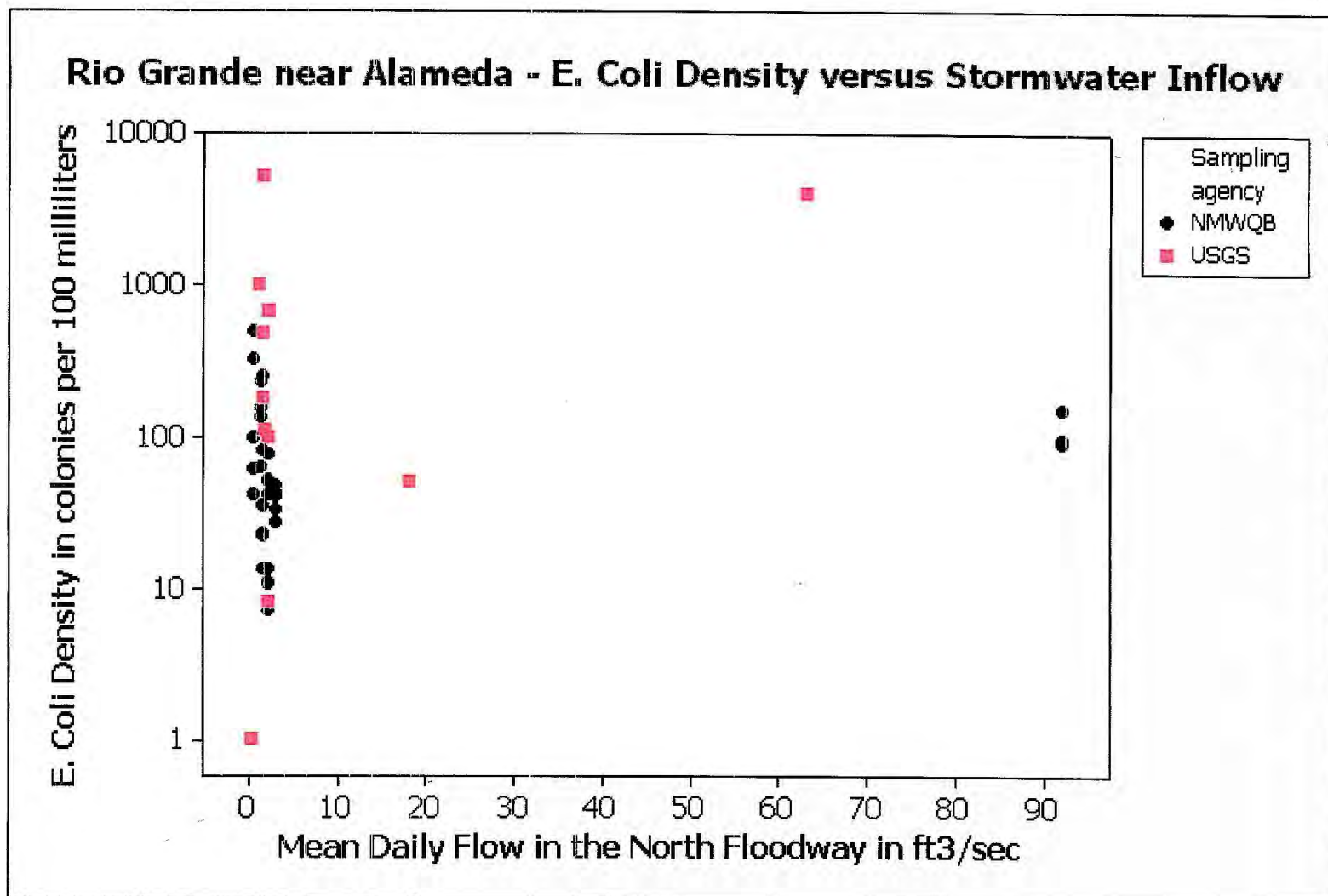


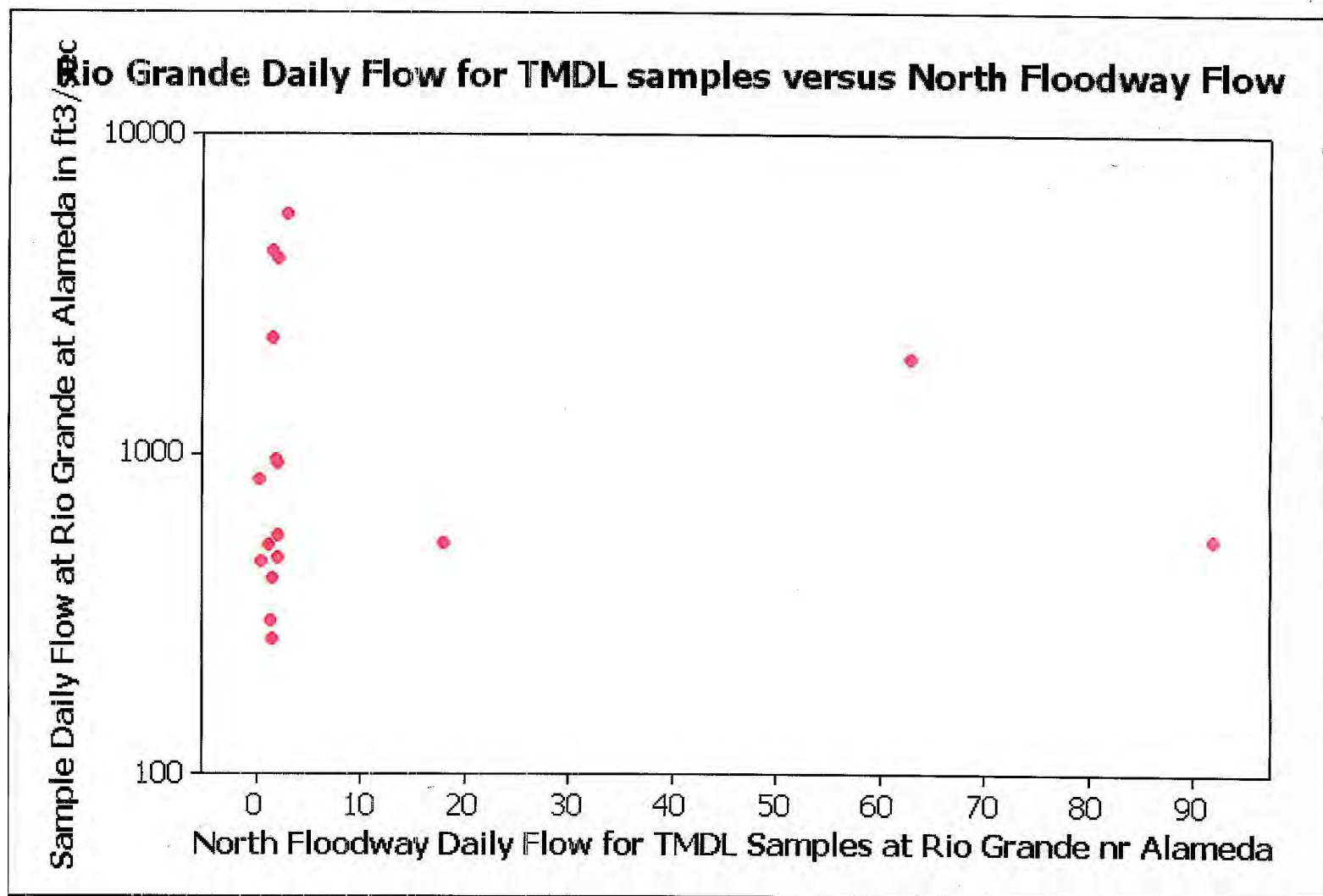


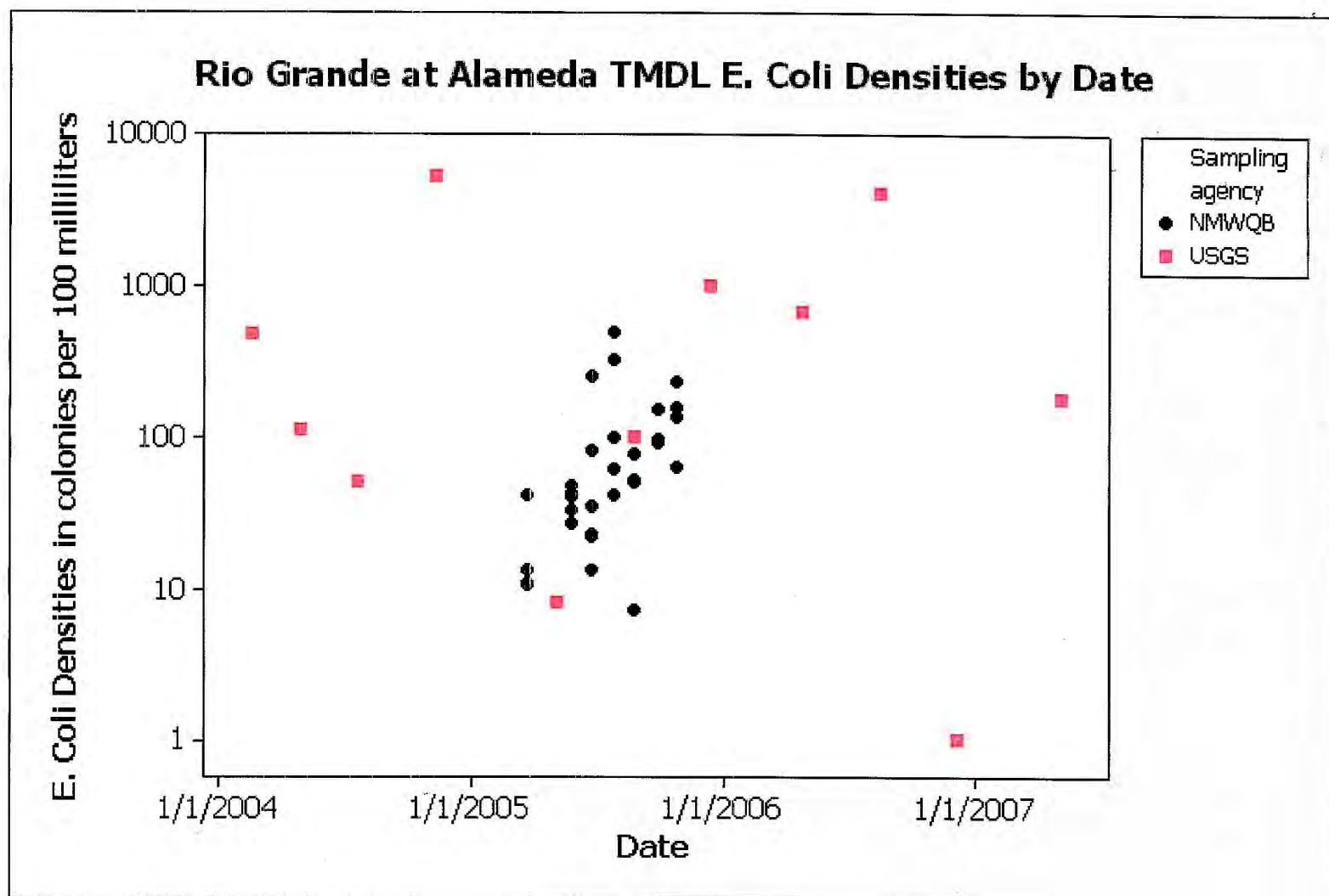












Comment Set H:

PUEBLO OF SANTA ANA
OFFICE OF THE GOVERNOR

October 26, 2009

Ms. Heidi Henderson
NMED SWQB
PO Box 5469
Santa Fe, NM 87502

NOV 02 2009

Dear Ms. Henderson:

The Pueblo of Santa Ana (the Pueblo) recently reviewed the New Mexico Environment Department's (NMED) Public Comment Draft Total Maximum Daily Load (TMDL) for the Middle Rio Grande Watershed and has developed the following technical questions to aid in clarification:

1. What was the technical basis for NMED to conduct monitoring below the Angostura Diversion? Is this monitoring site considered a reference point, and if so, what is the justification for this?
2. Is NMED considering additional monitoring stations above the Angostura Diversion with new wastewater treatment plants online to discharge to the Rio Grande? What is the process for adding sites upstream of the Angostura Diversion for future consideration in NMED's "Water Quality Monitoring of the Middle Rio Grande" report?
3. The current area of concern for *E. coli* in the Middle Rio Grande falls below the 550 bridge at the point of Bernalillo's Wastewater Treatment Plant discharge. It would be helpful to include approximate or recorded flow data within the document for NMED's monitoring sites (i.e. Table D.1) as it may assist with interpreting *E. coli* results.
4. What is the protocol for developing a TMDL in "shared waters" of dual jurisdiction; waters that, on one side of the channel are State lands and on the other side are Tribal or Pueblo lands?
5. The State of NM will undergo the triennial review of its water quality standards at the end of 2009. Considering the proposed designated use changes of secondary contact to primary contact and the inclusion of public water supply (segment 20.6.4.106), how will the TMDL for *E. coli* be revised and how does NMED propose to address this designated use change?
6. How and when will the provisional data collected on dissolved oxygen (DO) and other parameters in the Middle Rio Grande be incorporated into potential future TMDLs? Why was DO not included in the 2009 TMDL schedule as stated in the 2008-2010 State of New Mexico Integrated List?

If you have any questions regarding the Pueblo's comments, please contact Jennifer Wellman, Water Resources Division Manager, at (505)771-6754 or Genevieve McGeissey, Water Quality Scientist, at (505)771-6757. Thank you for your consideration of these issues.

Sincerely,



Bruce Sanchez
Governor

02 DOVE ROAD • SANTA ANA PUEBLO • NM 87004
TEL: 505-867-3301 • FAX: 505-867-3395 •

SWQB Response: Thank you for your comments. Although the comments were received after the end of the 45-day public comment period, SWQB chose to respond to the comments.

1. SWQB conducted water quality sampling at the Rio Grande below Angostura Diversion Works (30RGrand473.7) site during the 2005 water quality survey. This site was chosen because it is at the uppermost site of the Rio Grande (non-Pueblo Alameda Street Bridge to Angostura Diversion) Assessment Unit (AU) and is representative of the Rio Grande as it enters this AU. The site is considered a reference or background site for this study as it is located upstream of the municipalities in the Middle Rio Grande watershed.
2. For the purposes of the 2005 Middle Rio Grande survey, SWQB defined the Middle Rio Grande as the watershed from the Angostura Diversion to Elephant Butte Reservoir. SWQB has established Assessment Units upstream of the Angostura Diversion; the next two upstream are the Rio Grande (non-Pueblo Angostura Diversion to Cochiti Reservoir) and Rio Grande (Cochiti Reservoir to San Ildefonso bnd) Assessment Units. SWQB has three established stations in the Rio Grande (Cochiti Reservoir to San Ildefonso bnd) AU, but none in the Rio Grande (non-Pueblo Angostura Diversion to Cochiti Reservoir) AU due to the limited length of State waters along this reach of the Rio Grande.
3. Flow data has been added to Appendix D.
4. SWQB develops multi-jurisdictional TMDLs by using the most conservative water quality standard in the TMDL calculations. In this case, SWQB developed the TMDLs for the Rio Grande (Isleta Pueblo bnd to Alameda Street Bridge) and Rio Grande (non-Pueblo Alameda Street Bride to Angostura Diversion) by using the Pueblo of Isleta and Pueblo of Sandia standards, respectively. The regulations in 40 CFR §131.10(b) require the development of the TMDL using the tribal standards in order to be protective of the downstream standards. The regulations in 40 CFR §122.4(d) require allocations and effluent limits to be developed using the tribal standards in order to be protective of the downstream waters. A statement addressing this issue has been added to Section 2.3.
5. The NMED” Proposed Amendments to the Standards for Interstate and Intrastate Surface Waters, 20.6.4 NMAC” proposes a change from secondary contact to primary contact as well as the addition of the public water supply designated use for Segments 20.6.4.105 and 20.6.4.106. NMED proposes to change secondary contact to primary contact so that the designated use is consistent with the assigned criteria; the monthly geometric mean and single sample criteria already reflect primary contact E.coli criteria recommendations, so only the term for the designated use is included in the proposed changes. According to the NMED Proposed Amendments document,
“...the Department does not propose criteria at this time to apply generally to the public water supply use. The reason is that public water systems are required to provide treatment to comply with the Drinking Water Regulations. As a result, the water provided by public water systems must be safe to drink regardless of the quality of the source water. Nonetheless, it may be prudent to establish ambient water quality criteria as a preventative approach that could reduce treatment

costs. The Department intends to commence a stakeholder discussion after the triennial review to discuss the issue further.”

SWQB will continue to monitor the Rio Grande and apply the Procedures for Assessing Use Attainment for the State of New Mexico Integrated Clean Water Act §303(d)/§305(b) Water Quality Monitoring and Assessment Report (January 2008) to collected water quality data in order to assess the impairment status of the Rio Grande.

- 6. The Rio Grande (Isleta Pueblo bnd to Alameda Street Bridge) and Rio Grande (non-Pueblo Alameda Street Bridge to Angostura Diversion) were listed as impaired for dissolved oxygen on the 2008-2010 State of New Mexico CWA §303(d)/§305(b) Integrated List. However, per the February 2009 Record of Decision, EPA delisted these two segments of the Rio Grande for dissolved oxygen. However, the dissolved oxygen listings for these two segments of the Rio Grande are included in the Draft 2010-2012 State of New Mexico CWA §303(d)/§305(b) Integrated List. A schedule set for the dissolved oxygen TMDLs for these Assessment Units will not be set until after the impairment has been approved by the WQCC and EPA. Likewise, a TMDL for the ambient toxicity listing for the Rio Grande (non-Pueblo Alameda Street Bride to Angostura Diversion) has not been scheduled.*

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APPENDIX F
JURISDICTIONAL AREA APPROACH

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EPA released a memo entitled “Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs” in November 2002 clarifying EPA regulations regarding Waste Load Allocations (WLA) and Municipal Separate Storm Sewer Systems (MS4s) in TMDLs. In November 2008, EPA released the draft TMDLs to Stormwater Handbook to provide guidance to states as to how to include WLAs for MS4s in TMDLs. The handbook provides a number of options for states to consider when developing TMDLs that include MS4 allocations. One of the waterbody-based approaches to TMDL development includes the jurisdictional area approach:

“Jurisdictional area: loading capacity is allocated to permitted stormwater sources (and other land-based sources) on the basis of the portion of the drainage area included within their physical boundary. Without knowing the specific area draining to a stormwater conveyance system, the stormwater source area can be represented by the jurisdictional or operational area of the source (e.g., urbanized area for an MS4). For example, if the loading capacity is 100 lbs/day and the urbanized area of an MS4 represents 30 percent of the area draining to the assessment location, the MS4 WLA is specified as 30 lbs/day.” (Section 4.3.2)

The handbook also gives specific direction on incorporating WLAs for MS4s in TMDLs developed using Load Duration Curves:

“TMDLs developed using the load duration approach most often identify the portion of the loading capacity for the stormwater WLA(s) on the basis of jurisdictional area. However, because the duration curve framework establishes a series of individual flow-variable loading capacities, the portion of each loading capacity attributed to individual sources typically will also vary by flow. Figure 19 illustrates a TMDL that was developed using a duration curve framework. In the Figure 19 example, stormwater WLAs for MS4 communities are based on the percent jurisdictional area approach. In this case, 3 percent of the watershed falls within the jurisdiction of MS4 communities. Thus, the MS4 WLA is 3 percent of the available allocation for each flow zone. The remaining 97 percent is designated for nonpoint sources and natural background as the LA for each zone.” (Section 4.3.2.2)

The excerpts from the TMDLs to Stormwater Handbook provide the framework from which SWQB developed the WLA for the Phase I and Phase II MS4 permittees for each impaired Assessment Unit. However, the MRG-area presented two additional challenges. Unlike the 2002 Middle Rio Grande fecal coliform TMDL, the MRG E.coli TMDL includes both Phase I and Phase II MS4 permits. Additionally, the two permits each include jurisdictional area in the Rio Grande (Isleta Pueblo boundary to Alameda Bridge) and Rio Grande (non-Pueblo Alameda to Angostura Diversion) Assessment Units. As both AUs are also impaired for *E.coli*, TMDL calculations are therefore included for both AUs. The following explanation provides additional detail on these jurisdictional area calculations to supplement the information provided in Section 4.4.1.

Determination of Contributing Watershed Area

For the purposes of the MS4 WLA determinations, the contributing watershed is considered to be the Rio Grande drainage from Isleta Pueblo boundary to Cochiti Reservoir. This contributing drainage includes the USGS Hydrologic Unit Codes (HUCs) displayed in Figure F.1 and Table F.1. The total contributing area from the 8 HUCs is 2084.15 sq. mi.

As noted in Figure F.1, HUCs 1302020303 and 1302020302 do not contribute drainage to the Rio Grande (Alameda Bridge to Angostura Diversion) AU. Additionally, HUC 1302020301 only partially contributes to the Rio Grande (Alameda Bridge to Angostura Diversion) AU. The fraction that contributes to this AU (i.e. is upstream of the Alameda Bridge) was estimated to be 259 sq mi based on an east-west line drawn at the Alameda Bridge. Therefore, the total watershed area contributing to the Rio Grande (Alameda Bridge to Angostura Diversion) AU is the sum of these areas, totaling 1612.72 sq mi.

Phase I Permit Jurisdictional Area Approach

Four entities are authorized to discharge under the Phase I MS4 permit: City of Albuquerque, Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA), New Mexico Department of Transportation District 3, and University of New Mexico. The Phase I permit states:

“This permit covers all areas, except agricultural lands, within the corporate boundary of the City of Albuquerque, New Mexico served by, or otherwise contributing to discharges from municipal separate storm sewers owned or operated by the permittees listed above.”

Based on the incorporated city limits of the City of Albuquerque from GIS coverages, the Incorporated Area of the City of Albuquerque was determined to be 188.08 square miles (sq. mi.). However, 7.2 sq. mi. fall into the Rio Grande (Alameda Bridge to Angostura Diversion) AU while 180.88 sq. mi. fall into the Rio Grande (Isleta Pueblo bnd to Alameda Bridge) AU, again this division is based on an east-west line drawn at the Alameda Bridge.

Therefore, for the Rio Grande (Isleta Pueblo bnd to Alameda Bridge) AU, the Phase I MS4 WLA is calculated as follows (see Table F.2):

$$\begin{aligned} &\text{Total jurisdictional area} / \text{Total contributing drainage area} = \\ &180.88 \text{ sq. mi.} / 2084.15 \text{ sq. mi.} = 8.68\% \end{aligned}$$

The Phase I MS4 WLA for the Rio Grande (Alameda Bridge to Angostura Diversion) AU is calculated as follows (see Table F.2):

$$\begin{aligned} &\text{Total jurisdictional area} / \text{Total contributing drainage area} = \\ &7.2 \text{ sq. mi.} / 1612.72 \text{ sq. mi.} = 0.45\% \end{aligned}$$

These calculations are summarized in Section 4.4.1. The Phase I MS4 WLA values used in the TMDL document were rounded from these percent jurisdictional estimates to 9% and 1%, respectively.

Phase II Permit Jurisdictional Area Approach

The nine sMS4 permittees eligible for coverage under the general Phase II MS4 permit are listed in Table 4.7. The Phase II sMS4 permit (NMR040000) reads:

“This permit authorizes the discharge of storm water from small municipal separate storm sewer systems (MS4s) provided the MS4 is located fully or partially within an urbanized area as determined by the 2000 Decennial Census.”

The Urbanized Areas (UA) upstream from the Isleta Pueblo boundary within the Rio Grande drainage was determined from GIS coverages to be 108.89 sq. mi.; 29.53 sq. mi. fall into the Rio Grande (Isleta Pueblo bnd to Alameda Bridge) AU and 79.35 sq. mi. fall into the Rio Grande (Alameda Street Bridge to Angostura Diversion) AU. This UA values exclude the Incorporated Area of the City of Albuquerque. For the purposes of the MS4 WLA determinations, the contributing watershed is considered to be the Rio Grande drainage from Isleta Pueblo boundary to Cochiti Reservoir. This contributing drainage includes the USGS Hydrologic Unit Codes (HUCs) displayed in Figure F.1 and Table F.1. The total contributing area from the 8 HUCs is 2084.15 sq. mi.

Therefore, for the Rio Grande (Isleta Pueblo bnd to Alameda Bridge) AU, the Phase II MS4 WLA is calculated as follows (see Table F.3):

$$\begin{aligned} \text{Total jurisdictional area} / \text{Total contributing drainage area} = \\ 29.53 \text{ sq. mi.} / 2084.15 \text{ sq. mi.} = 1.42\% \end{aligned}$$

The Phase II MS4 WLA for the Rio Grande (Alameda Bridge to Angostura Diversion) AU is calculated as follows (see Table F.3):

$$\begin{aligned} \text{Total jurisdictional area} / \text{Total contributing drainage area} = \\ 79.35 \text{ sq. mi.} / 1612.72 \text{ sq. mi.} = 4.92\% \end{aligned}$$

These calculations are summarized in Section 4.4.1. The Phase II MS4 WLA values used in the TMDL document were rounded from these percent jurisdictional estimates to 1% and 5%, respectively.

Thus, the total WLA assigned to each AU for both Phase I and Phase II permits is as follows:

$$\begin{aligned} \text{Rio Grande (Isleta Pueblo bnd to Alameda Bridge): } 9 + 1 &= 10\% \\ \text{Rio Grande (Alameda Bridge to Angostura Diversion): } 1 + 5 &= 6\% \end{aligned}$$

Without rounding of these estimated values, the Rio Grande (Isleta Pueblo bnd to Alameda Bridge) WLA is 10.10% and the Rio Grande (Alameda Bridge to Angostura Diversion) WLA is 5.37%. In evaluating the potential impact, SWQB finds that, while the WLA is slightly smaller for the Rio Grande (Isleta Pueblo bnd to Alameda Bridge), this approach results in both a larger overall WLA allocation for MS4 permittees within the Middle Rio Grande and a 10% larger WLA for the Rio Grande (Alameda Bridge to Angostura Diversion) AU providing the permittees a larger WLA with which to work.

The remaining ninety percent was designated for nonpoint sources and natural background as the LA for each zone in the Rio Grande (Isleta Pueblo boundary to Alameda Street Bridge) AU. The remaining ninety four percent was designated for nonpoint sources and natural background as the LA for each zone in the Rio Grande (Alameda Street Bridge to Angostura Diversion). The WLA values for NMS000101 (Albuquerque Phase I MS4 permit) and NMR040000 (Phase II MS4s) are listed in Tables 4.11 and 4.12.

The TMDLs were calculated as described in Tables 4.4 and 4.5. From this calculated TMDL value, the Margin of Safety (MOS) and the NPDES permits were subtracted for each flow duration interval. In order to calculate the Phase I and Phase II MS4 permit WLAs, the percentages, derived using the jurisdictional area approach, were applied to the remaining TMDL quantity for each flow duration interval. For example, the high flow WLA for the Rio Grande (Isleta Pueblo bnd to Alameda Street Bridge) AU was calculated as follows:

$$\begin{aligned} \text{TMDL} - \text{MOS}^* - \text{NPDES WLA}^{**} &= \text{LA} \\ 5.27 \times 10^{12} - 1.40 \times 10^{12} - 1.35 \times 10^{11} &= 3.73 \times 10^{12} \text{ cfu/day} \end{aligned}$$

**as discussed in Section 4.7*

***note: sum of WLA for NM0022250 and NM0027873*

The MS4 WLAs were assigned as a percentage of the LA.

Phase I MS4 WLA = 9% and Phase II MS4 WLA = 1%, therefore;

$$\begin{aligned} \text{NMS000101 WLA} &= 0.09 \times 3.73 \times 10^{12} \text{ cfu/day} = 3.36 \times 10^{11} \text{ cfu/day} \\ \text{NMR040000 WLA} &= 0.01 \times 3.73 \times 10^{12} \text{ cfu/day} = 3.73 \times 10^{10} \text{ cfu/day} \\ \text{Total MS4 WLA} &= \text{NMS000101 WLA} + \text{NMR040000 WLA} = 3.73 \times 10^{11} \text{ cfu/day} \end{aligned}$$

The remaining available load is allocated to the LA. The final TMDL allocations read as follows:

$$\begin{aligned} \text{TMDL} - \text{MOS} - \text{NPDES WLA} - \text{MS4 WLA} &= \text{LA} \\ 5.27 \times 10^{12} - 1.40 \times 10^{12} - 1.35 \times 10^{11} - 3.73 \times 10^{11} &= 3.36 \times 10^{12} \text{ cfu/day} \end{aligned}$$

References:

US EPA, 2002. "Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs." Washington, D.C.

US EPA, 2008. TMDLs to Stormwater Permits Handbook (draft). Washington, D.C.

MRG TMDL MS4 Watersheds

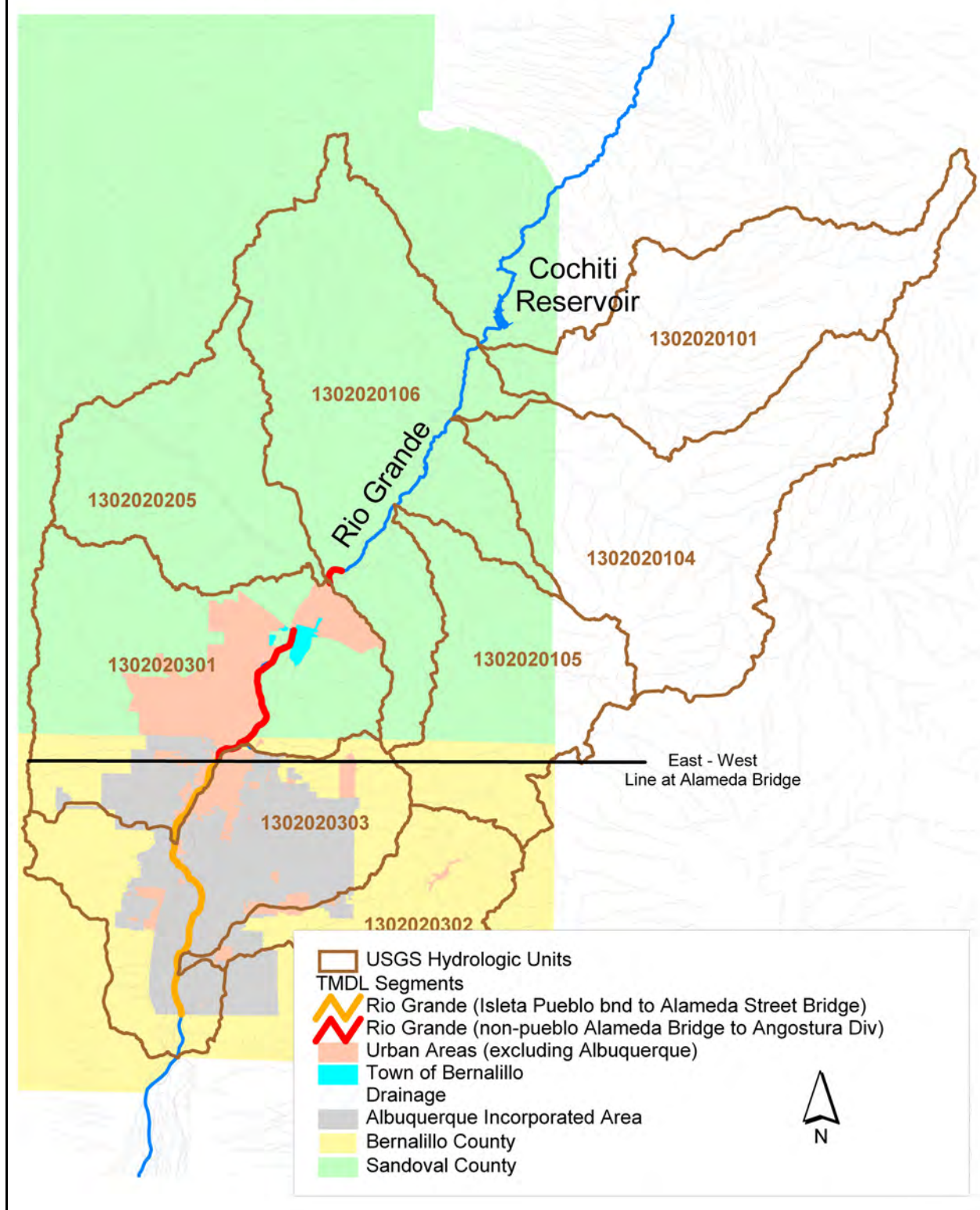


Figure F.1: Albuquerque-area MS4 jurisdiction

Table F.1: USGS Hydrologic Unit Code (HUC) areas

HUC	Total Area (sq mi)	Total Contributing Watershed Areas	
		Rio Grande (Isleta Pueblo bnd to Alameda Bridge)	Rio Grande (Alameda Bridge to Angostura Div)
1302020301- Arroyo de Las Calabacillas-Rio Grande	329.97	329.97	259
1302020303 - City of Albuquerque-Rio Grande	268.72	268.72	n/a
1302020302 - Tijeras Arroyo	131.74	131.74	n/a
1302020106 - Arroyo Tonque-Rio Grande	388.81	388.81	388.81
1302020101 - Santa Fe River	256.06	256.06	256.06
1302020205 - Lower Jemez River	192.60	192.60	192.60
1302020104 - Outlet Galisteo Creek	322.37	322.37	322.37
1302020105 - Arroyo Tonque	193.88	193.88	193.88
Totals	2084.15	2084.15	1612.72

Table F.2: Phase I MS4 WLA allocations

	Rio Grande (Isleta Pueblo bnd to Alameda Bridge)	Rio Grande (Alameda Bridge to Angostura Div)
Incorporated Area of the City of Albuquerque (sq mi)	180.88	7.2
Total contributing watershed area (see Table F.1)	2084.15	1612.72
Percent jurisdictional area	8.68%	0.45%

Table F.3: Phase II MS4 WLA allocations

	Rio Grande (Isleta Pueblo bnd to Alameda Bridge)	Rio Grande (Alameda Bridge to Angostura Div)
Urbanized Area within Rio Grande drainage excluding Albuquerque (sq mi)	29.53	79.35
Total contributing watershed area (see Table F.1)	2084.15	1612.72
Percent jurisdictional area	1.42%	4.92%

Appendix C

Ground Water Discharge Plan, DP-1053

Village of Los Lunas Surface Disposal Facility (Sludge)

- 1. Letter from NMED to Village of Los Lunas issuing Discharge Permit
Renewal and Modification, DP-1053, February 8th, 2013**
- 2. Letter from NMED to Village of Los Lunas issuing Discharge Permit
Renewal, DP-1053, June 6th, 2006**

- 1. Letter from NMED to Village of Los Lunas issuing Discharge Permit Renewal and Modification, DP-1053, February 8th, 2013**



NEW MEXICO
ENVIRONMENT DEPARTMENT

Ground Water Quality Bureau

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DAVE MARTIN
Secretary

BUTCH TONGATE
Deputy Secretary

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

February 8, 2013

The Honorable Louis F. Huning, Mayor
Village of Los Lunas
P.O. Box 1209
Los Lunas, NM 87031

RE: Discharge Permit Renewal and Modification, DP-1053, Village of Los Lunas Sludge Disposal Facility

Dear Mayor Huning:

The New Mexico Environment Department (NMED) issues the enclosed Discharge Permit Renewal and Modification, DP-1053, to the Village of Los Lunas (permittee) pursuant to the New Mexico Water Quality Act (WQA), NMSA 1978 §§74-6-1 through 74-6-17, and the New Mexico Water Quality Control Commission (WQCC) Regulations, 20.6.2 NMAC.

On January 2, 2013, NMED received written comments, submitted on your behalf by Chris Vigil, regarding the draft permit, dated November 16, 2012. NMED is in substantial agreement with these comments and has responded below.

Comment 1 & 2: NMED agrees to revise Condition 4 of the Discharge Permit to require that a total of 15 4-ft x 8-ft signs be posted along the facility boundary and to remove the requirement to include waste type information on the signs identifying each disposal cell number.

Comment 3: NMED agrees to revise Condition 14 of the Discharge Permit to require that the log book only record the name of the transport driver and the date of receipt. The log book is required to be kept onsite and be made available to NMED upon request.

Comment 4: NMED agrees to indicate that sludge is thickened to *approximately* 2.5% in the Discharge Permit Summary.

RECEIVED

FEB 12 2013

MOLZEN CORBIN

Mayor Louis F. Huning, DP-1053
February 8, 2013
Page 2

The Discharge Permit contains terms and conditions that shall be complied with by the permittee and are enforceable by NMED pursuant to Section 20.6.2.3104 NMAC, WQA, NMSA 1978 §74-6-5 and §74-6-10. Please be aware that this Discharge Permit may contain conditions that require the permittee to implement operational, monitoring or closure actions by a specified deadline.

Issuance of this Discharge Permit does not relieve the permittee of the responsibility to comply with the WQA, WQCC Regulations, and any other applicable federal, state and/or local laws and regulations, such as zoning requirements and nuisance ordinances.

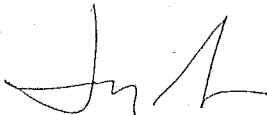
Pursuant to Paragraph (4) of Subsection H of 20.6.2.3109 NMAC, the term of the Discharge Permit shall be five years from the effective date. The term of this Discharge Permit will end on February 8, 2018.

NMED requests that the permittee submit an application for renewal (or renewal and modification) at least 180 days prior to the date the Discharge Permit term ends.

An invoice for the Discharge Permit Fee of \$2,300.00 is being sent under separate cover. Payment of the Discharge Permit Fee must be received by NMED within 30 days of the date the Discharge Permit is issued.

If you have any questions, please contact John Rebar Jr. at (505) 827-0018. Thank you for your cooperation during this Discharge Permit review.

Sincerely,



Jerry Schoeppner, Chief
Ground Water Quality Bureau

JS:JR

enc: Discharge Permit Renewal and Modification, DP-1053
Surface Disposal Data Sheet (SDDS; also available at the following website:
<http://www.nmenv.state.nm.us/gwb/forms/NewMexicoEnvironmentDepartment-GroundWaterQualityBureau-Forms.htm>)

cc: Bill Chavez, District Manager, NMED District I (permit – electronic copy)
NMED Los Lunas Field Office (permit – electronic copy)
John Romero, Office of the State Engineer (permit – electronic copy)
Chris Vigil, Village of Los Lunas, P.O. Box 1209, Los Lunas, NM 87031
Nicole Mangin, MEC Tech Services, 1945 Strawberry Drive NE, Rio Rancho, NM 87144
Clayton Teneyck, Molzen-Corbin & Associates, 2701 Miles Rd SE, Albuquerque, NM 87106

GROUND WATER DISCHARGE PERMIT RENEWAL AND MODIFICATION

Village of Los Lunas Sludge Disposal Facility, DP-1053

I. INTRODUCTION

The New Mexico Environment Department (NMED) issues this Discharge Permit Renewal and Modification (Discharge Permit), DP-1053, to the Village of Los Lunas (permittee) pursuant to the New Mexico Water Quality Act (WQA), NMSA 1978 §§74-6-1 through 74-6-17, and the New Mexico Water Quality Control Commission (WQCC) Regulations, 20.6.2 NMAC.

NMED's purpose in issuing this Discharge Permit, and in imposing the requirements and conditions specified herein, is to control the discharge of water contaminants from the Village of Los Lunas Sludge Disposal Facility (facility) into ground and surface water, so as to protect ground and surface water for present and potential future use as domestic and agricultural water supply and other uses and protect public health. In issuing this Discharge Permit, NMED has determined that the requirements of Subsection C of 20.6.2.3109 NMAC have been or will be met. Pursuant to Section 20.6.2.3104 NMAC, it is the responsibility of the permittee to comply with the terms and conditions of this Discharge Permit; failure may result in an enforcement action(s) by NMED (20.6.2.1220 NMAC).

The activities which produce the discharge, the location of the discharge, and the quantity, quality and flow characteristics of the discharge are briefly described as follows:

- Up to 45,000 gallons per day (gpd) of liquid, semi-solid and/or solid domestic wastewater treatment facility sludge is discharged to 220-acre surface disposal site.

The modification consists of an increase in the maximum daily discharge volume from 35,000 gallons per week to 45,000 gpd.

The discharge contains water contaminants which may be elevated above the standards of Section 20.6.2.3103 NMAC and/or the presence of toxic pollutants as defined in Subsection WW of 20.6.2.7 NMAC.

The facility is located at 189 Tren Rd SW, approximately 5.2 miles southwest of the intersection of Dalies Rd and NM-6, approximately 9 miles southwest of the Village of Los Lunas in Section 18 (Projected), Township 06N, Range 01E, Valencia County. The facility is located within the Nicolas de Chavez Land Grant. Ground water most likely to be affected is at a depth of approximately 400 feet and has a total dissolved solids concentration of approximately 150 milligrams per liter.

The original Discharge Permit was issued on May 9, 1996, amended on September 12, 1997 and subsequently renewed on August 14, 2001 and June 7, 2006. The application (i.e., discharge plan) consists of the materials submitted by the permittee dated August 30, 2011 and materials contained in the administrative record prior to issuance of this Discharge Permit. The discharge shall be managed in accordance with all conditions and requirements of this Discharge Permit.

Pursuant to Section 20.6.2.3109 NMAC, NMED reserves the right to require a Discharge Permit Modification in the event NMED determines that the requirements of 20.6.2 NMAC are being or may be violated or the standards of Section 20.6.2.3103 NMAC are being or may be violated. This may include a determination that structural controls and/or management practices approved under this Discharge Permit are not protective of ground water quality, and that more stringent requirements to protect ground water quality may be required by NMED. The permittee may be required to implement abatement of water pollution and remediate ground water quality.

Issuance of this Discharge Permit does not relieve the permittee of the responsibility to comply with the WQA, WQCC Regulations, and any other applicable federal, state and/or local laws and regulations, such as zoning requirements and nuisance ordinances.

The following acronyms and abbreviations may be used in this Discharge Permit:

Abbreviation	Explanation	Abbreviation	Explanation
BOD ₅	biochemical oxygen demand (5-day)	NTU	nephelometric turbidity units
CFR	Code of Federal Regulations	Org	organisms
CFU	colony forming units	SDDS	Surface Disposal Data Sheets
Cl	chloride	TDS	total dissolved solids
EPA	United States Environmental Protection Agency	TKN	total Kjeldahl nitrogen
gpd	gallons per day	total nitrogen	= TKN + NO ₃ -N
mg/kg	milligrams per kilogram	TPH	total petroleum hydrocarbons
mg/L	milligrams per liter	TRC	Total Residual Chlorine
mL	milliliters	TS	total solids
NMAC	New Mexico Administrative Code	UPC	Uniform Plumbing Code
NMED	New Mexico Environment Department	WQA	New Mexico Water Quality Act
NMSA	New Mexico Statutes Annotated	WQCC	Water Quality Control Commission
NO ₃ -N	nitrate-nitrogen	WWTF	Wastewater Treatment Facility

II. FINDINGS

In issuing this Discharge Permit, NMED finds:

1. The permittee is discharging effluent or leachate from the facility so that such effluent or leachate may move directly or indirectly into ground water within the meaning of Section 20.6.2.3104 NMAC.
2. The permittee is discharging effluent or leachate from the facility so that such effluent or leachate may move into ground water of the State of New Mexico which has an existing concentration of 10,000 mg/L or less of TDS within the meaning of Subsection A of 20.6.2.3101 NMAC.

3. The discharge from the facility is not subject to any of the exemptions of Section 20.6.2.3105 NMAC.

III. AUTHORIZATION TO DISCHARGE

Pursuant to 20.6.2.3104 NMAC, it is the responsibility of the permittee to ensure that discharges authorized by this Discharge Permit are consistent with the terms and conditions herein.

The permittee is authorized to discharge up to 45,000 gpd of liquid, semi-solid and/or solid domestic wastewater treatment facility sludge from the Village of Los Lunas Wastewater Treatment Facility to a 220-acre surface disposal site. The sludge is transported to the disposal site by tanker truck, stored onsite in a 15,000-gallon sludge nurse tank and sprayed onto the ground surface in eleven 20-acre disposal cells on a rotational basis.

Waste types that are not specifically authorized to be received by this Discharge Permit shall not be received at the facility.

[20.6.2.3104 NMAC, Subsection C of 20.6.2.3106 NMAC, Subsection C of 20.6.2.3109 NMAC]

IV. CONDITIONS

NMED issues this Discharge Permit for the discharge of water contaminants subject to the following conditions:

A. OPERATIONAL PLAN

#	Terms and Conditions
1.	The permittee shall implement the following operational plan to ensure compliance with Title 20, Chapter 6, Parts 1 and 2 NMAC. [Subsection C of 20.6.2.3109 NMAC]
2.	The permittee shall operate in a manner such that standards and requirements of Sections 20.6.2.3101 and 20.6.2.3103 NMAC are not violated. [20.6.2.3101 NMAC, 20.6.2.3103 NMAC, Subsection C of 20.6.2.3109 NMAC]
3.	The permittee shall maintain fences around the entire disposal facility to prevent unrestricted access. A minimum of a three-strand barbed wire fence and locked gate shall surround the facility. The permittee shall maintain a chain link fence and locked gate around the sludge nurse tank. [20.6.2.3109 NMAC]
4.	Within 90 of days of the effective date of this Discharge Permit (by May 9, 2013), the

#	Terms and Conditions
	permittee shall post the following signs at the following locations: • Signs in both English and Spanish that state: "Notice: Waste Disposal Area - KEEP OUT" and "Aviso: Área de Disposición - NO ENTAR" posted at the facility entrance and a total of 15 (4-ft by 8-ft) signs along the facility boundary. • A sign with the name of the facility's contact person, office phone number of the contact person, emergency contact phone number for the facility and physical location of the facility including township, range, and section(s) posted at the entrance gate. • A sign on each tank with the name of the tank contents. Tanks containing contaminated water should be labeled "Not Potable Water" and "el agua no es potable." • A sign to identify each cell by number. All signs shall be weatherproof and posted at the boundary of the cells to facilitate a rotational disposal schedule as required in conditions below. All signs shall be waterproof and shall remain legible for the term of this Discharge Permit. [20.6.2.3109 NMAC]
5.	The permittee shall apply liquid, semi-solids and/or solid domestic wastewater treatment facility sludge to eleven 20-acre disposal cells on a rotational basis. The sludge shall be evenly distributed throughout the individual cells in use. Ponding of liquid sludge shall be minimized. Treatment, storage and disposal of sludge shall be in accordance with requirements set forth in 40 CFR Part 503. [20.6.2.3104 NMAC]
6.	The amount of total nitrogen applied from domestic wastewater treatment facility sludge shall not exceed 200 pounds per acre per year. [20.6.2.3109 NMAC]
7.	The permittee shall inspect the facility weekly and collect any residual solid waste (trash) on the facility site. The collected materials shall be disposed of in a manner consistent with all local, state and federal regulations. [20.6.2.3109 NMAC]
8.	The permittee shall not discharge liquid wastes during periods of precipitation or when surface soils are frozen or saturated. Wastes may be stored in tanker trucks or the nurse tank during these periods. [20.6.2.3109 NMAC]

#	Terms and Conditions
9.	To prevent run-on and run-off from a storm event, the permittee shall maintain a minimum 24-inch earthen berm surrounding the perimeter of the facility. The berm shall be inspected on a regular basis and after any major rainfall event and repaired as necessary. In place of a berm across the facility entrance, the permittee shall construct and maintain shallow (minimum depth of six inches) stormwater diversion bar trenches parallel to and on each side of the facility entrance gate. [20.6.2.3107 NMAC, 20.6.2.3109 NMAC]
10.	The permittee shall utilize operators, certified by the State of New Mexico at the appropriate level, to operate the sludge disposal facility. The operations and maintenance of all or any part of the sludge disposal facility shall be performed by, or under the direct supervision of, a certified operator. [Subsection C of 20.6.2.3109 NMAC, 20.7.4 NMAC]

B. MONITORING AND REPORTING

#	Terms and Conditions
11.	The permittee shall conduct the following monitoring, reporting, and other requirements listed below in accordance with the monitoring requirements of this Discharge Permit. [Subsection A of 20.6.2.3107 NMAC, Subsection C of 20.6.2.3109 NMAC]
12.	METHODOLOGY – Unless otherwise approved in writing by NMED, the permittee shall conduct sampling and analysis in accordance with the most recent edition of the following documents: a) American Public Health Association, Standard Methods for the Examination of Water and Wastewater (18th, 19th or current) b) U.S. Environmental Protection Agency, Methods for Chemical Analysis of Water and Waste c) U.S. Geological Survey, Techniques for Water Resources Investigations of the U.S. Geological Survey d) American Society for Testing and Materials, Annual Book of ASTM Standards, Part 31. Water e) U.S. Geological Survey, et al., National Handbook of Recommended Methods for Water Data Acquisition f) Federal Register, latest methods published for monitoring pursuant to Resource Conservation and Recovery Act regulations g) Methods of Soil Analysis: Part 1. Physical and Mineralogical Methods; Part 2. Microbiological and Biochemical Properties; Part 3. Chemical Methods, American Society of Agronomy

#	Terms and Conditions
	[Subsection B of 20.6.2.3107 NMAC]
13.	The permittee shall submit semi-annual monitoring reports to NMED for the most recently completed semi-annual period by 1st of February and August each year. Semi-annual monitoring shall be performed during the following periods and submitted as follows: • January 1st through June 30th (first half) – due by August 1st • July 1st through December 31st (second half) – due by February 1st The monitoring reports shall contain the items specified in this Discharge Permit. [Subsection A of 20.6.2.3107 NMAC]
14.	The permittee shall document each load of sludge transported to the sludge disposal facility in a log book. The log book shall record the following information: • name of transport driver • date of receipt The log book recording the name of the transport driver and date of receipt shall be kept at the facility and the log book shall be made available to NMED upon request. [20.6.2.3107 NMAC]
15.	The permittee shall measure and record the volume and dry weight of domestic wastewater treatment facility sludge discharged to the 20-acre surface disposal cells each month by tracking the volume of the loads received and the percent total solids as determined by sampling each type of sludge (i.e., solid, semisolid, liquid). Records of the volume and dry weight of the sludge discharged shall be utilized for reporting in accordance with this Discharge Permit and shall be submitted to NMED in the semi-annual monitoring reports. [20.6.2.3107 NMAC]
16.	The permittee shall sample each sludge type (solid, semi-solid and liquid) transported to the surface disposal facility on a monthly basis and analyze the sample(s) for percent total solids (%TS). Samples shall be properly prepared, preserved, transported and analyzed in accordance with the methods authorized in this Discharge Permit. Analytical results, reported as %TS for each sludge type, shall be used for reporting purposes as outlined in this Discharge Permit and shall be submitted to NMED in the semi-annual monitoring reports. [20.6.2.3107 NMAC]

#	Terms and Conditions
17.	The permittee shall sample each sludge type (solid, semi-solid and liquid) transported to the surface disposal facility on a quarterly basis and analyze the samples for TKN and NO₃-N. Samples shall be properly prepared, preserved, transported and analyzed in accordance with the methods authorized in this Discharge Permit. Analytical results, reported as mg/kg for TKN and NO₃-N (dry weight basis), shall be used for reporting purposes as outlined in this Discharge Permit and shall be submitted to NMED in the semi-annual monitoring reports. [20.6.2.3107 NMAC]
18.	The permittee shall complete a SDDS (copy enclosed) to document the amount of nitrogen applied to each surface disposal cell, each month. A SDDS shall be completed for each sludge type (solid, semi-solid and liquid) associated with each disposal cell, and shall reflect the nitrogen concentration from the quarterly sludge analysis and the total number of dry tons discharged each month. Nitrogen content shall not be adjusted to account for volatilization or mineralization processes. The SDDS, or a statement that no surface disposal occurred within the specific cells, shall be submitted to NMED in the semi-annual monitoring reports. [20.6.2.3107 NMAC]

C. CONTINGENCY PLAN

#	Terms and Conditions
19.	In the event that a ground water quality standard identified in Section 20.6.2.3103 NMAC is exceeded; the total nitrogen concentration in ground water is greater than 10 mg/L; or a toxic pollutant (defined in Subsection WW of 20.6.2.7 NMAC) is present in ground water during the term of this Discharge Permit, upon closure of the facility or during the implementation of post-closure requirements, the permittee shall propose measures to mitigate damage from the discharge including, at a minimum, source control measures and a completion schedule by submitting a corrective action plan to NMED for approval. The permittee may be required to abate water pollution pursuant to Sections 20.6.2.4000 through 20.6.2.4115 NMAC, should the corrective action plan not result in compliance with the standards and requirements set forth in Section 20.6.2.4103 NMAC within 180 days of confirmation of ground water contamination. [Subsection A of 20.6.2.3107 NMAC, Subsection E of 20.6.2.3109 NMAC]
20.	In the event that a SDDS shows that the amount of nitrogen applied annually to any cell exceeds 200 pounds per acre per year, the permittee shall submit a corrective action plan for the reduction of nitrogen loading to the sludge disposal area to NMED for approval. The corrective action plan shall be implemented within 30 days of NMED approval.

#	Terms and Conditions
	[20.6.2.3107.A(10) NMAC]
21.	In the event that the sludge disposal area is saturated, frozen or covered with snow, sludge shall not be discharged to the surface disposal area. Should the adverse conditions persist beyond the sludge storage capacity of the wastewater treatment facility, the permittee shall obtain NMED approval for a temporary alternative. [20.6.2.3107.A(10) NMAC]
22.	In the event that a release (commonly known as a “spill”) occurs that is not authorized under this Discharge Permit, the permittee shall take measures to mitigate damage from the unauthorized discharge and initiate the notifications and corrective actions required in Section 20.6.2.1203 NMAC and summarized below. Within <u>24 hours</u> following discovery of the unauthorized discharge, the permittee shall verbally notify NMED and provide the following information: - The name, address, and telephone number of the person or persons in charge of the facility, as well as of the owner and/or operator of the facility. - The name and address of the facility. - The date, time, location, and duration of the unauthorized discharge. - The source and cause of unauthorized discharge. - A description of the unauthorized discharge, including its estimated chemical composition. - The estimated volume of the unauthorized discharge. - Any actions taken to mitigate immediate damage from the unauthorized discharge. Within <u>one week</u> following discovery of the unauthorized discharge, the permittee shall submit written notification to NMED with the information listed above and any pertinent updates. Within <u>15 days</u> following discovery of the unauthorized discharge, the permittee shall submit a corrective action report/plan to NMED describing any corrective actions taken and/or to be taken relative to the unauthorized discharge that includes the following: - A description of proposed actions to mitigate damage from the unauthorized discharge. - A description of proposed actions to prevent future unauthorized discharges of this nature. - A schedule for completion of proposed actions. In the event that the unauthorized discharge causes or may with reasonable probability cause water pollution in excess of the standards and requirements of Section 20.6.2.4103 NMAC, and the water pollution will not be abated within 180 days after notice is required to be given pursuant to Paragraph (1) of Subsection A of 20.6.2.1203 NMAC, the permittee may be required to abate water pollution pursuant to Sections 20.6.2.4000

#	Terms and Conditions
	through 20.6.2.4115 NMAC. Nothing in this condition shall be construed as relieving the permittee of the obligation to comply with all requirements of Section 20.6.2.1203 NMAC. [20.6.2.1203 NMAC]
23.	In the event that NMED or the permittee identifies any failures of the discharge plan or this Discharge Permit not specifically noted herein, NMED may require the permittee to submit a corrective action plan and a schedule for completion of corrective actions to address the failure(s). Additionally, NMED may require a Discharge Permit modification to achieve compliance with 20.6.2 NMAC. [Subsection A of 20.6.2.3107 NMAC, Subsection E of 20.6.2.3109 NMAC]

D. CLOSURE PLAN

#	Terms and Conditions
24.	Upon closure of the facility, the permittee shall perform the following closure measures: a) Pump out any sludge contained in the sludge nurse tank and discharge it by surface spray or subsurface injection to the disposal area. a) Remove or demolish sludge nurse tank and re-grade the area with suitable fill to blend with surface topography to promote positive drainage and prevent ponding. b) Backfill the cells with clean fill (as necessary) and contour to provide for positive stormwater drainage. c) Re-vegetate the cells and disturbed areas at the facility by establishing a vegetative cover equal to 70% of the native perennial vegetative cover consisting of at least three native plant species including at least one grass, but not including noxious weeds. The permittee shall maintain the vegetative cover through two consecutive growing seasons. d) Following final grading and re-seeding of the facility, the permittee shall maintain the perimeter fencing and security gate for a minimum of three years to prevent unauthorized access. e) Submit proof to NMED that all closure activities set forth for the facility under 40 CFR 503 have been completed. When all closure and post-closure requirements have been met, the permittee may request to terminate the Discharge Permit. [20.6.2.3107.A(11) NMAC]

E. GENERAL TERMS AND CONDITIONS

#	Terms and Conditions
25.	RECORD KEEPING - The permittee shall maintain a written record of the following information: a) Information and data used to complete the application for this Discharge Permit. b) Records of any releases (commonly known as "spills") not authorized under this Discharge Permit and reports submitted pursuant to 20.6.2.1203 NMAC. c) Records of the operation, maintenance, and repair of all facilities/equipment used to treat, store or dispose of wastewater. d) Facility record drawings (plans and specifications) showing the actual construction of the facility and bear the seal and signature of a licensed New Mexico professional engineer. e) Copies of monitoring reports completed and/or submitted to NMED pursuant to this Discharge Permit. f) The volume of wastewater or other wastes discharged pursuant to this Discharge Permit. g) Ground water quality and wastewater quality data collected pursuant to this Discharge Permit. h) Copies of construction records (well log) for all ground water monitoring wells required to be sampled pursuant to this Discharge Permit. i) Records of the maintenance, repair, replacement or calibration of any monitoring equipment or flow measurement devices required by this Discharge Permit. j) Data and information related to field measurements, sampling, and analysis conducted pursuant to this Discharge Permit. The following information shall be recorded and shall be made available to NMED upon request: i) The dates, location and times of sampling or field measurements; ii) The name and job title of the individuals who performed each sample collection or field measurement; iii) The sample analysis date of each sample; iv) The name and address of the laboratory, and the name of the signatory authority for the laboratory analysis; v) The analytical technique or method used to analyze each sample or collect each field measurement; vi) The results of each analysis or field measurement, including raw data; vii) The results of any split, spiked, duplicate or repeat sample; and viii) A copy of the laboratory analysis chain-of-custody as well as a description of the quality assurance and quality control procedures used. The written record shall be maintained by the permittee at a location accessible during a facility inspection by NMED for a period of at least five years from the date of application, report, collection or measurement and shall be made available to the department upon request.

#	Terms and Conditions
	[Subsections A and D of 20.6.2.3107 NMAC]
26.	INSPECTION and ENTRY – The permittee shall allow inspection by NMED of the facility and its operations which are subject to this Discharge Permit and the WQCC regulations. NMED may upon presentation of proper credentials, enter at reasonable times upon or through any premises in which a water contaminant source is located or in which are located any records required to be maintained by regulations of the federal government or the WQCC. The permittee shall allow NMED to have access to and reproduce for their use any copy of the records, and to perform assessments, sampling or monitoring during an inspection for the purpose of evaluating compliance with this Discharge Permit and the WQCC regulations. Nothing in this Discharge Permit shall be construed as limiting in any way the inspection and entry authority of NMED under the WQA, the WQCC Regulations, or any other local, state or federal regulations. [Subsection D of 20.6.2.3107 NMAC, NMSA 1978, §§ 74-6-9.B and 74-6-9.E]
27.	DUTY to PROVIDE INFORMATION - The permittee shall, upon NMED's request, allow for NMED's inspection/duplication of records required by this Discharge Permit and/or furnish to NMED copies of such records. [Subsection D of 20.6.2.3107 NMAC]
28.	MODIFICATIONS and/or AMENDMENTS – In the event the permittee proposes a change to the facility or the facility's discharge that would result in a change in the volume discharged; the location of the discharge; or in the amount or character of water contaminants received, treated or discharged by the facility, the permittee shall notify NMED prior to implementing such changes. The permittee shall obtain approval (which may require modification of this Discharge Permit) by NMED prior to implementing such changes. [Subsection C of 20.6.2.3107 NMAC, Subsections E and G of 20.6.2.3109 NMAC]
29.	PLANS and SPECIFICATIONS – In the event the permittee is proposing to construct a wastewater system or change a process unit of an existing system such that the quantity or quality of the discharge will change substantially from that authorized by this Discharge Permit, the permittee shall submit construction plans and specifications to NMED for the proposed system or process unit prior to the commencement of construction. In the event the permittee implements changes to the wastewater system authorized by this Discharge Permit which result in only a minor effect on the character of the

#	Terms and Conditions
	discharge, the permittee shall report such changes (including the submission of record drawings, where applicable) as of January 1 and June 30 of each year to NMED. [Subsections A and C of 20.6.2.1202 NMAC, NMSA 1978, §§ 61-23-1 through 61-23-32]
30.	CIVIL PENALTIES - Any violation of the requirements and conditions of this Discharge Permit, including any failure to allow NMED staff to enter and inspect records or facilities, or any refusal or failure to provide NMED with records or information, may subject the permittee to a civil enforcement action. Pursuant to WQA 74-6-10(A) and (B), such action may include a compliance order requiring compliance immediately or in a specified time, assessing a civil penalty, modifying or terminating the Discharge Permit, or any combination of the foregoing; or an action in district court seeking injunctive relief, civil penalties, or both. Pursuant to WQA 74-6-10(C) and 74-6-10.1, civil penalties of up to \$15,000 per day of noncompliance may be assessed for each violation of the WQA 74-6-5, the WQCC Regulations, or this Discharge Permit, and civil penalties of up to \$10,000 per day of noncompliance may be assessed for each violation of any other provision of the WQA, or any regulation, standard, or order adopted pursuant to such other provision. In any action to enforce this Discharge Permit, the permittee waives any objection to the admissibility as evidence of any data generated pursuant to this Discharge Permit. [20.6.2.1220 NMAC, NMSA 1978, §§ 74-6-10 and 74-6-10.1]
31.	CRIMINAL PENALTIES -- No person shall: 1) make any false material statement, representation, certification or omission of material fact in an application, record, report, plan or other document filed, submitted or required to be maintained under the WQA; 2) falsify, tamper with or render inaccurate any monitoring device, method or record required to be maintained under the WQA; or 3) fail to monitor, sample or report as required by a permit issued pursuant to a state or federal law or regulation. Any person who knowingly violates or knowingly causes or allows another person to violate the requirements of this condition is guilty of a fourth degree felony and shall be sentenced in accordance with the provisions of NMSA 1978, § 31-18-15. Any person who is convicted of a second or subsequent violation of the requirements of this condition is guilty of a third degree felony and shall be sentenced in accordance with the provisions of NMSA 1978, § 31-18-15. Any person who knowingly violates the requirements of this condition or knowingly causes another person to violate the requirements of this condition and thereby causes a substantial adverse environmental impact is guilty of a third degree felony and shall be sentenced in accordance with the provisions of NMSA 1978, § 31-18-15. Any person who knowingly violates the requirements of this condition and knows at the time of the violation that he is creating a substantial danger of death or serious bodily injury to any other person is guilty of a

#	Terms and Conditions
	second degree felony and shall be sentenced in accordance with the provisions of NMSA 1978, § 31-18-15. [20.6.2.1220 NMAC, NMSA 1978, §§ 74-6-10.2.A through 74-6-10.2.F]
32.	COMPLIANCE with OTHER LAWS - Nothing in this Discharge Permit shall be construed in any way as relieving the permittee of the obligation to comply with all applicable federal, state, and local laws, regulations, permits or orders. [NMSA 1978, § 74-6-5.L]
33.	RIGHT to APPEAL - The permittee may file a petition for review before the WQCC on this Discharge Permit. Such petition shall be in writing to the WQCC within thirty days of the receipt of postal notice of this Discharge Permit and shall include a statement of the issues to be raised and the relief sought. Unless a timely petition for review is made, the decision of NMED shall be final and not subject to judicial review. [20.6.2.3112 NMAC, NMSA 1978, § 74-6-5.O]
34.	TRANSFER of DISCHARGE PERMIT - Prior to the transfer of any ownership, control, or possession of this facility or any portion thereof, the permittee shall: 1) notify the proposed transferee in writing of the existence of this Discharge Permit; 2) include a copy of this Discharge Permit with the notice; and 3) deliver or send by certified mail to NMED a copy of the notification and proof that such notification has been received by the proposed transferee. Until both ownership and possession of the facility have been transferred to the transferee, the permittee shall continue to be responsible for any discharge from the facility. [20.6.2.3111 NMAC]
35.	PERMIT FEES - Payment of permit fees is due at the time of Discharge Permit approval. Permit fees shall be paid in a single payment or shall be paid in equal installments on a yearly basis over the term of the Discharge Permit. Single payments shall be remitted to NMED no later than 30 days after the Discharge Permit effective date. Initial installment payments shall be remitted to NMED no later than 30 days after the Discharge Permit effective date; subsequent installment payments shall be remitted to NMED no later than the anniversary of the Discharge Permit effective date. Permit fees are associated with <u>issuance</u> of this Discharge Permit. Nothing in this Discharge Permit shall be construed as relieving the permittee of the obligation to pay all permit fees assessed by NMED. A permittee that ceases discharging or does not commence discharging from the facility during the term of the Discharge Permit shall pay all permit fees assessed by NMED. An approved Discharge Permit shall be

#	Terms and Conditions
	suspended or terminated if the facility fails to remit an installment payment by its due date. [Subsection F of 20.6.2.3114 NMAC, NMSA 1978, § 74-6-5.K]

V. PERMIT TERM & SIGNATURE

EFFECTIVE DATE: February 8, 2013

TERM ENDS: February 8, 2018

[Subsection H of 20.6.2.3109 NMAC, NMSA 1978, § 74-6-5.I]



JERRY SCHOEPPNER
Chief, Ground Water Quality Bureau
New Mexico Environment Department



New Mexico Environment Department Ground Water Quality Bureau Discharge Permit Summary

Facility Information

Facility Name Village of Los Lunas Sludge Disposal Facility
Discharge Permit Number DP-1053

Legally Responsible Party The Honorable Louis F. Huning, Mayor
Village of Los Lunas
P.O. Box 1209
Los Lunas, NM 87031
(505) 839-3840

Treatment, Disposal and Site Information

Primary Waste Type Domestic Wastewater Treatment Facility Sludge
Facility Type Surface Disposal (Sludge)

Treatment Methods

Type	Designation	Description & Comments
Domestic Wastewater Treatment Facility Sludge	WWTF Sludge	Aerobically digested sludge thickened to approximately 2.5% solids content

Discharge Locations

Type	Designation	Description & Comments
Sludge Disposal (Surface Spray)	Sludge Disposal Facility	Eleven 20-acre disposal cells (monthly rotation); 15,000-gallon sludge nurse tank; 1,800-gallon capacity TerraGator (pressurized spray to ground surface)

Depth-to-Ground Water 400 feet
Total Dissolved Solids (TDS) 150 mg/L

Permit Information

Application Received August 30, 2011
Public Notice Published November 29, 2012
Discharge Permit Issued February 8, 2013
Discharge Permit Term Ends February 8, 2018
Permitted Discharge Volume 45,000 gallons per day

NMED Contact Information

Mailing Address Ground Water Quality Bureau
P.O. Box 5469
Santa Fe, New Mexico 87502-5469

GWQB Telephone Number (505) 827-2900

NMED Lead Staff John Rebar Jr.
Lead Staff Telephone Number (505) 827-0018
Lead Staff Email john.rebar@state.nm.us

**2. Letter from NMED to Village of Los Lunas issuing Discharge Permit
Renewal, DP-1053, June 6th, 2006**



BILL RICHARDSON
GOVERNOR

State of New Mexico
ENVIRONMENT DEPARTMENT

Ground Water Quality Bureau

Harold Runnels Building

1190 St. Francis Drive, P.O. Box 26110

Santa Fe, New Mexico 87502-6110

Telephone (505) 827-2918

Fax (505) 827-2965



RON CURRY
SECRETARY

CINDY PADILLA
DEPUTY SECRETARY

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

June 7, 2006

Phillip Jaramillo, Administrator
Village of Los Lunas
PO Box 1209
Los Lunas, NM 87031

**RE: Discharge Permit Renewal, DP-1053, Village of Los Lunas Surface Disposal Facility
(Sludge)**

Dear Mr. Jaramillo:

The New Mexico Environment Department (NMED) issues the enclosed Discharge Permit Renewal, DP-1053, to the Village of Los Lunas pursuant to the New Mexico Water Quality Act (WQA), NMSA 1978 §§74-6-1 through 74-6-17, and the New Mexico Water Quality Control Commission (WQCC) Regulations (copy previously provided), 20.6.2 NMAC.

The Discharge Permit contains terms and conditions that shall be complied with by the Village of Los Lunas and are enforceable by NMED pursuant to 20.6.2.3104 NMAC, WQA, NMSA 1978 §74-6-5 and §74-6-10. Issuance of this Discharge Permit does not relieve the Village of Los Lunas of its responsibility to comply with the WQA, WQCC Regulations, and any other applicable federal, state and/or local laws and regulations, such as zoning requirements and nuisance ordinances.

Pursuant to 20.6.2.3109.H.4 NMAC, the term of the Discharge Permit shall be five years from the date of issuance and will expire on June 7, 2011. You must submit an application for renewal at least 180 days before the permit expiration date.

If you have any questions, please contact Kathie Deal at 505-827-2713. Thank you for your cooperation during this Discharge Permit review.

June 7, 2006

Page 2

Sincerely,

George Schuman for W. Olson

William C. Olson, Chief
Ground Water Quality Bureau

WO:KD

enc: Discharge Permit Renewal
Land Application Data Sheet (LADS)
Sludge Transport Manifest

cc: Charles Lundstrom, District Manager, NMED District V (permit)
NMED Los Lunas Field Office (permit)
Jim Sizemore, Office of the State Engineer (permit)
Adrian Moya, WWTP Operator, same address as above (permit/enclosures)

GROUND WATER DISCHARGE PERMIT RENEWAL
Village of Los Lunas Surface Disposal Facility (Sludge), DP-1053

I. INTRODUCTION

The New Mexico Environment Department (NMED) issues this Discharge Permit Renewal, DP-1053, to the Village of Los Lunas (permittee) pursuant to the New Mexico Water Quality Act (WQA), NMSA 1978 §§74-6-1 through 74-6-17, and the New Mexico Water Quality Control Commission (WQCC) Regulations, 20.6.2 NMAC.

NMED's purpose in issuing this Discharge Permit, and in imposing the requirements and conditions specified herein, is to control the discharge of water contaminants from the Village of Los Lunas Surface Disposal Facility (Sludge) into ground and surface water, so as to protect ground and surface water for present and potential future use as domestic and agricultural water supply and other uses and protect public health. In issuing this Discharge Permit, NMED has determined that the requirements of 20.6.2.3109.C NMAC have been met.

The activities which produce the discharge, the location of the discharge, and the quantity, quality and flow characteristics of the discharge are briefly described as follows:

Up to 35,000 gallons of treated municipal sludge is discharged from the nurse tank at the Village of Los Lunas Surface Disposal Facility on one or multiple days each week. The sludge is transported from the Village of Los Lunas Wastewater Treatment Plant (WWTP) to a 220-acre surface disposal facility by tanker truck, emptied into the sludge nurse tank, and finally pumped from the tank and sprayed onto or injected into the ground using a sludge injection vehicle. Treatment, storage and disposal of sludge shall be in accordance with requirements set forth in 40 CFR 503. The discharge contains water contaminants or toxic pollutants which may be elevated above the standards of 20.6.2.3103 NMAC. The facility is located on an access road intersecting Dalies Road, 3 miles south of state road NM 6, approximately 9 miles southwest of Los Lunas in the Nicolas de Chavez Grant, in Section 18 (projected), T06N, R01E, Valencia County. Ground water beneath the site is at a depth of approximately 400 feet and has a total dissolved solids concentration of approximately 150 milligrams per liter.

The original Discharge Permit was issued on May 9, 1996 and subsequently amended on September 12, 1997 and renewed on August 14, 2001. The permittee's application consists of the materials submitted by Phillip Jaramillo dated February 21, 2006. The permittee's Discharge Plan consists of this application and previously submitted materials as applicable. The discharge shall be managed in accordance with the Discharge Plan as conditioned by this Discharge Permit.

Pursuant to 20.6.2.3109 NMAC, NMED reserves the right to require a Discharge Permit Modification in the event NMED determines that the requirements of 20.6.2 NMAC are being or may be violated or the standards of 20.6.2.3103 NMAC are being or may be violated. This may include a determination that structural controls and/or management practices approved under this Discharge Permit are not protective of ground water quality, and that more stringent requirements to protect and/or remediate ground water quality may be required by NMED.

These requirements may include expanding land application areas, changing waste management practices, expanding monitoring requirements, and/or implementing abatement of water pollution.

Issuance of this Discharge Permit does not relieve the Village of Los Lunas of its responsibility to comply with the WQA, WQCC Regulations, and any other applicable federal, state and/or local laws and regulations, such as zoning requirements and nuisance ordinances.

The following abbreviations may be used in this Discharge Permit:

Abbreviation	Explanation	Abbreviation	Explanation
BOD ₅	biochemical oxygen demand (5-day)	NMSA	New Mexico Statutes Annotated
CFR	Code of Federal Regulations	NO ₃ -N	nitrate-nitrogen
CFU	colony forming units	NTU	nephelometric turbidity units
Cl	chloride	TDS	total dissolved solids
LADS	land application data sheet(s)	TKN	total Kjeldahl nitrogen
mg/L	milligrams per liter	TSS	total suspended solids
mL	milliliters	total nitrogen	TKN+NO ₃ -N
NMAC	New Mexico Administrative Code	WQCC	Water Quality Control Commission
NMED	New Mexico Environment Department		

II. FINDINGS

In issuing this Discharge Permit, NMED finds:

1. The Village of Los Lunas is discharging effluent or leachate from the Village of Los Lunas Surface Disposal Facility (Sludge) so that such effluent or leachate may move directly or indirectly into ground water within the meaning of 20.6.2.3104 NMAC.
2. The Village of Los Lunas is discharging effluent or leachate from the Village of Los Lunas Surface Disposal Facility (Sludge) so that such effluent or leachate may move into ground water of the State of New Mexico which has an existing concentration of 10,000 milligrams per liter or less of total dissolved solids within the meaning of 20.6.2.3101.A NMAC.
3. The discharge from the Village of Los Lunas Surface Disposal Facility (Sludge) is not subject to any of the exemptions of 20.6.2.3105 NMAC.

III. CONDITIONS

The following conditions shall be complied with by the Village of Los Lunas and are enforceable by NMED. The Village of Los Lunas is permitted to discharge water contaminants subject to the following conditions:

OPERATIONAL PLAN

#	Terms and Conditions
1.	The permittee shall implement the following operational plan to ensure compliance with Title 20, Chapter 6, Parts 1 and 2 NMAC. [20.6.2.3106(C) NMAC, 20.6.2.3107 NMAC]
2.	The permittee shall operate in a manner such that standards and requirements of 20.6.2.3103 NMAC including human health, other domestic water supply and irrigation standards are not violated. [20.6.2.3103 NMAC]
3.	The permittee is authorized to discharge up to 35,000 gallons of treated municipal sludge from the nurse tank at the Village of Los Lunas Surface Disposal Facility on a single day each week. The sludge is transported from the Village of Los Lunas Wastewater Treatment Plant (WWTP) to a 220-acre surface disposal facility by tanker truck, emptied into the sludge nurse tank, and finally pumped from the tank and sprayed onto or injected into the ground using a sludge injection vehicle. Treatment, storage and disposal of sludge shall be in accordance with requirements set forth in 40 CFR 503. [20.6.2.3104 NMAC]
4.	The permittee shall maintain a livestock fence around the surface disposal facility and a locked chain link fence around the sludge nurse tank. [20.6.2.3109 NMAC]
5.	The permittee shall post signs in English and Spanish at the facility entrance indicating that the site is a sludge disposal facility and on the nurse tank indicating that the water is not potable within 90 days of the effective date of this Discharge Permit, by September 5, 2006. All signs shall remain visible and legible for the term of this Discharge Permit. [20.6.2.3109 NMAC]
6.	Within 90 days of the effective date of this Discharge Permit, by September 5, 2006, the permittee shall install 18 to 24-inch berms around the entire 220-acre surface disposal area to prevent surface water run-on and run-off. The berms shall be inspected on a regular basis and after any major rainfall event and repaired as necessary.
7.	Sludge shall be applied to 220 acres of land by surface sprayed application or subsurface injection. The sludge shall be evenly distributed over each of eleven 20-acre cells on a rotational basis. The amount of total nitrogen applied with the sludge shall not exceed 200 pounds per acre per year. Nitrogen content shall not be adjusted to account for volatilization or mineralization processes. Excessive ponding shall be prevented. [20.6.2.3109 NMAC]

MONITORING, REPORTING, AND OTHER REQUIREMENTS

#	Terms and Conditions
8.	The permittee shall conduct the following monitoring, reporting, and other requirements listed below. [20.6.2.3107 NMAC]

9.	METHODOLOGY - Unless otherwise approved in writing by NMED, the permittee shall conduct sampling and analysis in accordance with the most recent edition of the following documents: a) American Public Health Association, Standard Methods for the Examination of Water and Wastewater (18th, 19th or current); b) U.S. Environmental Protection Agency, Methods for Chemical Analysis of Water and Waste; c) U.S. Geological Survey, Techniques for Water Resources Investigations of the U.S. Geological Survey; d) American Society for Testing and Materials, Annual Book of ASTM Standards, Part 31. Water; e) U.S. Geological Survey, et al., National Handbook of Recommended Methods for Water Data Acquisition; and f) Methods of Soil Analysis: Part I Physical and Mineralogical Methods, and Part 2. Chemical and Microbiological Properties, American Society of Agronomy. [20.6.2.3107(B) NMAC]
10.	The permittee shall submit semi-annual monitoring reports to NMED by the 28th of January and July each year. As detailed in other conditions in this Discharge Permit, the reports shall include discharge volumes, LADS, copies of DMRs, and analytical results from soil and sludge sampling. These requirements are summarized on the attached sheet. [20.6.2.3107 NMAC]
11.	The permittee shall measure and record the volume and dry weight of sludge discharged monthly to the surface disposal area by tracking the number of loads transported from the WWTP and the average percent total solids of the sludge transported each day. Records of the average percent total solids shall be kept on a manifest (example enclosed) that is maintained on-site. Records of the volume and dry weight of the sludge discharged shall be submitted to NMED in the semi-annual monitoring reports. [20.6.2.3107 NMAC]
12.	The permittee shall sample sludge transported to at the surface disposal facility on a semi-annual basis for TKN and NO₃-N. Analytical results, reported as mg/kg TKN and NO₃ (dry weight basis), shall be submitted to NMED in the semi-annual monitoring reports. [20.6.2.3107 NMAC]
13.	The permittee shall complete the Discharge Monitoring Report (DMR) required under 40 CFR 503. Copies shall be submitted in the monitoring report due by the 28th of July each year. [40.503(17) CFR, 74-6-5.E(1) Water Quality Act, 74-6-5.K Water Quality Act]
14.	The permittee shall complete land application data sheets (LADS - copy enclosed) semi-annually to document the amount of nitrogen applied to the surface disposal area. The LADS shall reflect the nitrogen concentration from the most recent sludge analysis and the total number of dry tons discharged each month (determined using the average total solids concentration of the sludge in the nurse tank each day of application and volume measurement of each truck load of sludge transported to the surface disposal facility). The LADS shall be submitted to NMED in the semi-annual monitoring reports. [20.6.2.3107 NMAC]

15.	The permittee shall collect two composite soil samples annually from each of the cells where sludge was applied. In each cell, six soil aliquots shall be collected at a depth of 24 inches and six soil aliquots shall be collected at a depth of 48 inches. The six aliquots collected at each depth shall be mixed to create two composite soil samples. The permittee shall also collect soil samples at a depth of 24 and 48 inches at one nearby location not receiving sludge applications. The two composite samples from each of the cells where sludge was applied and the two samples from the location not receiving sludge applications shall be analyzed for TKN and NO ₃ -N. Soil NO ₃ -N shall be analyzed by a 2 molar KCl extract, as described in Section 33-3.2 of Methods of Soil Analysis, Part 2, American Society of Agronomy, or another method approved by NMED. Analytical results and a map outlining the sampling locations shall be submitted to NMED in the monitoring report due the 28 th of July each year. [20.6.2.3107 NMAC]

CONTINGENCY PLAN

#	Terms and Conditions
16.	In the event that ground water standards are violated during the term of this Discharge Permit, upon closure of the facility or during the implementation of post-closure requirements, the permittee shall submit a plan to abate water pollution to NMED within 30 days of confirmation of contamination. The plan shall include a site investigation to define the source, nature and extent of contamination; a proposed abatement option; and a schedule for its implementation. The site investigation and abatement option shall be consistent with the requirements and provisions of 20.6.2.4101, 4103, 4106, 4107, and 4112 NMAC. The abatement plan shall be implemented within 30 days of NMED approval. [20.6.2.3107(A)10 NMAC]
17.	In the event that the analytical results from the soil sampling indicate significant migration of total nitrogen, the permittee shall submit to NMED within 60 days a corrective action plan. The plan shall propose additional soil testing to determine the extent of the vertical migration of TKN and NO ₃ -N below the sludge disposal area and address source control or a reduction of the total nitrogen discharged. [20.6.2.3107(A)10 NMAC]
18.	In the event of a spill or release that is not authorized under this Discharge Permit, the permittee shall initiate the notifications and corrective actions as required in 20.6.2.1203 NMAC. The permittee shall take immediate corrective action to contain and remove or mitigate the damage caused by the discharge. Within 24 hours after discovery of the discharge, the permittee shall verbally notify NMED and provide the information required by 20.6.2.1203.A.1 NMAC. Within 7 days of discovering the discharge, the permittee shall submit a written report to NMED verifying the oral notification and providing any additional information or changes. The permittee shall submit a corrective action report within 15 days after discovery of the discharge. [20.6.2.1203 NMAC]
19.	In the event NMED or the permittee identifies any other failures of the discharge plan or system not specifically noted herein, NMED may require the permittee to develop for NMED approval contingency plans and schedules to cope with the failures. [20.6.2.3107(A)10 NMAC]

20.	In the event that LADS show that the amount of nitrogen applied annually exceeds 200 pounds per acre per year, the permittee shall submit to NMED for approval a corrective action plan for the reduction of nitrogen loading to the sludge disposal area. The corrective action plan shall be implemented within 30 days of NMED approval. [20.6.2.3107(A)10 NMAC]
21.	In the event that the sludge disposal area is frozen or covered with snow, sludge shall not be discharged to the surface disposal area. In the event that the adverse conditions persist beyond the storage capacity of the WWTP, the permittee shall obtain NMED approval for a temporary alternative. [20.6.2.3107(A)10 NMAC]

CLOSURE PLAN

#	Terms and Conditions
22.	Upon closure of the facility, the permittee shall perform the following closure measures: a) Pump out any sludge contained in the sludge nurse tank and discharge it by subsurface injection to the disposal area. b) Maintain the fencing around the disposal facility for 30 days to prevent access. c) Allow the five retention ponds that collect disposal site runoff to dry and then regrade the ponds with clean fill to blend with the surface topography. d) Remove the sludge nurse tank and regrade the site. When all post-closure requirements have been met, the permittee may request to terminate the Discharge Permit. [20.6.2.3107(A)11 NMAC]

GENERAL TERMS AND CONDITIONS

#	Terms and Conditions
23.	RECORD KEEPING - The permittee shall maintain at its facility a written record of all data and information related to field measurements, sampling, and analysis conducted pursuant to this Discharge Permit. The following information shall be recorded and shall be made available to NMED upon request: a) The dates, exact place and times of sampling or field measurements; b) The name and job title of the individuals who performed each sample collection or field measurement; c) The date of the analysis of each sample; d) The name and address of the laboratory and the name and job title of the person that performed the analysis of each sample; e) The analytical technique or method used to analyze each sample or take each field measurement; f) The results of each analysis or field measurement, including raw data; g) The results of any split sampling, spikes or repeat sampling; and h) A description of the quality assurance and quality control procedures used. [20.6.2.3107(A) NMAC]

24.	RECORD KEEPING - The permittee shall maintain a written record of any spills, seeps, and/or leaks of effluent, and of leachate and/or process fluids not authorized by this Discharge Permit. [20.6.2.3107(A) NMAC]
25.	RECORD KEEPING - The permittee shall maintain a written record of the operation, maintenance, and repair of all facilities/equipment used to treat, store or dispose of wastewater; to measure flow rates, to monitor water quality, or to collect other data required by this Discharge Permit. This record shall include repair, replacement or calibration of any monitoring equipment and repair or replacement of any equipment used in the permittee's waste or wastewater treatment and disposal system. [20.6.2.3107(A) NMAC]
26.	RECORD KEEPING - The permittee shall maintain a written record of the amount of wastewater, effluent, leachate or other wastes discharged pursuant to this Discharge Permit. [20.6.2.3107(A) NMAC]
27.	RECORD KEEPING - The permittee shall retain records of all monitoring information, including all calibration and maintenance records, copies of all reports required by this Discharge Permit, and records of all data used to complete the application for this Discharge Permit for a period of at least five years from the date of the sample collection, measurement, report or application. This period may be extended by request of the Secretary at any time. [20.6.2.3107(A) NMAC]
28.	INSPECTION and ENTRY - The permittee shall allow the Secretary or an authorized representative, upon the presentation of credentials, to: a) Enter at regular business hours or at other reasonable times upon the permittee's premises or other location where records must be kept under the conditions of this Discharge Permit, or under any federal or WQCC regulation. b) Inspect and copy, during regular business hours or at other reasonable times, any records required to be kept under the conditions of this Discharge Permit, or under any federal or WQCC regulation. c) Inspect, at regular business hours or at other reasonable times, any facility, equipment (including monitoring and control equipment or treatment works), practices or operations regulated or required under this Discharge Permit, or under any federal or WQCC regulation. d) Sample or monitor, at reasonable times for the purpose of assuring compliance with this Discharge Permit or as otherwise authorized by the New Mexico Water Quality Act, any effluent, water contaminant, or receiving water at any location before or after discharge. [20.6.2.3107(D) NMAC, 74-6-9.B & E Water Quality Act]
29.	INSPECTION and ENTRY - Nothing in this Discharge Permit shall be construed as limiting in any way the inspection and entry authority of NMED under the WQA, the WQCC Regulations, or any other applicable law or regulation. [20.6.2.3107 NMAC, 74-6-9.B & E Water Quality Act]

30.	DUTY to PROVIDE INFORMATION - The permittee shall furnish to NMED, within a reasonable time, any documents or other information which it may request to determine whether cause exists for modifying, terminating and/or renewing this Discharge Permit or to determine compliance with this Discharge Permit. The permittee shall also furnish to NMED, upon request, copies of documents required to be kept by this Discharge Permit. [20.6.2.3107(D) NMAC, 74-6-9.B & E Water Quality Act]
31.	SPILLS, LEAKS, and OTHER UNAUTHORIZED DISCHARGES - This Discharge Permit authorizes only those discharges specified herein. Any unauthorized discharges violate 20.6.2.3104 NMAC and must be reported to NMED and remediated as required by 20.6.2.1203 NMAC. [20.6.2.1203 NMAC]
32.	MODIFICATIONS and/or AMENDMENTS - The permittee shall notify NMED of any changes to the permittee's wastewater treatment and disposal system, including any changes in the wastewater flow rate or the volume of wastewater storage, or of any other changes to operations or processes that would result in any significant change in the discharge of water contaminants. The permittee shall obtain NMED's approval, as a modification to this Discharge Permit pursuant to 20.6.2.3109.E, F, or G NMAC, prior to any increase in the quantity discharged, or any increase in the concentration of water contaminants discharged, above those levels approved in this Discharge Permit. [20.6.2.3107(C) NMAC]
33.	ENFORCEMENT - Any violation of the requirements and conditions of this Discharge Permit, including any failure to allow NMED staff to enter and inspect records or facilities, or any refusal or failure to provide NMED with records or information, may subject the permittee to an enforcement action. Pursuant to WQA 74-6-10.A and B, such action may include a compliance order requiring compliance immediately or in a specified time, assessing a civil penalty, modifying or terminating the Discharge Permit, or any combination of the foregoing; or an action in district court seeking injunctive relief, civil penalties, or both. Pursuant to WQA 74-6-10.C and 74-6-10.1, civil penalties of up to \$15,000 per day of noncompliance may be assessed for each violation of the WQA 74-6-5, the WQCC Regulations, or this Discharge Permit, and civil penalties of up to \$10,000 per day of noncompliance may be assessed for each violation of any other provision of the WQA, or any regulation, standard, or order adopted pursuant to such other provision. For certain violations specified in WQA 74-6-10.2, criminal penalties may also apply. In any action to enforce this Discharge Permit, the permittee waives any objection to the admissibility as evidence of any data generated pursuant to this Discharge Permit. [74-6 Water Quality Act]
34.	COMPLIANCE WITH OTHER LAWS - Nothing in this Discharge Permit shall be construed in any way as relieving the permittee of the obligation to comply with all applicable federal, state, and local laws, regulations, permits or orders. [20.6.2 NMAC]
35.	RIGHT to APPEAL - The permittee may file a petition for hearing before the WQCC on this Discharge Permit. Such petition shall be in writing to the WQCC within thirty (30) days of the receipt of this Discharge Permit. Unless a timely petition for hearing is made, the decision of NMED shall be final. [74-6-5.N Water Quality Act]

June 7, 2006

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36.	TRANSFER of DISCHARGE PERMIT - Prior to the transfer of any ownership, control, or possession of this permitted facility or any portion thereof, the permittee shall notify the proposed transferee in writing of the existence of this Discharge Permit and include a copy of this Discharge Permit with the notice. The permittee shall deliver or send by certified mail to NMED a copy of the notification and proof that such notification has been received by the proposed transferee. [20.6.2.3111 NMAC]
37.	TERM - Pursuant to the WQA 74-6-5.H and 20.6.2.3109.H NMAC, the term of this Discharge Permit is five years from its effective date. To renew this Discharge Permit, the permittee must submit an application for renewal at least 180 days before the termination date. [20.6.2.3109(H) NMAC, 74-6-5.H Water Quality Act]

EFFECTIVE DATE: June 7, 2006

EXPIRATION DATE: June 7, 2011

George Schuman for W. Olson

WILLIAM C. OLSON

Chief, Ground Water Quality Bureau

New Mexico Environment Department



New Mexico Environment Department Ground Water Quality Bureau
Discharge Permit Summary

Facility Information

Facility Name Village of Los Lunas Surface Disposal Facility (Sludge)
Discharge Permit Number DP-1053
Legally Responsible Party Phillip Jaramillo, Administrator
Village of Los Lunas
PO Box 1209
Los Lunas, NM 87031
505-839-3840

Treatment, Disposal and Site Information

Primary Waste Type Domestic
Facility Type Municipal Wastewater Sludge Disposal

Treatment Methods

Treatment Type	Designation	Description & Comments
Mechanical Treatment Plant	WWTP	Village of Los Lunas WWTP

Discharge Locations

Discharge Type	Designation	Description & Comments
Surface Disposal (sludge)	surface disposal area	220 acres; surface spray application or subsurface sludge injection

Depth to Ground Water 400 feet
Total Dissolved Solids (TDS) 150 mg/L

Permit Information

Application Received February 21, 2006
Public Notice Published April 27, 2006
Discharge Permit Approved June 7, 2006
Discharge Permit Expires June 7, 2011
Permitted Discharge Volume 35,000 gallons on one or multiple days each week

NMED Contact Information

Mailing Address Ground Water Quality Bureau
PO Box 26110
Santa Fe, New Mexico 87502
Telephone Number 505-827-2900
NMED Lead Staff Kathie Deal
Lead Staff Telephone Number 505-827-2713
Lead Staff E-Mail kathie.deal@state.nm.us



New Mexico Environment Department Ground Water Quality Bureau
Discharge Permit Renewal
Summary of Required Actions, Monitoring and Reporting

Village of Los Lunas Surface Disposal Facility (Sludge), DP-1053

Effective Date: June 7, 2006

Required Actions

#	Description of Required Actions	Due Date
1.	Post signs in English and Spanish indicating that the site is a sludge disposal facility and that the water is not potable.	within 90 days of effective date, by September 5, 2006
2.	Install berms around the entire surface disposal area.	within 90 days of effective date, by September 5, 2006
3.	Submit Monitoring Reports, containing items specified below.	semi-annually, by the 28 th of January and July, beginning in July

Monitoring and Reporting Requirements

#	Description of Monitoring and Reporting Requirements	Monitoring Frequency	Reporting Due Dates
1.	Measure the percent total solids of each load. Calculate and record the average percent solids of transported sludge each day.	each load of sludge transported	keep onsite
2.	Record total monthly volume and dry weight of sludge discharged to the surface disposal area.	monthly (6)	<i>each Reporting period</i>
3.	Analyze sludge from nurse tank for TKN and NO ₃ -N. Submit analytical results (laboratory reports).	semi-annually	28 th of Jan & Jul
4.	Complete and submit Land Application Data Sheet (LADS).		
5.	Copy and submit Discharge Monitoring Reports (DMR).	annually	28 th of Jul <i>March/April Analysis</i>
6.	Analyze composite soil samples collected from the surface disposal area (24 inches and 48 inches) for TKN and NO ₃ -N. Submit analytical results (laboratory reports) and a map showing sampling locations.		

NOTE: See Discharge Permit for full requirement details.

Submit all reports to:

NMED Ground Water Quality Bureau
PO Box 26110
Santa Fe, New Mexico 87502

SLUDGE TRANSPORT MANIFEST

[illegible]



New Mexico Environment Department
Ground Water Quality Bureau

Land Application Data Sheet

Last Updated: May 31, 2005

DP#:

FACILITY NAME:

SURFACE DISPOSAL FACILITY (SLUDGE)

REPORT PERIOD - FROM:

TO:

(month/day/yr)

(month/day/yr)

MONTH	CELL #	A SLUDGE APPLIED (dry tons)	B LAB RESULTS: TN TKN (mg/kg) + NO3-N (mg/kg)	C LAB RESULTS: TN* (lbs/ton) (B / 500)	D NITROGEN APPLIED (lbs) (C x A)	E NITROGEN APPLIED (lbs/acre) (D / # acres)
example: January	1	45.00	30,000	60.00	2,700.00	11.25
January						
February						
March						
April						
May						
June						
July						
August						
September						
October						
November						
December						
TOTALS						

(*) 500 mg/kg = 1 lb/ton

Appendix D

Condition of the Existing Facilities at the Activated Sludge Plant

APPENDIX D
SUMMARY OF THE CONDITION OF EXISTING FACILITIES AT THE ACTIVATED SLUDGE WWTP

Unit Operation	Description	Manufacturer	Year Built	Evaluation Criteria	Present Condition and Comments	Recommendation for Continued Use
Wastewater Treatment Plant (WWTP) Site	- The WWTP is located at 1960 Heaton Loop S.E., Los Lunas, Valencia County, NM. - The outfall discharges to the receiving waters named Rio Grande in Segment 20.6.4.105 of the Rio Grande Basin, from a point located approx. Latitude 34m 46s 48d North, Longitude 106m 43s 50d West - The site where the WWTP is located consists of approximately 19.9 acres.	Not applicable	-		- NPDES Permit NM0020303 effective July 1, 2007, expired on June 30, 2012. - Effluent from the activated sludge plant and the new membrane bioreactors (MBR) plant is blended and discharged to the Rio Grande River. - Wasted sludge is mechanically thickened by a gravity belt thickener and stabilized in the aerobic digesters, then transported by a tanker truck to the sludge disposal site for land application.	
ACTIVATED SLUDGE WASTEWATER TREATMENT PLANT						
Activated Sludge WWTP	- The original wastewater treatment facility was constructed in 1981 as an extended aeration process with capacity of 0.7 MGD average day flow and 1.4 MGD peak flow. - The basis of design was 220 mg/L BOD and 200 mg/L TSS. - In 1992, the plant was converted to a conventional activated sludge process, thereby increasing the capacity to approximately 1.23 MGD with discharge standards current for the time. - Due to changes in the NPDES permit in the mid 1990s, the capacity of the plant was reduced from 1.23 MGD to about 0.8 MGD.	Not applicable	1981, 1995	- Detention time and aeration process necessary to meet current NPDES limits: 30 mg/L BOD, 30 mg/L TSS, <126 cfu/100 ml E.coli, 6.6-9.0 pH units, 48-hr acute Whole Effluent Toxicity Test at 14% critical dilution. - WWTP current rated capacity = 0.8 MGD average day flow. - WWTP peak flow capacity = 2.0 MGD assuming peaking factor of 2.5Qavg.	- The activated sludge plant is currently receiving 0.4 to 0.5 MGD influent flow. - Per the plant operators, the plant performance is fine at this flow rate. - The operations staff commented that the Village has implemented a grease-trap inspection program which has resulted in a better influent quality and a reduction in problems at the plant related to the presence of grease.	- The main problem associated with the operation of this plant is getting replacement part for the existing equipment, which can be hard to find and expensive. - Rated capacity of plant: • 0.8 MGD average flow • 2.0 MGD peak flow
Influent Lift Station with Submersible Pumps	- Influent: main raw sewage influent line 18-in; other streams from the plant main drain line, flow from the administration/lab building, flows from the grit chamber and grit processing equipment. - Influent lift station wet well was originally equipped with three screw-type pumps. - Three submersible were installed to replace the original screw-type pumps. - Capacity: Each pump is sized for 1,170 gpm at 43.3-ft TDH with a single pump. Two pumps in operation have capacity for 1,870 gpm at 50.9-ft TDH. Motors: 20 HP. - The pumps have AFDs that allow the speed of the pump and discharge rate to be adjusted in response to the changes in the influent flow rate (level in wet well).	Flygt Pumps	2007	- Wet well and equipment must have capacity to pump peak flow. - A facility should include one installed standby pump.	- Influent line: condition unknown. - There are three pumps installed, two for service and one standby unit. - The pumps are relatively new and appear to be in good mechanical condition. - The pumps are heavy and need to be removed from the wet well at least once per year for maintenance (drain glycol). - Because of the geometry of the wet well originally designed for screw-type pumps, solids accumulate in the wet well. This interferes with the proper operation of the level transmitters. - There is only one float as back up of level transmitters. - Condition of Concrete: - Sidewalks: minor cracking. - Wetwell: concrete in good condition.	- Install two more floats for back up. - Rated capacity of pumps: • 1,170 gpm one pump • 1,870 gpm two pumps

APPENDIX D
SUMMARY OF THE CONDITION OF EXISTING FACILITIES AT THE ACTIVATED SLUDGE WWTP

Unit Operation	Description	Manufacturer	Year Built	Evaluation Criteria	Present Condition and Comments	Recommendation for Continued Use
Influent Lift Station with Submersible Pumps (continued)					- Condition of Coatings: - Re-touch of coating inside the south side of the wet well in progress at the time of the site visit on April, 2011. - Some coating degradation inside the wet well, where the pumps are located. Access to this area is difficult. - Pipe coating in good condition, small areas show minor deterioration. - Condition of Equipment: - No visible signs of deterioration or leakage. - Pipes show some minor signs of cracking, but no visible leakage or corrosion. - Electrical system and equipment appear to be in good condition. - Condition of Miscellaneous Metals: - Handrail and grating in good condition and adequately secured. - Structural support for pumps in fair condition, minor signs of surface rusting.	
Flow Metering	- Influent flow measurement consists of a Parshall flume with a 9-in wide throat.		1981	- Per the "Isco Open Channel Flow Measurement Handbook", the minimum and maximum recommended flow rates for free flow through a 9-in Parshall flume are 0.059MGD and 5.73 MGD, respectively. The maximum recommended head is 2.0 ft.	- The Parshall flume appears to be in good condition. - The operations staff does not report any problems with its operation and accuracy.	- Rated capacity of Parshall flume: • 5.73 MGD peak flow
Mechanical Bar Screens	- There are two front cleaned mechanical bar screens; the west screen is the primary unit and the east screen the emergency/back-up unit. - The west bar screen (primary screen) is 2-ft 6-in wide with 3/8-in openings between bars, inclined at 30 degrees to vertical. Motor: 1.5 HP. - The east bar screen (back-up) is 2-ft 6-in wide and has ¾-in openings between bars. Motor: 1.5 HP.	West screen: Enviroquip East Screen: Sampson bar screen by Vulcan Industries, Inc.		- General Engineering Practice: Bar screens capable of removing solids that may damage downstream equipment (pumps, valves, etc.) or that get deposited at the bottom of the basins. - Per NMED "Recommended Standards for Wastewater Facilities", Section 61 "Screening Devices", clear openings for mechanically cleaned screens should not be less than ¼-in to prevent excessive capture of organics; maximum clear opening will be 1-3/4-in.	- Bar screen openings are within the recommended standards. However, the operators report that a lot of solids pass through them to the aeration basins and clarifiers. - Most of the west bar screen has been re-built. - Condition of Concrete: - Some signs of leakage from this structure can be seen inside the grit pumps room and on the south wall (exterior) of the grit pumps room. Mineral deposits have been formed. - Minor concrete cracking and damage on sidewalks. - Condition of Equipment: - West bar screen: stainless steel, in good condition. Minor corrosion. Discharge basket made of carbon steel with visible corrosion.	- The plant operators report that this equipment is old and obsolete thus it is hard to find replacement parts. - Rated capacity of mechanical bar screens is: • 2.18 MGD average flow • 5.45 MGD peak flow

APPENDIX D
SUMMARY OF THE CONDITION OF EXISTING FACILITIES AT THE ACTIVATED SLUDGE WWTP

Unit Operation	Description	Manufacturer	Year Built	Evaluation Criteria	Present Condition and Comments	Recommendation for Continued Use
Mechanical Bar Screens (continued)					- Electrical system and equipment appear to be in fair condition. - Condition of Miscellaneous Metals: - Old (1-ton) crane by the bar screens shows minor corrosion. - Stairways and handrail in good condition. - Some gaps on grating at entrance works structures (bar screens, channels). - No aluminum kick plate on north side of bar screens area. - Screenings discharge chute in fair condition.	
Aerated Grit Chamber and Grit Pumps	- The existing grit chamber is a concrete tank with an approx. volume of 8,976 gallons. - Two WEMCO torque flow grit pumps, Model C4x4, each 220 gpm at 32-ft head and 780 rpm. - Pump motors, General Electric 10 HP. - Air to the air diffusers in the grit chamber is supplied by the plant aeration system blowers.	Grit Pumps: WEMCO torque-flow pumps.	1981	- Per NMED "Recommended Standards for Wastewater Facilities", Section 63.4.4 "Aerated Grit Chambers", the detention time should be no less than 3 minutes at design peak hourly flows. - General Engineering Practice: One pump in service and one pump standby.	- The grit removal system is working properly. - The rated capacity of the grit chamber at a 5-min detention time is 2.59 MGD peak flow. The operations staff reports that the aerated grit chamber appears to remove a lot of grit, but the amount of deposited at the bottom of the aeration basins is unknown as these basins have never been drained - Condition of Concrete: - Minor cracking and damage on top of walls around this area. - South side of the screenings channels has cracks on concrete and signs of leakage. - Minor signs of leakage around the entrance works area, northeast side of the grit chamber wall and east side of the bar screens structure, above the grit pumps room. - Pumps located inside a room which looks in good condition. The ceiling shows minor signs of potential leakage from the bar screens located on top of the room. - Condition of Coatings: - Inside grit chamber there is a more visible deterioration of coating. - Good condition of valves and piping coating, with minor damage. Minor corrosion on check valves.	- Rated capacity of the aerated grit chamber is: • 1.04 MGD average flow • 2.59 MGD peak flow

APPENDIX D
SUMMARY OF THE CONDITION OF EXISTING FACILITIES AT THE ACTIVATED SLUDGE WWTP

Unit Operation	Description	Manufacturer	Year Built	Evaluation Criteria	Present Condition and Comments	Recommendation for Continued Use
Grit Cyclone & Classifier	- WEMCO Hydrogritter (cyclone/classifier), Model 12, 220 gpm at 5 psi. - Classifier: 12-in. - Cyclone: 10-in. - Motor: 0.5 HP.	Hydrogritter Unit: WEMCO	1981	- Capacity of this equipment should match the capacity of the other components of the entrance works (grit chamber)	- Condition of Equipment: - Cyclone/classifier - some corrosion, but operational. - Electrical system and equipment appear to be in fair condition.	
Aeration Basins	- The biological treatment process consist of two aeration basins which have a capacity of 374,500 gallons each (including the clarifier feed basin), at a side water depth (SWD) of 22-ft. The estimated detention time is 18.5 hrs at 0.98 MGD flow. - Air is supplied by the centrifugal blowers located in the blowers/maintenance room. An 18-in header splits the air flow into two 12-in feed lines, one for each train. - The aeration system consists of two air bridges per basin. Each air bridge is equipped with nine 24-in shear tubes with 2-in air drops.	Aeration equipment: Enviroquip	1981	- General Engineering Practice: Biological process capable of producing effluent with low ammonia to meet current Whole Effluent Toxicity (WET) Test requirements in the NPDES permit.	- The original design as a conventional activated sludge process was converted to extended aeration for the removal of ammonia; the aeration basins capacity decreased to approximately 0.8 MGD. - The plant is currently receiving about 0.4 to 0.5 MGD of flow. - Aeration equipment appears to be working well with homogeneous air distribution in the basins. - Air for both basins is supplied by one blower. - Condition of Concrete: - Minor cracking on concrete on top of walls. - Condition of Coatings: - Some coating degradation on top of some wall areas and inside the basins. - Butterfly valves on air piping have deteriorated coating and some signs of corrosion. - Condition of Equipment: - Significant corrosion on influent gates. - Some noise on air piping indicates potential air leak. - Condition of Miscellaneous Metals: - Handrail and grating in good condition. - Minor, localized corrosion on grating supports/frames. - Additional Notes: - Electrical system and equipment appear to be in good condition. - Hydrants show signs of corrosion. - RAS channel in good condition, marks (tape) on the flume cannot be read. - The aeration basins have never been drained; functionality and operational condition of the drain valves is questionable. - Some scum and solids accumulation on the southeast corner of the re-lift wet well (south section of the aeration basins).	- Rated capacity of the aeration basins: • 0.8 MGD average flow • 2.0 MGD peak flow - The operators report good performance of the plant for current flows 0.4 to 0.5 MGD.
Return Activated Sludge (RAS)	- A return activated sludge (RAS) channel is provided between the two aeration basins. The RAS channel is aerated. - The approximate volume of the RAS channel is 39,500 gallons. - The RAS line from the clarifiers is 10-in. Suction is provided by two airlift pumps located at the south side of the RAS channel. - A Parshall flume is used to measure RAS flow.					

APPENDIX D
SUMMARY OF THE CONDITION OF EXISTING FACILITIES AT THE ACTIVATED SLUDGE WWTP

Unit Operation	Description	Manufacturer	Year Built	Evaluation Criteria	Present Condition and Comments	Recommendation for Continued Use
Blowers	- Four centrifugal blowers. - Blowers are 125 HP, 1894 cfm per unit at 3500 rpm and 12.3 psia inlet pressure. - For the aeration basins, one blower running for current flows. For higher flows, two units running. The other blower is a standby unit. The blower that supplies air for the aeration basins also provides aeration of the grit chamber, the re-aeration basins, and the airlift pumps. - One blower in service continuously to supply air for the aerobic digester.	Spencer Turbine Co. Blowers, Model 70100-H Spec. Reliance Motors.	1981, 1995	- General Engineering Practice: Number of blowers and capacity need to be capable of meeting peak air flow demand for removal of organics and nitrification. An additional unit must be available as a standby.	- The operations staff reports that even with one blower supplying air to both the aeration basins, for current flows the DO concentration in the basins is high and some air has to be released in the post-aeration basins (originally designed as chlorine contact chambers). - The blower used for the aerobic digester is the newest unit which was added in 1995, during construction of the sludge handling facilities. The other three blowers are part of the original extended aeration plant built in 1981. - Blowers cannot be supported by the existing emergency generator to run during power outages. - Condition of Concrete: - Blowers building in good general condition. - Very minor cracking on wall. - Condition of Equipment: - Evaporative cooler – some corrosion. - Emergency generator – in fair condition, but needs to be replaced in the short term. - Blowers – in good condition, maintenance has been related to replacing bearings.	- There are four blowers installed, but only two units are usually in service for current flow conditions (0.4 to 0.5 MGD). - The blowers are in fair condition for continued use at this plant in the short term. However, some failures and difficulties to get spare parts have been recently experienced (2011).
Secondary Clarifiers	- The activated sludge plant has two secondary clarifiers, each 40-ft diameter and SWD of 14-ft. - Drive motor: 0.5 HP. - The surface area is approximately 1,250 square feet (sq.ft.) and 131,000 gallons of volume per unit. - Spray pump (located inside the washwater pumps room): 100 gpm at 80-ft TDH. - Pump motor: 5 HP.	Clarifiers: Enviroquip, Inc. Spray pump: Fairbanks-Morse.	1981	- General Engineering Practice: Overflow rate at peak flow 500-600 gpd/sq.ft. or at average flow with largest unit out of service.	- The 30-year old original equipment is still in service and in good operational condition. - Plant operators report good effluent quality at current flow conditions. - The secondary clarifiers are the limiting process units of the activated sludge plant. - At current flow of 0.5 MGD the surface overflow rate is 200 gpd/sq.ft. - Condition of Concrete: - Minor cracking on top of walls and common wall with the aeration basins. - Condition of Coatings: - Some degradation of coating on top of walls and upper part of the common walls with the aeration basins. - Most of the coating in the effluent box (interior wall) is severely deteriorated. - Condition of Equipment: - Low maintenance requirements, mainly lubrication.	- The operators report good performance of the plant for current flows 0-4 to 0.5 MGD. - Rated capacity of two secondary clarifiers: • 0.8 MGD average flow • 1.5 MGD peak flow (at 600 gpd/sq.ft.) • 2.0 MGD peak flow (at 800 gpd/sq.ft.).

APPENDIX D
SUMMARY OF THE CONDITION OF EXISTING FACILITIES AT THE ACTIVATED SLUDGE WWTP

Unit Operation	Description	Manufacturer	Year Built	Evaluation Criteria	Present Condition and Comments	Recommendation for Continued Use
Secondary Clarifiers (continued)					- Weirs and baffles in good condition, minor corrosion. - Flow over the weirs is more uniform on the east clarifier than in the west clarifier due to some large solids deposition on the weirs in the west clarifiers. - Flow from the spray bar appears to be uniform. - Some floatable solids have accumulated around the corners of the effluent box - Condition of Miscellaneous Metals: - Handrail and grating in good condition. - Minor corrosion on top of the feed well, by the clarifier drive. - Additional Notes: - Electrical system appears to be in good condition. - Button covers on the control panels have been severely degraded by the elements, but still functional.	
Post-Aeration Basins	- These basins were originally designed as chlorine contact chamber. After the improvements made in 1995 and installation of the UV disinfection system, the basins have been used for re-aeration of effluent from the clarifiers.	Not Applicable	1981	Not Applicable.	- Flow capacity in the post-aeration basins is “unlimited” as they are not a required biological treatment process to achieve current discharge limits in the NPDES permit.	
Waste Activated Sludge (WAS) Pumps	- The WAS pumps draw waste sludge from the RAS channel located between the aeration basins and discharges to the gravity belt thickener. - Two double disc pumps installed each 300 gpm at 20-ft TDH. - Pump motor: 15 HP. - Drive: Nord mechanical variable speed drive, model SF41R250-254T. - The pumps are equipped with a manual speed control. - The pump is driven through a mechanical variable speed drive within a range of 110-660 rpm. However, the pumps have been constantly run at about 250 gpm for many years.	Penn Valley Pumps, Baldor Motors Nord variable speed drive	1981	- General Engineering Practice: size pumps to match capacity of gravity belt filter press. Include a standby unit.	- The WAS pumps have VFDs, but they are typically operated to run at 250 gpm. - The operators would like to use a direct drive and run constantly at 250 gpm. - Condition of Concrete: - Building in good general condition, minor cracking on floor (north side). - Condition of Coatings: - Minor damage. - Condition of Equipment: - Piping – minor signs of leakage. - Some grease around south pump seals, with minor signs of leakage. - North pump in good condition, no grease or apparent leaks.	- Rated capacity WAS Pumps: 250 gpm

APPENDIX D
SUMMARY OF THE CONDITION OF EXISTING FACILITIES AT THE ACTIVATED SLUDGE WWTP

Unit Operation	Description	Manufacturer	Year Built	Evaluation Criteria	Present Condition and Comments	Recommendation for Continued Use
Ultraviolet (UV) Light Disinfection System	- There are two banks with a total of 16 modules (8 per bank) with submerged UV lamps located in a single channel. - The set of lamps is designed to provide 65% UV light transmissivity at 30 mg/L TSS. - An automatic level controller is placed at the end of the channel to ensure that a constant depth passes the UV lamps at all times.	Trojan Technologies, Inc.	1995	- Per NMED "Recommended Standards for Wastewater Facilities", Section 104 "UV Disinfection", UV disinfection should be limited to high quality effluent having at least 65% UV radiation transmittance at 254 nm wave length and BOD/TSS concentrations <30 mg/l at any time.	- The system is capable of providing the disinfection required per current standards. - Both banks are in service all the time. At the time of the site visit on April 2011, the west bank had 8 sets of lamps and the east bank had only 7 sets. - Plant operators inspect the lamps daily and remove them weekly for inspection and cleaning. - Condition of Concrete: - Some damage on the effluent weir walls, downstream of the UV channels. - Concrete on the UV channels and structure in good condition. - Condition of Coatings: - Some deterioration on the walls (interior) of the UV channels. - Operational Issues: - Some floatable solids have accumulated in the clear well located inside the effluent box. - The weighted effluent weir is not functioning properly and has been secured externally.	- Rated capacity of UV disinfection system: 1.5 MGD average flow
Washwater System	- Two washwater pumps installed. - Washwater pumps supply water for clarifiers spray and gravity belt thickener operation and cleaning. - Each pump sized for 90 gpm at 230-ft head and 3500 rpm. - Pump motor: 15 HP.	Aurora Pumps Model 342A		- General Engineering Practice: Required pumps for service plus one standby.	- There are two pumps installed, one in service and one standby. - South pump was re-built. - Condition of Concrete: - Some cracks on south wall of the building. - Pre-cast roof panels look in good condition. - Old chlorination room is currently used for storage of UV lamps. - Condition of Coatings: - Building in good condition.	- Washwater system is capable of supplying water for two clarifiers spraying and for the gravity belt thickener cleaning/washing. - There are some safety concerns due to the lack of residual chlorine.
Effluent Pump Station	- Two 12-in diameter submersible pumps installed, one in service and one standby. - Capacity for 2,000 gpm at 19.5-ft TDH (low well level) and 2,500 gpm at 16-ft TDH (high well level). - Pump motors: 14 HP. - The existing pumps were modified in 2010 to include new AFDs (currently installed on south pump), local control panel, programmable logic controller (PLC), pressure transducer, and backup floats.	Flygt Pumps		- General Engineering Practice: Required pumps for service plus one standby.	- The effluent pumps are used to convey disinfected effluent from the activated sludge plant to the blend box where it is combined with effluent from the MBR prior to final disposal. - The existing effluent pumps were designed to handle 100% of the flow from the collection system at the activated sludge. - After putting the MBR plant in service in 2010, electrical modifications to the existing pumps were required to match the reduced flows to the activated sludge plant.	- Rated capacity effluent pump: • 2,000 gpm at 19.5-ft (low wet well level) • 2,500 gpm at 16-ft (high wet well level)

APPENDIX D
SUMMARY OF THE CONDITION OF EXISTING FACILITIES AT THE ACTIVATED SLUDGE WWTP

Unit Operation	Description	Manufacturer	Year Built	Evaluation Criteria	Present Condition and Comments	Recommendation for Continued Use
Emergency Generator	- Generator has capacity to run one influent pump, one bar screen, and one effluent pump only. - Original generator: Capacity 90 KW generator driven by a 149 HP diesel engine. Model F674D, automatic transfer switches and 300 gallons diesel storage tank. - Existing generator: a used generator was installed in April 2012 to replace the old unit, which was about 30 years old. Capacity 160 kW, 200 kva, operated by 180 HP motor. “New” generator is a 1998 Caterpillar unit which had 1346 hours of service at start-up.	Old: Marathon Electric, Magna One. Model: Synchronous AC Generator Existing: Caterpillar model 3208	1981	- General Engineering Practice: Capable of running critical equipment and plant components during power outages and emergencies.	- The old generator was not reliable. - The generator broke down in November 2010 and some other failures occurred in 2011. - The starters were also replaced. - It was hard to find replacement parts and very costly for the plant to run a portable generator during emergencies. - Replaced with a 1998 used unit in April 2012.	- Old generator was replaced with a used unit, which has more capacity.
OTHER PLANT COMPONENTS						
Administration /Lab Building	- The activated sludge plant has a building that is currently used as general administration office and laboratory. - The building has several separate rooms for the following uses: laboratory (including emergency eye wash and shower), lab office area, office space, training/break room, restrooms for men and women, janitor’s closet, locker room, and shower room.			- N/A	- The administration building is now small because the operations staff has increased since the time of construction of the original extended aeration plant.	- More office space is needed for the operators and management. - The laboratory space is also small and there is need for more equipment, particularly analytical kits (Hach®) to measure nitrogen and other parameters at the plant instead of sending the samples to external laboratories. - Audio-visual equipment is also needed for training at the plant.
Effluent Disposal Line	- After blending, the combined effluent from the activated sludge plant and the MBR plant flows through the original 16-in diameter ductile iron pipeline installed in the 1980s that discharges into the Rio Grande.		1981	- General Engineering Practice: Sized to convey average and peak flows. - The pipe is capable of handling average day flow of 1.7 MGD, equivalent to peak flow of 3.4 MGD.	- The effluent disposal line to the point of discharged is over 30 years.	- The effluent line needs to be replaced in the near future, preferably by year 2016.

Appendix E

Condition of the Existing Facilities at the Membrane Bioreactors (MBR) Plant

APPENDIX E

SUMMARY OF THE CONDITION OF THE MEMBRANE BIOREACTORS (MBR) PLANT COMPONENTS

Unit Operation	Description	Manufacturer	Present Condition and Comments
General Plant Design Criteria	- Influent characteristics: Domestic wastewater, influent BOD = 322 mg/L, TSS = 250 mg/L, total nitrogen= 40 mg/L. - Min. temperature for membranes = 15°C. - Mixed liquor suspended solids in MBR basins greater than 12,000 mg/L and 12 days SRT. - Design flows: Average daily flow = 1.8 MGD. Peak daily flow = 3.6 MGD. - Effluent quality: The MBR process designed to produce effluent with <5 mg/L BOD, <5 mg/L TSS, and <10 mg/L total nitrogen.	Not Applicable	- The MBR plant started construction in 2007 and operations in 2010. - MBR plant layout is for a “campus”, which would allow construction of other MBR facilities while sharing some components. - Designed for construction in phases. - Entrance works designed for ultimate plant capacity of 3.6 MGD (after installation of a third fine screen and ancillary equipment). - Current MBR system (basins, pumps, blowers) designed for Phase 1 flow of 0.9 MGD (with lower cassettes) and 1.8 MGD with upper-level cassettes and three additional permeate pumps. - Another MBR system as the one described above can be supported by the existing entrance works.
Flow Metering (Magmeter)	- The influent to the MBR plant is received directly from the Morris lift station and the plant drain lift station. - The flow meter is an 18-in electromagnetic unit with capacity to measure 756 to 30,250 gpm.		- Influent Mag meter has capacity for average flow of 3.1 MGD and a peak flow of 6.0 MGD. - The following flow parameters will be logged once per day: average daily flow, continuous flow total, daily flow total, daily maximum flow, daily minimum flow, and recent total flow. - The operations staffs report that they have notice that during the early hours, the influent received at the MBR plant is very black and septic in appearance. This may be due to the ON/OFF cycle at the Morris lift station.
Fine Screens, Screenings Compactor, and Screenings Conveyor	- Two fine screens and two screenings press/compactors currently installed and room for a third future unit. - Peak capacity 6.62 MGD (at 325 mg/L TSS), each screen. - Screens perforation size: 2 mm (0.08-in). - Screens drive unit: 1.5 HP motor.	Fine Screens: Waste-Tech, Inc., Model RS 3024-60 Rotosieve Filter Drum Screen	- The fine screens alternate once per day, but can be set to be alternated twice per day. - The south screen gear box was replaced. - Rated capacity of fine screens (each): • 6.6 MGD peak flow

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SUMMARY OF THE CONDITION OF THE MEMBRANE BIOREACTORS (MBR) PLANT COMPONENTS

Unit Operation	Description	Manufacturer	Present Condition and Comments
Fine Screens, Screenings Compactor, and Screenings Conveyor (continued)	- Screens drive unit: 1.5 HP motor. - Screenings press/compactor capacity for up to 0.33 cfm of screenings. - Screenings minimum volume reduction: 75-85%. Solids after compaction: 35-40%. - Screenings press/compactor 2 HP motor. - One screening conveyor transports screenings discharged by the washer/presses to the discharge chute. - The spiral conveyor is 9-in dia., 20-ft long, 1.5 HP motor. - The conveyor has capacity for up to 0.33 cfm or 25 lbs/min of screenings at 5-10% solids. - Water for continuous washing of the screens supplied at 25 gpm and 80 psig.	Screenings Washer/Press: Waste-Tec, Inc. Model FSM SP(W) 200 Screenings Conveyor: Waste-Tec, Inc. Model SC 230	
Aerated Grit Chamber, Grit Pump and Classifier	- The grit chamber is 15-ft wide by 15-ft long, 14.8-ft SWD from the discharge weir to the top of the grout that forms the hopper. Depth at the center of the tank 17.6-ft. - Grit chamber is equipped with a 24-in draft tube aerator and a 4-in airlift grit pump. - Design air flow rate: maximum 30 scfm/1000 cu.ft. of working tank volume, average 20 scfm/1000 cu.ft. - The air lift pump discharges to the classifier which washes out organic material and dewateres the grit. - The grit classifier is a 12-in diameter screw conveyor equipped with a 0.33 HP motor.		- Grit chamber designed for 5-minutes detention time at peak flow. - The grit pump has capacity for up to 100 gpm at 12 cfm air flow. - The grit pump runs continuously for 20 min/hr and is off for 40 mi/hr. - Rated capacity of grit chamber: • 7.2 MGD peak flow
Grit Chamber Blowers	- Two positive displacement blowers supply air to the grit chamber and airlift pump. - Air flow rate: 120 scfm, 155 icfm. - The motor capacity is 10 HP.	Blowers: Aerzen Model GM 10S	- Each blower (one duty and one standby) has capacity for an air flow rate of 120 standard cubic feet per minute (scfm) at a discharge pressure of 7.0 psig.
Anoxic Basins	- Two anoxic basin each 41-ft wide by 15-ft long. - Variable water depth; maximum 12-ft, low 8-ft. - The volume of mixed liquor in the basins varies from 55,200 gallons (at maximum water level) to 36,800 gallons (at lowest water level). - Two submersible mixers per basin. - Capacity of the mixers driven by 2.5-HP motors is 4,010 gpm minimum pumping rate.	Mixers: Flygt Model 4630	

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SUMMARY OF THE CONDITION OF THE MEMBRANE BIOREACTORS (MBR) PLANT COMPONENTS

Unit Operation	Description	Manufacturer	Present Condition and Comments
Transfer Pumps	- Two submersible pumps known as “transfer pumps” per anoxic basin. - The transfer pumps located in the anoxic basins feed the pre-aeration basins. - Pumps design operating point: 3,397 gpm at 15.7-ft TDH. - Pump motor: 25-HP, 1160 rpm.	Transfer Pumps: Flygt Model NP3171 with 614 impeller	- The operations staff reports problems to remove the pumps from the basins because they are heavy. The crane on top of the basins available to remove them is a manual unit which is not appropriate for this task. It works fine to remove the mixers and smaller (lighter) equipment. - An electrical crane to remove the transfer pumps is desirable to replace the existing manual crane.
Pre-Aeration (PA) Basins	- Two pre-aeration basins, each 41-ft wide by 23-ft long. - Each basin is equipped with eleven (11) 24-in shear tubes with 2-in air drops, two submersible mixers, an effluent slide gate (flow under bottom), and a DO probe. - The aeration system is designed for a maximum air flow rate per tube of 65.9 scfm at 3.5 fps. - The submersible mixers are driven by 4.0 HP motors with minimum pumping rate of 4,490 gpm.	Mixers: Flygt Model 4640	
Pre-Aeration (PA) Blowers	- Two positive displacement blowers with AFDs provide air for mixing and organics removal at the pre-aeration basins. - Air flow rate: 1638 scfm, 2120 icfm. - Intake pressure at site: 12.29 psia. - The motor capacity is 100 HP. - The PA blowers are controlled by the DO concentration in the basins. This probe is checked and calibrated using a portable probe.	Blowers: Aerzen	- Each blower has a design capacity of 1,638 cfm at a pressure of 7 psi. The blowers are driven by 100 HP motors.
MBR Basins	- The flow from each pre-aeration basin is split into two MBR basins, which results in a total of four MBR basins in the plant. - Each MBR basin is 14-ft wide by 32-ft long and a maximum water level of 18.5-ft (minimum of 14-ft water depth to cover a double-deck set of cassettes). - There are nine (9) cassettes installed in each of the four MBR basins (lower level).	Membranes: Kubota Corporation, Flat Plate Cartridges Model MK200, Diffuser Case Model DES200	- An upper and lower submerged membrane unit (SMU or cassettes) can be installed in each basin but only the lower SMUs are currently installed. - During normal operation, membrane filtration is gravity driven. - The total capacity of the four MBR basins with the lower cassettes installed is 0.9 MGD at average day flow.

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SUMMARY OF THE CONDITION OF THE MEMBRANE BIOREACTORS (MBR) PLANT COMPONENTS

Unit Operation	Description	Manufacturer	Present Condition and Comments
MBR Basins (continued)	- A cassette is composed of 200 flat plate cartridges with a pore size opening of 0.4 microns that prevents the passage of suspended solids while allowing the free passage of filtered water (permeate). - Each membrane cartridge has a surface area of 8.6-sq.ft., designed for a flux (flow) of 14.7 gallons per day per square foot (gpd/sq.ft.) at 15°C during maximum month flow and peak flux of 29.4gpd/sq.ft at 15°C during a 24-hr peak event. - Each MBR basin is equipped with nine air diffuser assemblies (one per cassette) fitted with a diffuser manifold designed to distribute air for membrane cleaning and aeration of the mixed liquor. - Each diffuser assembly is equipped with a backwash flushing system to clean the diffusers.		- The capacity can be increased to 1.8 MGD when the upper level cassettes are installed in the four basins and three more permeate pumps are added to the permeate lift station.
MBR Blowers	- The MBR blowers deliver air to the membrane basins for mixing, MBR plate cleaning to prevent fouling, and for organics removal at the basins. - Three positive displacement blowers (two in service, one standby) supply air to the MBR basins. - Air flow rate: 1780 scfm, 2304 icfm. - Intake pressure at site: 12.29 psia. - The motor capacity is 125 HP.	Blowers: Aerzen	- Each blower has a design capacity of 1,780 cfm at a pressure of 9 psi.
Permeate Pump Station	- The permeate wet well is 10-ft 10-in wide by 20-ft long and 12.5-ft total depth. - At a high water level (HWL) the storage volume is 13,776 gallons. - There are three permeate pumps installed with AFDs. - The pumps operate automatically to pump permeate to the effluent blend and sampling box. - Pumps design operating points: Single pump: 1,520 gpm at 18-ft TDH. Three pumps: 4,241 gpm at 21.4-ft TDH. Five pumps: 6,325 gpm at 26.2-ft TDH. - Pump motor: 15-HP, 1755 rpm.	Permeate Pumps: Flygt Model NP3153 with 436 impeller	- The existing three pumps can handle the MBR expansion from 0.9 MGD to 1.8 MGD. - The permeate pump station wet well has capacity for three more permeate pumps, which will have to be installed when a new MBR plant is constructed. - Rated capacity of the permeate pumps: • Single pump design capacity of 1,520 gpm at 18-ft TDH. • Three pumps 4,241 gpm at 21.4-ft TDH. - Five pumps operating at full speed (when lower and upper cassettes are installed), 6,325 gpm (9.1 MGD peak flow) at 26.2-ft TDH.

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SUMMARY OF THE CONDITION OF THE MEMBRANE BIOREACTORS (MBR) PLANT COMPONENTS

Unit Operation	Description	Manufacturer	Present Condition and Comments
WAS Pumps	- Two rotary lobe WAS pumps to pump sludge from the MBR plant to the gravity belt thickener. - The WAS pumps are positive displacement, so the discharge rate is directly related to the speed of the pump. - Adjustable frequency drives (AFDs) are used to adjust the speed of the pumps. - The design output of WAS pumps is 275 gpm at a discharge pressure of 40.5 psig and 299 rpm.	WAS Pumps: Vogelsang Model VX136-210Q	- Rated capacity of the WAS pumps: • Single pump design capacity 275 gpm at 40.5 psig discharge pressure.
Chlorine Injection (CI) Pumps	- There are two chlorine injection (CI) pumps in the permeate pump station wet well, one duty and one standby. - The CI pumps supply sodium hypochlorite for cleaning of the cassettes in the MBR basins. - The other function of the CI pumps is to supply water for cooling of the UV lamps during low-flow. - Pump design operating point: 153 gpm at 66-ft TDH. - Pump motor: 6.5-HP, 3475 rpm.	Chlorine Injection Pumps: Flygt Model NP3102 with 256 impeller	- The CI pumps are installed in the permeate pump station wet well. - Rated capacity of the chlorine injection pumps: • Single pump design capacity 153 gpm at 66-ft TDH.
Ultraviolet (UV) Light Disinfection	- The plant is equipped with two closed vessel UV disinfection units. - Each UV vessel is equipped with six medium pressure, high intensity lamps. - The permeate flows by gravity from the MBR basins through the UV disinfection closed vessels to the permeate pump station. - UV system is designed to provide effluent disinfection capable of reducing E.coli count to less than 126 cfu/100 ml. - Because of the high-quality effluent from the MBR plant, radiation transmittance is >75%.	UV Disinfection: Aquionics, Inc.	- The system has full redundancy. The vessel used is alternated to get equal use of all lamps. - Rated capacity UV disinfection system: • 2.0 MGD average flow • 4.0 MGD maximum flow
Plant Drain Pump Station	- The drain lift station has two submersible pumps. - A level transmitter is provided in the wet well to control the pumps. One float switch is also provided as backup control. - Pump design operating point: 465 gpm at 42.5-ft TDH. - Pump motor: 10-HP, 1735 rpm.	Flygt Model NP3127 with 421 impeller	- The installed float switch appears to be too high to start the pump. The float switch needs to be at a lower elevation. - Rated capacity of the plant drain pumps: • Single pump design capacity 465 gpm at 42.5-ft TDH.

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SUMMARY OF THE CONDITION OF THE MEMBRANE BIOREACTORS (MBR) PLANT COMPONENTS

Unit Operation	Description	Manufacturer	Present Condition and Comments
Washwater (WW) System	- The washwater (WW) system consists of two end-suction centrifugal pumps that draw disinfected permeate from the UV disinfection discharge lines to supply washwater to the plant. - Washwater is used for cleaning/washing of the classifier and fine screens and also for the hydrants. - Pump design operating point: 169 gpm at 196-ft TDH. - Pump motor: 20-HP, 3600 rpm.	Aurora Model 344-A	- The WW pumps start automatically when the washwater system pressure drops below the setpoint or the flow to the system exceeds the setpoint. - Rated capacity of the washwater system: - Single pump design capacity 169 gpm at 196-ft TDH
Effluent Blend and Sampling Box	- Disinfected effluent from the activated sludge plant is pumped into the new effluent blend and sampling box where it mixes with the effluent (permeate) from the MBR plant. - After blending, the effluent flows through a 24-in line that connects to the original 16-in outfall line that discharges to the river.		
MBR Electrical Generator	- The existing generator at the MBR has enough capacity to run all plant components during power outages.		- The generator has enough capacity to maintain the MBR plant operational during power outages. - The generator is exercised every week. - Minor problems (software/programming) related to the operation of the pre-aeration blowers has been observed after exercising the generator.

Appendix F

Condition of the Existing Sludge Management Facilities

APPENDIX F
SUMMARY OF THE CONDITION OF EXISTING SLUDGE TREATMENT AND SLUDGE DISPOSAL FACILITIES

Unit Operation	Description	Manufacturer	Year Built	Evaluation Criteria	Present Condition and Comments	Recommendation for Continued Use
Gravity Belt Thickener (GBT)	- The belt thickener (GBT) is 2-meter wide with an original capacity to process up to 220 gpm at 1% solids concentration. - Modifications were made to the GBT to increase the capacity to up to 500 gpm. - Condition 1 – WAS from activated sludge plant: 500 gpm maximum at 0.5 % solids concentration (or 625 lbs dry solids per hour). Maximum polymer dosage of 5 lbs/dry ton of solids applied to the GBT. Thickened solids concentration 5-6%. - Condition 2 – WAS from MBR plant: 166 gpm maximum 1.5% solids (or 625 lbs dry solids per hour). Maximum polymer dosage of 6.5 lbs/dry ton of solids applied to the GBT. Thickened solids concentration 5%. - Design solids recover 90% minimum. - Polymer feed system: “Siemens Polyblend”, max. capacity 45 gph at 50 psi. - Polymer: “Clarifloc R C-6266”, polyacrylamide.	GBT: Enviroquip; Polymer Feed System: Siemens Poly-blend	1995, 2010	-	- The equipment is in good mechanical condition. - In 2010, modifications were made to increase the original capacity and the belt was replaced. - The quality of the filtrate (which flows back to the influent lift station) has improved since the belt replacement. - The polymer feed system is relatively new. - Potable water is used to dilute the polymer prior to feeding. - Polymer dose is adjusted depending on the sludge source; different for sludge from MBR and activated sludge plant (WAS from the MBR plant required more polymer due to higher solids concentration). - Condition of Concrete: - Building in good condition, minor cracking on concrete floors. - Condition of Equipment: - GBT in good condition-. - Polymer system in good condition, with a secondary containment sump. - Insulation of potable water line used for polymer dilution is in bad condition.	- Rated capacity of the gravity belt thickener: 220 gpm - Assuming that the GBT runs only during regular plant operating hours (5 days per week, 7 hours per day), the capacity of the GBT is 92,400 gpd of sludge. - The capacity of the GBT can be increased by increasing the hours in service.
Thickened Waste Activated (TWAS) Pump	- One positive displacement progressive cavity pump, 100 gpm at 100 psi. - Pump driven through a mechanical variable speed drive within a range of 87.5- 350 rpm. - Pump motor: 15 HP.	Pump: Netzsch Drive: Reeves	1995	-	- One pump installed. - The stator was replaced. - Condition of Equipment: - Currently working well, no mechanical problems were reported. - Condition of Coatings: - Minor corrosion at pump base. - Piping in good condition.	
Aerobic Digesters	- Four concrete basins (common wall), each cell 25-ft square, 22-ft SWD. - Total digester volume 411,400 gallons. - Covered digesters (fiberglass covers). - Aeration consists of two separate systems: 1) A total of 20 2-in stainless steel diffusers mounted inside a 2-ft diameter draft tube with air supplied by the centrifugal blower located inside the aeration basins blower room. A set of five draft tubes is installed in	Aeration System: Enviroquip	1995	- Digested sludge must meet Class B requirements for land disposal. - Per Metcalf & Eddy: Oxygen requirements: 2.3 lb O₂/lb VSS - Energy requirements for diffused air mixing: 20-40 cfm/1000 cf volume - Reduction in VSS: 38-50%	- Thickened sludge is discharged into Cell 1 of the digester. - The aeration system for Cells 1 and 2 was modified in 2007 to replace the air piping and related components that were corroding at that time. The aeration system in Cells 3 and 4 was not modified in 2007 and continued to be exposed to the corrosive atmosphere. - Emergency repairs and improvements for the aeration system in Cells 3 and 4 were	- The operations staff’s preference is to continue with covered digesters for sludge stabilization (the chief operator has experience with uncovered digesters). - The aerobic digester shows signs of deterioration due to the corrosive environment, including: corrosion of metal

APPENDIX F
SUMMARY OF THE CONDITION OF EXISTING SLUDGE TREATMENT AND SLUDGE DISPOSAL FACILITIES

Unit Operation	Description	Manufacturer	Year Built	Evaluation Criteria	Present Condition and Comments	Recommendation for Continued Use
Aerobic Digesters (continued)	each of the four cells. 2) This aeration system consists of 48 1-in air diffusers with air supplied by the positive displacement blowers located in the aerobic digester blowers room. A set of 24 aerators are installed in each of the two south cells.				implemented in February 2011. - Condition of Concrete: - Concrete on top of the basins shows signification deterioration and severe cracking on some areas mainly near the covers/walls joints. There is exposed aggregate at some points. - The point where the four cells meet is severely damaged. - Stucco on digester walls is in good condition. No visible signs of leakage through stucco. - Condition of Coatings: - Digesters are covered – condition of coating inside the basins cannot be evaluated without removing the covers. - Condition of Equipment: - Air piping on top of the digesters has been recently re-done. - Condition of equipment inside the digesters is unknown because the basins are covered. - Significant discoloration of RFP covers. - Condition of Miscellaneous Metals: - Access stairs and handrail in good condition. - Metal walkways and grating on top of the digesters show severe deterioration and significant corrosion - Most locks on access hatches are broken or damaged.	components, cracking of concrete which appears to be severe on areas. These problems need to be addressed. - The aerobic digesters appear to be the most deteriorated component of the overall wastewater treatment process at the Village of Los Lunas. - The condition of the concrete and equipment under the covers is unknown because the basins are covered. Removal of the covers will be difficult due to the location of the air piping on top of them.
Digester Blowers	- Two positive displacement (PD) blowers. These blowers supply air to either digester Cell 3 or 4 (south). - Each blower rated at 258 acfm at 21.28 psig at the outlet. - Blower motor: 20 HP.	Universal Blower PAC, Inc.	1995	-	- One centrifugal blower located in the aeration basins blower room supplies air to Cells 1 and 2. - Cells 3 or 4 receive air from the centrifugal blower as well as from the PD blower. - The PD blower supplies air to only one of the two south basins of the aerobic digesters. The assignment of a south basin as the sludge storage basin is made through the operator interface unit. The remaining south digester basin may be operated as a normal unit of the aerobic digester. - Blowers and piping appear to be in good condition.	

APPENDIX F
SUMMARY OF THE CONDITION OF EXISTING SLUDGE TREATMENT AND SLUDGE DISPOSAL FACILITIES

Unit Operation	Description	Manufacturer	Year Built	Evaluation Criteria	Present Condition and Comments	Recommendation for Continued Use
Digested Sludge Pump	- One centrifugal pump with capacity 600 gpm at 20-ft head and 900 gpm at 14-ft head, 1150 rpm. - Pump motor: 7.5 HP.	WEMCO-Hidrostal Pump; Reliance Motor	1995	-	- The digested sludge pump draws sludge from Cell 4 of the digester and feeds the tanker truck that transport the sludge to the final disposal site. - The hauling tanker has capacity for 5,000 gal. - Condition of Coatings: - Piping and valves coating in good condition. - Condition of Equipment: - Piping – good condition. - Pump – possible leakage around seals.	
Sludge Drying Beds	- Twelve rectangular sludge drying beds. - Originally, the beds had an 18-in layer of sand at the top, an intermediate 12-in layer of gravel and a bottom layer of ½-in gravel of variable depth. Under-drain piping is also provided to carry the drainage from the beds by gravity to the influent lift station. - A skid steer loader is capable of getting into the beds surface to remove dried sludge.		1995	-	- The sludge drying beds are used only occasionally, but for the most part they have been abandoned. - The beds appear to be in good operational condition. - The piping and valves that are visible have notorious corrosion, but are operational.	-
Sludge Disposal Site	- The Village owns approximate 200 acres of land available for surface disposal of digested sludge. - The site is located approximately 9 miles southwest of the Village. - Tanker truck has capacity for approximately 5,000 gallons. - Nursing tank at the site has storage capacity for approximately 15,000 gallons. - Terra Gator injection truck has capacity for approximately 2,500 gallons. - The site is divided in 11 sections.	Not applicable	1995	- Because the Village land applies the sludge to a site less than 800 feet above a ground water source, regulations set by the New Mexico Environment Department (NMED) Ground Water Section must be met. - Sludge to be land-applied must meet Class B requirements. - Current permit allows for disposal of up to 35,000 gallons of sludge per week (5,000 gpd).	- New Mexico Environment Department Ground Water Discharge Plan, DP-1053 which expires on June 7, 2011. - The sludge disposal site is located above a water source approximately 400 feet below and with a TDS concentration of 150-350 mg/L. - Sludge is hauled from the plant to the final disposal site once every 10 days. Prior to start up of the MBR plant, sludge was hauled once every 14 days. - The total land available is used in less than one year (this means that some sections receive sludge twice per year). - Soil samples are taken at six different points per parcel, one sample 24-in deep and another 48-in deep. These samples are analyzed for nitrogen content and the results are reported to the NMED. - Some sections cannot be fully used at this time due to an increase in nitrogen concentrations. - Monitoring wells are not required in the current permit.	- Because of the increase in soil nitrogen concentration in some sections, it is desirable to find the means to reduce nitrogen in digested sludge as much as possible.

Appendix G

Selected Pictures of Existing Facilities

ACTIVATED SLUDGE PLANT



Influent Lift Station



**Entrance Works
(Hydrogritter on top of the grit chamber)**



VFDs for Influent Pump



Grit Pumps



Damage Inside Grit Pumps Room



Damage Outside Grit Pumps Room



Damage on Grit Chamber Wall



Cyclone/Classifier



Damage on Cyclone/Grit Classifier



Damage on Wall at Entrance Works Structure



West Mechanical Bar Screen



Bar Screens Discharge Chute



West Aeration Basins



East Aeration Basins



**Aeration Basins RAS channel
(Under Grating)**



**East Aeration Basins Air Piping
(Pipe May be Leaking)**



**Aeration Basins Influent Gates
(Significant Corrosion)**



Re-lift Airlift Pumps



West Secondary Clarifier



East Secondary Clarifier Spray Bar



East Secondary Clarifier Damage on Concrete



Clarifier Effluent Re-aeration Box



Clarifiers Effluent Box Exterior



UV Disinfection System



External Support for the Weighted Effluent Weir



Effluent Pumps VFDs



Washwater Pumps



Washwater Room Exterior



Exterior of the Blowers Room

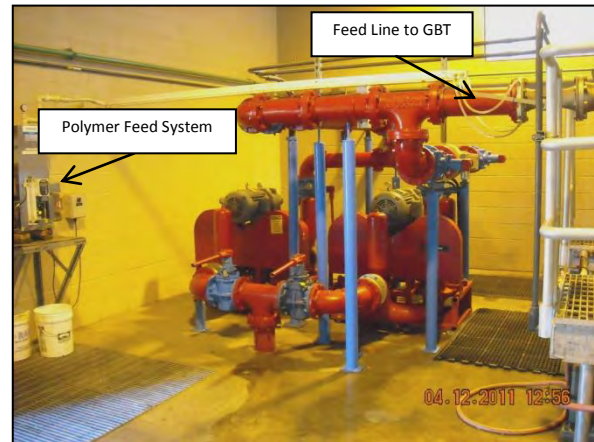


Centrifugal Blowers

SLUDGE TREATMENT FACILITIES



Exterior (North) of the Sludge Handling Bldg.



**WAS Pumps for Activated Sludge Plant;
Feed Pipe to the Gravity Belt Thickener (GBT)**



Interior of the Sludge Handling Building



Gravity Belt Thickener (GBT)



Aerobic Digesters



Digested Sludge Pump



Aerobic Digesters - Covers (1)



Aerobic Digesters – Covers (2)



Aerobic Digesters – Walkways/Grating



**Aerobic Digesters –
Covers/Concrete Damage (1)**



Aerobic Digesters – Piping Under Covers



**Aerobic Digesters –
Covers/Concrete Damage (2)**



**Aerobic Digesters –
Covers/Piping Damage (2)**



**Aerobic Digesters –
Covers/Piping Damage (2)**



Aerobic Digesters - Covers and Walkway



Sand Beds For Sludge Disposal

MEMBRANE BIOREACTOR PLANT



Entrance Works, Pre-Aeration Basins, and MBR Building



Fine Screens



Piping Gallery



In-Vessel UV Disinfection



Blowers

EFFLUENT OUTFALL



Pressure Manhole



Air Relief Valve in Pressure Manhole



Effluent Discharge Pipe



Discharge of Treated Effluent

SLUDGE DISPOSAL SITE



Sign at the Site Entrance



Building Where the Sludge Application Vehicle is Housed



Vehicle Used for Sludge Application



Sludge Nursing Tank



Sludge Application Site (1)

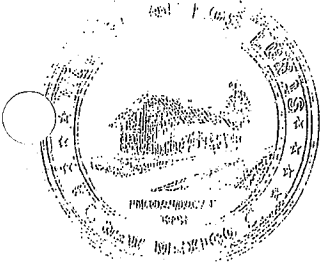


Sludge Application Site (2)

Appendix H

- 1. Letter from the Village of Los Lunas to NMED – Request for Temporary Permission to Discharge Digested Sludge, July 26, 2011**
- 2. Letter from the NPDES Granting Permission for Temporary Disposal of Sludge, September 19, 2011**
- 3. Letter-Report from the Village of Los Lunas to NMED Regarding Emergency Sludge Disposal, January 20, 2012**

**1. Letter from the Village of Los Lunas to NMED – Request for
Temporary Permission to Discharge Digested Sludge, July 26, 2011**



Village of Los Lunas

660 MAIN STREET

P. O. BOX 1209

LOS LUNAS, NEW MEXICO 87031

PHONE: (505) 839-3840

FAX: (505) 352-3580

ADMINISTRATION DEPARTMENT

July 26, 2011

Mr. John J. Rebar, Jr.
 Environmental Scientist, Pollution Prevention Section
 Ground Water Quality Bureau
 New Mexico Environment Department
 P.O. Box 5469
 Santa Fe, New Mexico 87502

RE: Village of Los Lunas, NM
WWTP – Request for Temporary Permission to Discharge Digested Sludge

Dear Mr. Rebar:

As discussed during our meeting on June 29, 2011 at the New Mexico Environment Department (NMED), the Village of Los Lunas is having operational problems with the performance of the aerobic digesters that provide treatment to the sludge wasted from the operation of the Village's wastewater treatment plant (WWTP).

The Village currently operates two different wastewater treatment processes: An activated sludge plant which was originally built in 1981, and a membrane bioreactor (MBR) plant which started operations in 2010. The treated and disinfected effluent from both facilities is blended prior to discharge into the Rio Grande under the National Pollutant Discharge Elimination System (NPDES) Permit No. NM0020303. The sludge that is wasted from both facilities is thickened to approximately 4-5% total solids concentration by a gravity belt thickener. The thickened sludge is then pumped to a four-cell covered aerobic digester. Digested sludge is transported by tanker truck from the Village's WWTP to the sludge disposal site on a regular basis for surface disposal. The digested sludge is emptied into the sludge nurse tank located at the site and finally pumped from the tank and sprayed onto the ground using a Terra Gator vehicle. The sludge treatment facilities and sludge disposal site were built in 1996, and some of the components (mainly the aerobic digesters) show some degradation due to the harsh, corrosive environment.

The sludge disposal site consists of approximately 220 acres of land located on an access road intersecting Dalies Road, 3 miles south of state road NM6, approximately 9 miles southwest of the Village of Los Lunas in the Nicolas de Chavez Grant in Section 18, T06N, R01E, Valencia County. Ground water is at a depth of approximately 400 feet and has a total dissolved solids concentration of approximately 150 milligrams per liter.

ROBERT E. VIALPANDO
 MAYOR

PETER FERNANDEZ
 VILLAGE ADMINISTRATOR

CHARLES GRIEGO
 COUNCILMAN

RICHARD LOVATO
 COUNCILMAN

GERARD SAIZ
 COUNCILMAN

CECILIA CC CASTILLO
 COUNCILWOMAN

The Village has a Ground Water Discharge Plan (DP-1053) which was originally issued on May 9, 1996, subsequently amended on September 12, 1997, and most recently renewed on June 6, 2006. The DP-1053 allows for the disposal of up to 35,000 gallons per week of digested sludge. The permit expired on June 7, 2011, but the Village is currently in the process of preparing a renewal and modification application package which is anticipated to be submitted to the NMED Ground Water Quality Bureau (GWQB) the first week of August 2011.

After the MBR plant was brought online last year, the operations staff started to notice some operational issues and inconsistent performance of the digesters. In February 2011, the problem was aggravated by two events: First, a pipe that allowed for sludge to be fed at different locations in the aerobic digesters failed due to corrosion and freezing which occurred during a severe winter storm; and second, the operations staff found that the aeration diffusers were plugged and providing insufficient aeration. The Village is in the process of implementing a project to repair the feed line, and the diffusers have already been unplugged and cleaned. Aeration appears to be better now and the digester's performance has started to improve slowly.

As part of the technical assistance that the Village's Consulting Engineer, Molzen Corbin, is providing, it was requested that the Village analyze the contents of the digesters for ammonia. Laboratory results showed ammonia concentrations ranging from 1,200 mg/kg to 1,700 mg/kg in the sludge. These concentrations are a sign of toxicity in the digesters, which can also be perceived by the strong ammonia odor in the off-gases from the digesters and the black appearance of the sludge.

In order to bring the digesters back to proper operational condition and consistent performance, it is necessary to remove the toxic sludge from the digesters and re-start the feeding process under different operational conditions, such as lower solids content in the feed sludge. To implement this process, disposal of a significant volume of sludge which will likely exceed the maximum hydraulic application rate set by the current discharge permit will be required.

After evaluating several alternatives, including dewatering of the digested sludge and disposal at a landfill, the Village of Los Lunas has concluded that the most technically and economically feasible option is to dispose of the sludge at the Village's surface disposal site. The sludge in the digester currently meets the requirements set forth in 40 CFR 503 for Class B biosolids.

The Village is respectfully requesting authorization from the NMED for a variance to temporarily exceed the current maximum hydraulic rate of 35,000 gallons of sludge per week. Assuming a scenario where the entire contents of the digester need to be removed and disposed of at the surface disposal site, approximately 411,000 gallons of digested sludge would be land-applied. At an estimated application rate of 20,000 gallons per day, it would take approximately four weeks to complete the process if sludge is hauled to the site from Monday to Friday. This would be equivalent to an application rate of approximately 100,000 gallons per week under the worst-case scenario.

Mr. John J. Rebar, Jr.
July 26, 2011
Page 3

A sample of the contents of the digester was taken on July 14, 2011 and analyzed for total nitrogen (TKN+NO₃) by a certified laboratory. The laboratory results indicated that the total nitrogen content is 100,000 mg/kg on a dry-weight basis (see laboratory report enclosed with this letter). The sludge in the digester has a total solids concentration of about 4.0% which results in a total mass of approximately 62 metric tons of solids on a dry-weight basis. Therefore, in the event that the entire contents of the digesters have to be removed and land-applied, a total of 13,700 pounds of nitrogen would be applied. Of the total 220 acres of land that the Village owns at the disposal site, approximately 70 acres would be used for disposal of the sludge, thus resulting in a nitrogen loading of about 196 pounds per acre. These parcels would not receive any additional sludge during the remainder of the year to avoid exceeding the maximum recommended application rate of 200 pounds per acre, per year. All the calculations and estimates previously discussed are based on the worst-case scenario. However, a more reasonable scenario contemplates that only 50% of the volume of the digester will have to be removed to re-start the digestion process.

As it was mentioned during our meeting, the Village of Los Lunas is actively seeking alternatives to correct the problems with the digesters and ensure that they do not occur again. The Village will greatly appreciate authorization from the NMED Ground Water Quality Bureau to dispose of the contents of the digesters at the sludge disposal site. This will allow for faster implementation of corrective actions and operational changes for consistent performance of the sludge treatment system.

The Village would like to begin the digester recovery process as soon as possible. It is respectfully requested that the entire 120-day period be granted for this request for temporary permission to discharge digested sludge. To assist with expediting this request, a check for \$250.00 to cover the temporary permit filing fee is enclosed.

If you have any questions or require additional information, please do not hesitate to contact me at (505) 352-7629 or our Engineer, Mr. Clayton Ten Eyck, P.E., at (505) 242-5700.

Sincerely,

VILLAGE OF LOS LUNAS

James Blasing
Utilities Director

CHT:ps
Enclosures

cc: Mr. Robert George, NMED GWQB
Mr. Peter Fernandez, Village of Los Lunas
Mr. Clayton Ten Eyck, Molzen Corbin



COVER LETTER

Wednesday, July 20, 2011

Mike Sanchez
Village of Los Lunas
PO Box 1209
Los Lunas, NM 87031
TEL: (505) 866-2114
FAX (505) 866-2115
RE: DP1053 TKN/NO3

Order No.: 1107474

Dear Mike Sanchez:

Hall Environmental Analysis Laboratory, Inc. received 1 sample(s) on 7/14/2011 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. Below is a list of our accreditations. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. All samples are reported as received unless otherwise indicated.

Please do not hesitate to contact HEAL for any additional information or clarifications.

Sincerely,

A handwritten signature in black ink, appearing to read "Andy Freeman".

Andy Freeman, Laboratory Manager

NM Lab # NM9425 NM0901
AZ license # AZ0682



Hall Environmental Analysis Laboratory, Inc.

Date: 20-Jul-11

Analytical Report

CLIENT: Village of Los Lunas
Lab Order: 1107474
Project: DP1053 TKN/NO3
Lab ID: 1107474-01

Client Sample ID: TKN and NO3
Collection Date: 7/14/2011 8:20:00 AM
Date Received: 7/14/2011
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ASTM 2216: PERCENT MOISTURE						
Percent Moisture	96	0.10		wt%	1	Analyst: RAA 7/15/2011
EPA METHOD 300.0: ANIONS						
Nitrogen, Nitrate (As N)	ND	3.0		mg/Kg	10	Analyst: SRM 7/15/2011 6:31:33 PM
METHOD 4500-N-ORG C: TKN						
Nitrogen, Total Kjeldahl	4500	200		mg/Kg	1	Analyst: TAF 7/18/2011 11:08:00 AM

Qualifiers:

* Value exceeds Maximum Contaminant Level
E Estimated value
J Analyte detected below quantitation limits
NC Non-Chlorinated
PQL Practical Quantitation Limit

B Analyte detected in the associated Method Blank
H Holding times for preparation or analysis exceeded
MCL Maximum Contaminant Level
ND Not Detected at the Reporting Limit
S Spike recovery outside accepted recovery limits

Hall Environmental Analysis Laboratory, Inc.

Date: 20-Jul-11

Analytical Report

CLIENT: Village of Los Lunas
Lab Order: 1107474
Project: DP1053 TKN/NO3
Lab ID: 1107474-01

Client Sample ID: TKN and NO3
Collection Date: 7/14/2011 8:20:00 AM
Date Received: 7/14/2011
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ASTM 2216: PERCENT MOISTURE						Analyst: RAA
Percent Moisture	96	0.10		wt%	1	7/15/2011
EPA METHOD 300.0: ANIONS						Analyst: SRM
Nitrogen, Nitrate (As N)	ND	68		mg/Kg-dry	10	7/15/2011 6:31:33 PM
METHOD 4500-N-ORG C: TKN						Analyst: TAF
Nitrogen, Total Kjeldahl	100000	4600		mg/Kg-dry	1	7/18/2011 11:08:00 AM

Qualifiers:

* Value exceeds Maximum Contaminant Level
E Estimated value
J Analyte detected below quantitation limits
NC Non-Chlorinated
PQL Practical Quantitation Limit

B Analyte detected in the associated Method Blank
H Holding times for preparation or analysis exceeded
MCL Maximum Contaminant Level
ND Not Detected at the Reporting Limit
S Spike recovery outside accepted recovery limits

QA/QC SUMMARY REPORT

Client: Village of Los Lunas
Project: DP1053 TKN/NO3

Work Order: 1107474

Analyte	Result	Units	PQL	SPK Va	SPK ref	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Method: EPA Method 300.0: Anions

Sample ID: MB-27614

MBLK

Batch ID: 27614 Analysis Date: 7/15/2011 5:56:43 PM

Nitrogen, Nitrate (As N)

ND

mg/Kg

0.30

Sample ID: LCS-27614

LCS

Batch ID: 27614 Analysis Date: 7/15/2011 6:14:08 PM

Nitrogen, Nitrate (As N)

7.136

mg/Kg

0.30

7.5

0

95.1

90

110

Method: Method 4500-N-org C: TKN

Sample ID: MB-27626

MBLK

Batch ID: 27626 Analysis Date: 7/18/2011 11:08:00 AM

Nitrogen, Total Kjeldahl

ND

mg/Kg

50

Sample ID: LCS-27626

LCS

Batch ID: 27626 Analysis Date: 7/18/2011 11:08:00 AM

Nitrogen, Total Kjeldahl

952.0

mg/Kg

50

1000

0

95.2

80

120

Qualifiers:

E Estimated value

J Analyte detected below quantitation limits

ND Not Detected at the Reporting Limit

H Holding times for preparation or analysis exceeded

NC Non-Chlorinated

R RPD outside accepted recovery limits

Hall Environmental Analysis Laboratory, Inc.

Sample Receipt Checklist

Client Name VILLAGE OF LOS LUNAS

Date Received:

7/14/2011

Work Order Number 1107474

Received by: AMF

Sample ID labels checked by:

Checklist completed by:

Signature

Date

Initials

Matrix:

Carrier name Client drop-off

Shipping container/cooler in good condition?

Yes ☒

No ☐

Not Present ☐

Custody seals intact on shipping container/cooler?

Yes ☐

No ☐

Not Present ☐

Not Shipped ☒

Custody seals intact on sample bottles?

Yes ☐

No ☐

N/A ☒

Chain of custody present?

Yes ☒

No ☐

Chain of custody signed when relinquished and received?

Yes ☒

No ☐

Chain of custody agrees with sample labels?

Yes ☒

No ☐

Samples in proper container/bottle?

Yes ☒

No ☐

Sample containers intact?

Yes ☒

No ☐

Sufficient sample volume for indicated test?

Yes ☒

No ☐

All samples received within holding time?

Yes ☒

No ☐

Water - VOA vials have zero headspace?

No VOA vials submitted ☒

Yes ☐

No ☐

Number of preserved bottles checked for pH:

Water - Preservation labels on bottle and cap match?

Yes ☐

No ☐

N/A ☒

Water - pH acceptable upon receipt?

Yes ☐

No ☐

N/A ☒

<2 >12 unless noted below.

Container/Temp Blank temperature?

21.0°

<6° C Acceptable

If given sufficient time to cool.

COMMENTS:

Client contacted

Date contacted:

Person contacted

Contacted by:

Regarding

Comments:

Corrective Action

**2. Letter from the NPDES Granting Permission for Temporary
Disposal of Sludge, September 19, 2011**



NEW MEXICO
ENVIRONMENT DEPARTMENT

Ground Water Quality Bureau

SUSANA MARTINEZ
Governor

JOHN A. SANCHEZ
Lieutenant Governor

Harold Runnels Building
1190 St. Francis Drive
P.O. Box 5469, Santa Fe, NM 87502-5469
Phone (505) 827-2918 Fax (505) 827-2965
www.nmenv.state.nm.us



DAVE MARTIN
Secretary

BUTCH TONGATE
Acting Deputy Secretary

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

September 19, 2011

James Blasing, Utilities Director
Village of Los Lunas
P.O. Box 1209
Los Lunas, NM 87031

RE: Temporary Permission to Discharge, Village of Los Lunas Sludge Disposal Facility, DP-1053

Dear Mr. Blasing:

The New Mexico Environment Department (NMED) has reviewed your request, dated July 26, 2011, and additional information submitted on your behalf by Molzen-Corbin & Associates, dated August 18, 2011, for temporary permission to discharge up to 20,000 gallons per day (gpd) (for a total maximum discharge volume of 400,000 gallons) of biosolids (sludge) from the Village of Los Lunas Wastewater Treatment Facility (WWTF) aerobic digesters to four 20-acre cells within the Village of Los Lunas Sludge Disposal Facility. The disposal facility is located along an access road intersecting Dalies Road, 3 miles south of NM-6, approximately 9 miles southwest of the Village of Los Lunas in the Nicolas de Chavez Grant in Section 18 (projected), Township 06N, Range 01E, Valencia County. Ground water most likely to be affected is at a depth of approximately 400 feet.

The Village of Los Lunas WWTF is experiencing operational and structural failures associated with the facility's aerobic digesters. In order to repair the digesters and return them back to operational condition, it is necessary to remove a significant volume of sludge from the digesters. Discharge Permit, DP-1053, authorizes the discharge of up to 35,000 gpd of sludge per week at the Village of Los Lunas Sludge Disposal Facility. The temporary permission to discharge is being requested in order for sludge to be land applied at the disposal facility at a rate exceeding the maximum discharge volume authorized by DP-1053.

Temporary permission to discharge digester sludge to four 20-acre cells at Village of Los Lunas Sludge Disposal Facility is hereby granted for 120 days (until January 17, 2012), pursuant to Subsection B of 20.6.2.3106 NMAC. This approval is contingent on your discharging as described in your July 26, 2011 and August 18, 2011 correspondence and upon the following requirements:

1. Sludge shall be discharged so that the amount of total nitrogen applied in the sludge shall not exceed 200 pounds per acre per cell with nitrogen applications due to sludge discharge pursuant to DP-1053 taken into account. Nitrogen content shall not be adjusted to account for volatilization or mineralization processes.
2. Sludge shall be applied to the four 20-acre cells on a rotational basis. The sludge shall be evenly distributed throughout the individual cell in use. Ponding of liquid sludge shall be minimized. **A facility map indicating the location and cell number of each cell receiving digester sludge shall be submitted to NMED within 150 days of the effective date of this letter (by February 16, 2012).**
3. Treatment, storage and disposal of sludge shall be in accordance with requirements set forth in 40 CFR Part 503. This may include requirements not addressed in this approval.
4. The total volume of sludge land applied to each cell shall be recorded. **The total volume of sludge land applied to each disposal cell shall be submitted to NMED within 150 days of the effective date of this letter (by February 16, 2012).**
5. The total dry weight of the sludge that is land applied to each disposal cell shall be determined by measuring the average percent total solids content of the sludge (conduct weekly total solids sampling/analysis, at a minimum, during weeks that discharge occurs) and the volume of the sludge transported to each disposal cell.
6. Surface Disposal Data Sheets (SDDS) shall be completed to document the amount of additional nitrogen applied to each surface disposal cell. A SDDS shall be completed for each disposal cell receiving digester sludge and shall reflect the average nitrogen concentration from the weekly total solids sludge analysis and the total number of dry tons discharged to each cell. **A SDDS for each disposal cell receiving digester sludge shall be submitted to NMED within 150 days of the effective date of this letter (by February 16, 2012).**

This approval does not relieve you of your responsibility to comply with any other applicable federal, state, and/or local laws and regulations, such as zoning requirements and nuisance ordinances. Also, this approval does not relieve you of liability should your operation result in actual pollution of surface or ground waters.

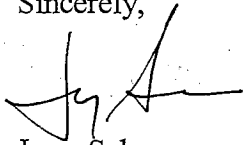
If you have any questions, please contact Robert George, Domestic Waste Team Leader, at (505) 476-3648 or John Rebar Jr. at (505) 827-0018.

James Blasing, DP-1053

September 19, 2011

Page 3

Sincerely,



Jerry Schoeppner, Acting Chief
Ground Water Quality Bureau

JS:RG/JR

encs: Land Application Data Sheet (LADS; also available at the following website:
<http://www.nmenv.state.nm.us/gwb/forms/NewMexicoEnvironmentDepartment-GroundWaterQualityBureau-Forms.htm>)

cc: Clayton Ten Eyck, Molzen-Corbin & Associates, 2701 Miles Road SE Albuquerque, NM
87106 (enclosure)

New Mexico Environment Department
Ground Water Quality Bureau



MONITORING REPORT DUE DATE:

REPORTING PERIOD (i.e., from _____ to _____):

FIELD / ZONE ID: 1

ACRES IN FIELD / ZONE²:[illegible]

¹One LADS form should be used for each field/zone (may include subsurface irrigation area, leachfield, golf course, field within a re-use area, etc.).

²For leachfields with an absorption area in square-feet, 1 acre = 43,560 ft².

³Each form must reflect the *most recent* 12 months of wastewater discharge.

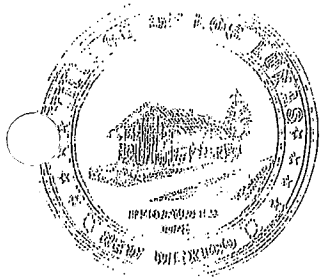
⁴Direct meter readings in gallons; or acre-ft multiplied by 325,850.

⁵This information should be obtained from the *most recent* laboratory analysis. When sampling quarterly, record the same data for the three months of that monitoring quarter.

⁶In the event discharge did not occur, please report "no discharge" in the NOTES column.

The use of additional fertilizers is required to be reported. Please complete the "Fertilizer Log" form and attach it to the LADS.

**3. Letter-Report from the Village of Los Lunas to NMED Regarding
Emergency Sludge Disposal, January 20, 2012**



Village of Los Lunas

660 MAIN STREET

P. O. BOX 1209

LOS LUNAS, NEW MEXICO 87031

PHONE: (505) 839-3840

FAX: (505) 352-3580

January 20, 2012

ADMINISTRATION DEPARTMENT

Mr. Robert George
Pollution Prevention Section, Domestic Team Leader
Ground Water Quality Bureau
New Mexico Environment Department
P.O. Box 5469
Santa Fe, New Mexico 87502

**RE: Village of Los Lunas, NM Wastewater Treatment Plant
Temporary Permission to Discharge Digested Sludge**

Dear Mr. George:

On September 19, 2011 the Village of Los Lunas Wastewater Treatment Plant (WWTP) received Temporary Permission for discharge of digested sludge in excess of the permitted volume per the existing permit DP-1053 (35,000 gallons per week). The Village was authorized to temporarily discharge up to 20,000 gallons per day (gpd) up to a total maximum of 400,000 gallons.

The Village applied digested sludge to the surface disposal site located at Dalies Road, three miles south of NM-6, approximately nine miles southwest of the Village of Los Lunas, in Section 18, Township 06N, Range 01E, Valencia County. The purpose of this letter is to provide a summary of the volumes of sludge, total solids quantities, and nitrogen applied to the disposal site under the Temporary Permission.

As shown in **Figure 1**, the surface disposal site consists of 11 Sections. Under the Temporary Permission, four sections (approximately 20 acres each) were used, which are identified as Sections 4, 5, 6, and 7. The total volume of sludge hauled and discharged into each section was recorded on a daily basis. Copies of the sludge hauling manifests are provided with this letter. The total volume of sludge that was applied to each section is: Section 4 = 50,000 gallons, Section 5 = 45,000 gallons, Section 6 = 50,000 gallons, and Section 7 = 50,000 gallons. **The total volume of sludge discharged under the temporary permission is 195,000 gallons over approximately 80 acres of land.**

A sample of the sludge was taken from each 5,000-gallon tanker truck hauling sludge and analyzed for total solids concentration at the WWTP's laboratory. **Table 1 presents a summary of the daily volume of sludge applied to each section, the total solids concentration in each load, and the total amount of sludge solids per load.** Three samples of digested sludge were taken in December 2011, when the temporary permit was in place, and sent to a certified laboratory to get analyzed for Total Kjeldahl Nitrogen (TKN) and Nitrate-Nitrogen (NO₃-N). **The average total nitrogen concentration (TKN+NO₃, dry weight basis) was 88,533 mg/kg.** This concentration was used to calculate the mass of nitrogen and the nitrogen loading rate applied to each section.

ROBERT E. VIALPANDO
MAYOR

PETER FERNANDEZ
VILLAGE ADMINISTRATOR

CHARLES GRIEGO
COUNCILMAN

RICHARD LOVATO
COUNCILMAN

GERARD SAIZ
COUNCILMAN

CECILIA CC CASTILLO
COUNCILWOMAN

Table 1 - Sludge Hauling and Solids Applied Under the Temporary Permission

Date	Sludge Disposal Site, Section No.	Volume Applied, gallons	Total Solids, %	Sludge Solids Applied	
				Lbs	Metric Ton
12/11/2011	4	5,000	6.0	2,502	1.14
12/11/2011	4	5,000	4.9	2,043	0.93
12/11/2011	4	5,000	4.1	1,710	0.78
12/11/2011	4	5,000	3.9	1,626	0.74
12/12/2011	4	5,000	3.8	1,585	0.72
12/12/2011	4	5,000	3.8	1,585	0.72
12/12/2011	4	5,000	3.8	1,585	0.72
12/12/2011	4	5,000	3.8	1,585	0.72
12/13/2011	4	5,000	3.8	1,585	0.72
12/13/2011	4	5,000	3.9	1,626	0.74
TOTAL SECTION 4		50,000	-	17,431	7.92
12/13/2011	5	5,000	3.8	1,585	0.72
12/13/2011	5	5,000	3.7	1,543	0.70
12/13/2011	5	5,000	3.7	1,543	0.70
12/15/2011	5	5,000	4.3	1,793	0.82
12/15/2011	5	5,000	4.3	1,793	0.82
12/15/2011	5	5,000	3.8	1,585	0.72
12/15/2011	5	5,000	3.8	1,585	0.72
12/16/2011	5	5,000	3.6	1,501	0.68
12/16/2011	5	5,000	3.6	1,501	0.68
TOTAL SECTION 5		45,000	-	14,428	6.56
12/16/2011	6	5,000	3.8	1,585	0.72
12/16/2011	6	5,000	3.7	1,543	0.70
12/22/2011	6	5,000	3.5	1,460	0.66
12/22/2011	6	5,000	4.2	1,751	0.80
12/22/2011	6	5,000	3.9	1,626	0.74
12/22/2011	6	5,000	3.6	1,501	0.68
12/28/2011	6	5,000	3.6	1,501	0.68
12/28/2011	6	5,000	3.9	1,626	0.74
12/28/2011	6	5,000	3.9	1,626	0.74
12/29/2011	6	5,000	3.4	1,418	0.64
TOTAL SECTION 6		50,000	-	15,638	7.11

Table 1 (cont'd) - Sludge Hauling and Solids Applied Under the Temporary Permission

Date	Sludge Disposal Site, Section No.	Volume Applied, gallons	Total Solids, %	Sludge Solids Applied	
				Lbs	Metric Ton
12/29/2011	7	5,000	4.6	1,918	0.87
12/29/2011	7	5,000	3.7	1,543	0.70
12/29/2011	7	5,000	3.6	1,501	0.68
12/30/2011	7	5,000	3.8	1,585	0.72
12/30/2011	7	5,000	3.3	1,376	0.63
12/30/2011	7	5,000	3.1	1,293	0.59
1/4/2012	7	5,000	3.1	1,293	0.59
1/4/2012	7	5,000	3.0	1,251	0.57
1/4/2012	7	5,000	3.3	1,376	0.63
1/4/2012	7	5,000	3.8	1,585	0.72
TOTAL SECTION 7		50,000	-	14,720	6.69

Table 2 presents a summary of sludge disposal and nitrogen loading application rates to each section used under the Temporary Permission only. The nitrogen loading rates are: Section 4 = 77.16 lbs N/acre, Section 5 = 63.87 lbs N/acre, Section 6 = 69.22 lbs N/acre, Section 7 = 65.16 lbs N/acre. Per the requirements listed under the Temporary Permission, individual Surface Disposal Data Sheets (SDDS) were completed for each section that received sludge. The SDDS are enclosed with this letter.

Table 2 - Summary of Sludge Disposal and Nitrogen Loading Rates Under the Temporary Permission

Parameter	Sludge Disposal Section			
	4	5	6	7
Total Volume Sludge, gallons	50,000	45,000	50,000	50,000
Total Solids Applied, lbs	17,431	14,428	15,638	14,720
Total Solids Applied, metric tons	7.92	6.56	7.11	6.69
Total Nitrogen (in sample), mg/kg	88,533	88,533	88,533	88,533
Total Nitrogen Applied, kg N	701.45	580.62	629.29	592.37
Total Nitrogen Applied, lbs N	1,543.18	1,277.37	1,384.43	1,303.21
Section Size, acres	20	20	20	20
Nitrogen Loading, lbs N/acre	77.16	63.87	69.22	65.16

The four sections that were used under the Temporary Permission had previously received some digested sludge in 2011, as shown in the Land Application Data Sheet (LADS) provided with this letter. **Table 3 presents a summary of the LADS and includes the mass of nitrogen and nitrogen loading rates to Sections 4, 5, 6, and 7 previously applied in 2011 under the WWTP normal sludge disposal procedures only.**

Table 3 - Nitrogen Application Under Normal Operation Conditions

Parameter	Sludge Disposal Section			
	4	5	6	7
Total Nitrogen Applied, lbs N	98.14	149.66	144.48	96.60
Section Size, acres	20	20	20	20
Nitrogen Loading, lbs N/acre	4.91	7.48	7.22	4.83

Table 4 shows the total quantities and nitrogen loading rates to each section accounting for both the application of sludge during normal operations (2011) and under the Temporary Permission. The total nitrogen loading rates are: Section 4 = 82.07 lbs N/acre, Section 5 = 71.35 lbs N/acre, Section 6 = 76.44 lbs N/acre, and Section 7 = 69.99 lbs N/acre.

Table 4 - Total Nitrogen Quantities and Application Loading Rates Per Section

Parameter	Sludge Disposal Section			
	4	5	6	7
Total Nitrogen Applied, lbs N	1,641.32	1,427.03	1,528.91	1,399.81
Section Size, acres	20	20	20	20
Nitrogen Loading, lbs N/acre	82.07	71.35	76.44	69.99

The Village of Los Lunas has completed the discharge of digested sludge under the Temporary Permission and has resumed regular hauling of sludge per the current permit DP-1053. Treatment, storage, and disposal of the sludge were in accordance with all applicable 40 CFR 503 requirements. The Village greatly appreciates the temporary authorization that the NMED Ground Water Quality Bureau granted to dispose of digested sludge, as requested for this emergency situation.

Mr. Robert George
January 20, 2012
Page 5

If you have any questions or require additional information, please do not hesitate to contact either me at (505) 352-7629 or our Engineer, Mr. Clayton Ten Eyck, P.E., at (505) 242-5700.

Sincerely,

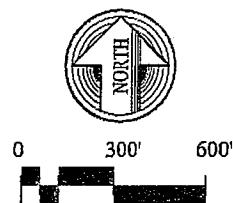
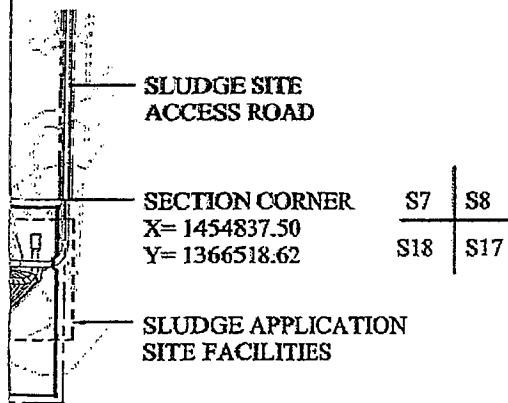
VILLAGE OF LOS LUNAS

James Blasing
Utilities Director

MMC:ps
Enclosures

cc: Mr. John Rebar, Jr., NMED GWQB
Mr. Peter Fernandez, Village of Los Lunas
Mr. Clayton Ten Eyck, P.E., Molzen Corbin

EAST MICHIGAN, Jan 17, 2012 - 4:00pm UY USRA: dsl:ar
 RWG: LOCATION: LOS LUNAS SLL 101-27 Emergency Sludge Application SINGS
 DWG: NAME: SLL-101.dwg



LEGEND

- ARCHAEOLOGICAL SITE
- BARBED WIRE FENCE
- PROPERTY BOUNDARY

MOLZENCORBIN

Emergency Sludge Assistance - Village of Los Lunas, New Mexico

FIGURE 1
Sludge Application Site Location Plan

Waste Hauling Manifest

[illegible]

Only One Section Per Month, Per Form

Turn Form in to LAB at the end of Hauling Month

Waste Hauling Manifest

[illegible]

Only One Section Per Month, Per Form

Turn Form in to LAB at the end of Hauling Month

Last Updated: May

DP#: 1053

FACILITY NAME: Village of Los Lunas

SURFACE DISPOSAL FACILITY (SLUDGE)

REPORT PERIOD - FROM: 01-01-2011 TO: 01-30-2011
(month/day/yr) (month/day/yr)

MONTH	CELL # EACH CELL IS 20 ACRES	A SLUDGE APPLIED (dry tons)	B LAB RESULTS: TKN TKN (mg/kg) + NO3-N (mg/kg)	C LAB RESULTS: TN* (lbs/ton) (B / 500)	D NITROGEN APPLIED (lbs) (C x A)	E NITROGEN APPLIED (lbs/acre) (D / # acres)
example: January	1	45.00	30,000	60.00	2,700.00	11.25
January	4	14.12	3500	7	98.14	4.91
February	5	21.38	3500	7	149.16	7.48
March	6	20.14	3500	7	144.48	7.22
April	7	13.80	3500	7	96.16	4.83
May	9	6.84	3500	7	47.88	2.39
June	NO	SLUDGE	HAULED -	DRIVING BEES UTILIZED		
July						
August						
September						
October						
November						
December						
TOTALS		76.68			536.76	26.83

(*) 500 mg/kg = 1 lb/ton

New Mexico Environment Department
Ground Water Quality Bureau



1 One SDDS form should be used for each cell designation and each sludge source. Examples of "Sludge Source" include: thickened solids, non-thickened solids, multiple treatment facilities, liquid sludge, dry sludge, etc.

2 Each form must reflect the *most recent* 12 months of sludge discharge.

3 One metric ton = 2,200 lbs

4 This information should be obtained from the *most recent* laboratory analysis. Note: If quarterly sampling is required, record the same data for the three months of that monitoring quarter.

5 In the event discharge did not occur, please report "no discharge" in the NOTES column.

Last Updated: June 10, 2011

Surface
Slits

TOTALS

multiple treatment facilities, liquid sludge, dry sludge, etc.;

Each form must reflect the most recent 12 months of sludge discharge.

⁴This information is provided for informational purposes only. One metric ton = 2,200 lbs.

This monitoring should be obtained from the most recent laboratory analysis. Note: If quarterly sampling is required, record the same data for the three months of that monitoring quarter.

in the event discharge did not occur, please report "no discharge" in the "NOTES" column.

Last Updated: June 10, 2011

Surface Disposal Data Sheet (SDDS)

New Mexico Environment Department Ground Water Quality Bureau



DATE:	1/16/2012	DP#:	1053	MONITORING REPORT DUE DATE:		2/16/2012
FACILITY NAME:	Village of Los Lunas WWTP			REPORTING PERIOD (i.e., from to):		
SLUDGE SOURCE: ¹	Digested sludge			Temporary Permission		
DISCHARGE CELL DESIGNATION: ¹				Section 6		
				# ACRES IN CELL: 20.0		

MONTH & YEAR OF DISCHARGE ²	A WEIGHT OF SLUDGE DISCHARGED metric tons dry weight ³	B SLUDGE SAMPLE: TOTAL NITROGEN CONCENTRATION ⁴ (TKN + NO ₃ -N) mg/kg	C SLUDGE DISCHARGED: TOTAL NITROGEN ((A x B) ÷ 1,000) kg N	D SLUDGE DISCHARGED: TOTAL NITROGEN (C x 2.2) lbs N	E NITROGEN LOADING (D ÷ # acres) lbs N/acre	NOTES ⁵
example assuming a 50-acre cell: MM - YY	125 metric tons	2063 mg/kg TKN + 887 mg/kg NO ₃ -N = 2750 mg/kg N	(125 metric tons x 2750 mg/kg) ÷ 1,000 = 343.8 kg N	343.8 kg N/metric ton x 2.2 = 756 lbs N	756 lbs N ÷ 50 acres = 15.1 lbs N/acre	
Dec-11	0.72	88,533.00	63.8	140	7.0	
Dec-11	0.70	88,533.00	62.1	137	6.8	
Dec-11	0.66	88,533.00	58.7	129	6.5	
Dec-11	0.80	88,533.00	70.5	155	7.8	
Dec-11	0.74	88,533.00	65.4	144	7.2	
Dec-11	0.68	88,533.00	60.4	133	6.6	
Dec-11	0.68	88,533.00	60.4	133	6.6	
Dec-11	0.74	88,533.00	65.4	144	7.2	
Dec-11	0.74	88,533.00	65.4	144	7.2	
Dec-11	0.64	88,533.00	57.1	126	6.3	
				TOTALS		
				1,384	69.2	

¹One SDDS form should be used for each cell designation and each sludge source. Examples of "Sludge Source" include: thickened solids, non-thickened solids, multiple treatment facilities, liquid sludge, dry sludge, etc.

²Each form must reflect the most recent 12 months of sludge discharge.

³One metric ton = 2,200 lbs

⁴This information should be obtained from the most recent laboratory analysis. Note: If quarterly sampling is required, record the same data for the three months of that monitoring quarter.

⁵In the event discharge did not occur, please report "no discharge" in the NOTES column.

Surface Disposal Data Sheet (SDDS)



New Mexico Environment Department Ground Water Quality Bureau



DATE: 1/16/2012		DP#: 1053		MONITORING REPORT DUE DATE: 2/16/2012	
FACILITY NAME: Village of Los Lunas WWTP		REPORTING PERIOD (i.e., from to):			
SLUDGE SOURCE: ¹ Digested sludge		DISCHARGE CELL DESIGNATION: ¹ Section 7		Temporary Permission	
				# ACRES IN CELL:	20.0

MONTH & YEAR OF DISCHARGE ²	A WEIGHT OF SLUDGE DISCHARGED metric tons dry weight ³	B SLUDGE SAMPLE: TOTAL NITROGEN CONCENTRATION ⁴ (TKN + NO ₃ -N) mg/kg	C SLUDGE DISCHARGED: TOTAL NITROGEN (A x B) x 1,000 kg N	D SLUDGE DISCHARGED: TOTAL NITROGEN (C x 2.2) lbs N	E NITROGEN LOADING (D ÷ # acres) lbs N/acre	NOTES ⁵
example assuming a 50-acre cell: MM - YY	125 metric tons	2063 mg/kg TKN + 687 mg/kg NO ₃ -N = 2750 mg/kg N	(125 metric tons x 2750 mg/kg) ÷ 1,000 = 343.8 kg N	(343.8 kg N/metric ton) x 2.2 = 756 lbs N	756 lbs N ÷ 50 acres = 15.1 lbs N/acre	
Dec-11	0.87	88,533.00	77.2	170	8.5	
Dec-11	0.70	88,533.00	62.1	137	6.8	
Dec-11	0.68	88,533.00	60.4	133	6.6	
Dec-11	0.72	88,533.00	63.8	140	7.0	
Dec-11	0.63	88,533.00	55.4	122	6.1	
Dec-11	0.59	88,533.00	52.0	114	5.7	
Dec-11	0.59	88,533.00	52.0	114	5.7	
Dec-11	0.57	88,533.00	50.3	111	5.5	
Dec-11	0.63	88,533.00	55.4	122	6.1	
Dec-11	0.72	88,533.00	63.8	140	7.0	
TOTALS				1,303	65.2	

¹One SDDS form should be used for each cell designation and each sludge source. Examples of "Sludge Source" include: thickened solids, non-thickened solids, multiple treatment facilities, liquid sludge, dry sludge, etc.

²Each form must reflect the most recent 12 months of sludge discharge.

³One metric ton = 2,200 lbs

⁴This information should be obtained from the most recent laboratory analysis. Note: If quarterly sampling is required, record the same data for the three months of that monitoring quarter.

⁵In the event discharge did not occur, please report "no discharge" in the NOTES column.

Appendix I

NMED Requirements and Guidelines for Sludge Disposal at Landfill

Sludge Disposal Management Plan Preparation Guidelines

A generator of sludge is required to prepare a Disposal Management Plan (DMP) prior to disposal of the sludge at a landfill or other approved disposal facility permitted to accept sludge. Prior to the landfill's acceptance of the sludge for disposal, a generator-specific DMP must be prepared by the generator of the sludge. The DMP must be reviewed and approved by the New Mexico Environment Department's (NMED) Solid Waste Bureau (SWB) prior to disposal of the sludge. The DMP must also be accepted and implemented by the disposal facility prior to disposal of the sludge.

In accordance with the special waste requirements for sludge, as addressed under the New Mexico Solid Waste Rules (SWR), 20.9.8.16 NMAC, the following outline is provided to assist in the preparation of a DMP:

Title Page or Cover Letter on Company or Governmental Letterhead
Provide the facility name, address and location

Address Cover Letter and Mail to:
Manager, Enforcement Section
Solid Waste Bureau
New Mexico Environment Department
1190 St. Francis Drive
P.O. Box 5469
Santa Fe, New Mexico 87502-5469

Include a Table of Contents (optional, but suggested)

The Following Sections are Generally Required in the DMP:

- A. Current Operations – Explain the current waste water or water treatment plant operations including type of operation; origin of sludge (e.g. city system, septic, supply well, or other); estimated sludge generation rate per year; current volume of stockpiled sludge, if applicable; explain how generated sludge will be stored or stockpiled prior to disposal (include estimated volume to be stored, and other details); provide anticipated volumes to be transported and frequency of disposal.
- B. Disposal Facility – Identify the landfill(s) or other disposal facilities where sludge is to be disposed. Ensure disposal facilities are permitted to accept sludge and provide the physical address, state-issued permit number and identity of the facility operator. When available, attach copies of the correspondence between the disposal facility and the treatment plant operator. When included, such correspondence should demonstrate the disposal facility's awareness of the nature of the sludge, estimated quantity or volume, necessary sampling frequency and parameters for testing of the sludge, and the willingness to incorporate the terms of the DMP into the disposal facility's records and operations. The DMP should also include a description of the disposal method or alternate use of the sludge at the landfill (as indicated by the operator of the proposed disposal facility). Prior to transporting sludge to an approved disposal facility, a copy of the landfill operator's written acceptance of the DMP shall be provided to the SWB.

- C. Sludge Transportation – Provide assurance that a current and properly registered commercial or special waste hauler authorized for the transport of sludge is proposed. If such a hauler has not been selected at the time of the DMP submittal, insert a statement in the DMP indicating that the identity of the proposed hauler will be provided to the SWB at least 10 days prior to commencement of hauling, thereby allowing the SWB time to verify the registration status of the hauler. If a hauler has been selected, identify the registered hauler by business name, address, certificate number and contact person. Assert that a special waste manifest meeting all the requirements of 20.9.8.19 NMAC will be used for each load of sludge to be transported, to include all necessary signatures, dates, addresses, telephone numbers, and permit or registration numbers. Assert that the generator will retain copies of both the originating and finalized manifests for a period of at least three years, and that such manifests will be made available to the SWB for inspection, upon request. Finally, indicate the truck route to each of the disposal facilities planned for use, beginning at the generating location (e.g., waste water or water treatment plant). While not required, it is preferred that a route map be attached.
- D. Sludge Sampling and Analysis – Explain how collected sludge samples will be representative in nature (e.g., a number of grab samples will be collected and mixed together from various locations and depths from the drying bed or stockpile to comprise one representative sample, or a grab will be taken from the belt press just prior to tipping into the transporting truck and/or storage container). Provide the frequency of sampling and analysis in order to meet the requirements under the SWR, 20.9.8.16.C(1) NMAC, which specifies one representative sample per 100 cubic yards. *[Note: An alternative sampling and analysis frequency can be approved by the SWB, but must be approved in writing and is typically an option that generally follows SWB review of laboratory reports from several rounds of sludge sampling, leading to a determination that the sludge is homogeneous. Such request must be specifically made by the generator in writing and submitted to the SWB under separate cover.]* Identify the analytical laboratory to perform the analysis by business name, address and telephone number, and provide a written assurance that the proposed laboratory follows QA/QC procedures in accordance with U.S. EPA approved methods. Include a statement acknowledging that all sludge analytical results require SWB approval prior to initial disposal and thereafter as indicated in the approved DMP.

The generator is required to test a representative sample of the sludge for the following parameters listed below, in accordance with the SWR, 20.9.8.16.D NMAC. Request from the selected laboratory the required analysis results, and when available, also request copies of the chain-of-custody form identifying the requested analyses and the laboratory's QA/QC report. These documents may be provided to the SWB under separate cover, or in the case of a new or revised DMP, as an attachment to the DMP.

Required Sludge Analysis Parameters¹:

20.9.8.16.D. NMAC Prior to delivery of sludge to a solid waste facility for disposal, the generator shall test a representative sample for the following parameters to determine if it exceeds the specified limits below:

- (1) no free liquids as determined by paint filter liquids test¹ (U.S. EPA test method 9095), *unless exempt in accordance with 20.9.4.17 NMAC (Research, Development, and Demonstration Permits);*
- (2) percent solids (no specified limits)¹;
- (3) pH, within the range of 2.0 to 12.5¹;
- (4) polychlorinated biphenyls (PCBs), *less than 50 mg/Kg; and*

(5) toxicity characteristic leaching procedure (TCLP) (U.S. EPA test method 1311), for the following parameters and maximum allowable concentrations:

- (a) arsenic, 5.0 mg/L¹;
- (b) benzene, 0.5 mg/L;
- (c) cadmium, 1.0 mg/L¹;
- (d) chlordane, 0.03 mg/L;
- (e) chromium, 5.0 mg/L¹;
- (f) 2,4-Dichlorophenoxy-acetic acid, 10.0 mg/L;
- (g) lead, 5.0 mg/L¹;
- (h) lindane, 0.4 mg/L;
- (i) mercury, 0.2 mg/L¹;
- (j) methyl ethyl ketone, 200.0 mg/L; and
- (k) toxaphene, 0.5 mg/L.

Prior to transporting sludge to an approved disposal facility, a copy of the laboratory analysis shall be provided to the SWB for review and approval.

- E. Contingency Plan or Actions – Explain the actions necessary in the event of an unplanned release or spill and how the material will be contained, cleaned up, and how the spill area will be disinfected. This is also required by the registered sludge hauler while the waste is in transport and a similar incident is encountered.
- F. Future Changes to the DMP Requires Notification – Insert an acknowledgement that any future changes or deviations from the terms and requirements of the approved DMP require prior notification to the SWB for review and approval.
- G. Attachments – List and label all attached documents, including letters or other correspondence, maps, special waste manifest examples, laboratory reports and related documentation, and all other exhibited items.

¹ Reduced Parameter List for Water Treatment Sludge (e.g. cooling tower water, drinking water filter media), absent any reason to require additional parameters; SWB policy guidance from March 9, 2011 (revision).

SLUDGE DISPOSAL MANAGEMENT PLAN (DMP)

Communities Wastewater Treatment Facility

November 04, 2009

Current Wastewater Treatment Facility

The Communities Wastewater Treatment Facility (C WWTF), operated by Water Service Company, is an extended aeration activated sludge facility. The C WWTF is located at 123 Trail, City, NM, and services the town of Belder and the surrounding area in NM. Daily, about 2,000 gallons of waste activated sludge at less than 1% Total Suspended Solids is pumped to holding tanks. The sludge is decanted to a concentration of about 1% and further dewatered with a centrifuge to a cake of 20-30% Total Solids (%TS). The centrifuge came on line August 2009, eliminating previous land application of the sludge. Based on the annual National Pollutant Discharge Elimination System (NPDES) Sludge Discharge Monitoring Report for 2008, the C WWTF produces about 70 dry tons of sludge per year, of which all will be disposed of at a landfill. And assuming a maximum roll-off container load of 10 tons, the container will be taken to the permitted disposal facility bi-weekly (see Attachment A, Sludge Disposal Calculations).

Generator Contact Information

Name: Bobby T
Telephone: 555-123-4567
Fax: 555-123-4567
E-mail: b@water.com

Disposal Facilities

Pursuant to 20.9.8.16 NMAC-Sludge, Water Service Company is requesting NMED approval to transport and dispose of dewatered waste activated sludge at the Valencia Regional Landfill and Recycling Facility, located at 1600 West Highway 6, Los Lunas, NM. This facility is permitted to receive municipal sludge under permit no. SWM-231402 & SWM-012339(SP), and is operated by Waste Management of New Mexico. The sludge will be disposed of in accordance with the landfill operations (see Appendix B for landfill communication and preliminary waste approval).

Truck Route to the Valencia Regional Landfill

From Communities Wastewater Treatment Facility at 123 Trail, head east on Trail. Turn north on Highway 3 to Road. Turn west on Road to Main Street. Turn North on Main Street to I-25. Turn North on I-25 to Exit 2. Turn West on Main Street/Highway 6 to the Valencia Regional Landfill located at 1600 West Highway 6. (See Attachment C)

EXAMPLE DMP

Transportation to Landfill

A registered special waste hauler will be used. The sludge will be transported by DISPOSAL, INC.

Contact and Address: Charles M
Disposal, Inc.
123 Address Road
City, NM 87000
555-123-4567 (Phone)
555-123-4567 (Fax)

The dewatered waste activated sludge will be transported in a leak-free and covered trailer. Each load will have a special Waste Manifest (see Attachment D), which meets the requirements specified in Section 20.9.8.19 NMAC. The original and signed copies of the manifest will be kept on file at the C WWTF, as per Section 20.9.8.19 NMAC.

Sludge Sampling and Analysis

A representative sample of the dewatered activated sludge will be sampled for parameters listed below prior to transporting each roll-off container to the Valencia Regional Landfill for disposal. The representative sample will be taken in the center of the roll-off container, about 12 inches below the surface of the sludge.

A representative sample of the dewatered waste activated sludge was collected on August 26, 2009, for analysis for the Paint Filter Liquids Test. Analytical Laboratories, Inc. conducted the analysis. This lab will continue to be used for such services. All other parameters listed below were tested on March 4, 2009 to ensure adherence with specified limits in Section 20.9.8.19 NMAC (see Attachment E).

During normal operation, representative samples for the parameters listed below will be collected every 100 cubic yards, or 5 representative samples collected and analyzed per year (5 roll-off loads @ 10 tons/load or every 50 tons – see Attachment A for sludge disposal calculations), until permission to reduce the number of samples taken annually is requested from the generator (based on a demonstration the sludge is homogeneous) and approved by the Solid Waste Bureau.

Required Sludge Analysis Parameters:

20.9.8.16.D. NMAC Prior to delivery of sludge to a solid waste facility for disposal, the generator shall test a representative sample for the following parameters to determine if it exceeds the specified limits below:

EXAMPLE DMP

(1) no free liquids as determined by paint filter liquids test¹ (U.S. EPA test method 9095), *unless exempt in accordance with 20.9.4.17 NMAC (Research, Development, and Demonstration Permits)*;

(2) percent solids (no specified limits)¹;

(3) pH, within the range of 2.0 to 12.5¹;

(4) polychlorinated biphenyls (PCB's), *less than 50 mg/Kg*; and

(5) toxicity characteristic leaching procedure (TCLP) (U.S. EPA test method 1311), for the following parameters and maximum allowable concentrations:

- (a) arsenic, 5.0 mg/L¹;
- (b) benzene, 0.5 mg/L;
- (c) cadmium, 1.0 mg/L¹;
- (d) chlordane, 0.03 mg/L;
- (e) chromium, 5.0 mg/L¹;
- (f) 2,4-Dichlorophenoxy-acetic acid, 10.0 mg/L;
- (g) lead, 5.0 mg/L¹;
- (h) lindane, 0.4 mg/L;
- (i) mercury, 0.2 mg/L¹;
- (j) methyl ethyl ketone, 200.0 mg/L; and
- (k) toxaphene, 0.5 mg/L.

[¹ Reduced Parameter List for Water Treatment Sludge (e.g. cooling tower water, drinking water filter media), absent any reason to require additional parameters; Solid Waste Bureau policy guidance from March 9, 2011 (revision).]

Contingency Plan

The Sludge Transporter will be a registered hauler with an approved contingency plan in the event of an unplanned release or spill of the sludge (see Attachment F). Local police can contact the Water Service Company Operations Supervisor, Bobby T at 555-123-4567 in the event of an emergency.

Future Sludge Disposal Plan

The Water Service Company plans to continue the procedure outlined in this DMP for the foreseeable future.

If you have any questions or require additional information, please contact me at the number given below.

Sincerely,

WATER SERVICE

EXAMPLE DMP

Robert T, Operations Supervisor

RT/rt

Enclosures

cc Jake K, NMED
 Sandra G, NMED
 WSC File

Enclosures:

- Attachment A – Sludge Disposal Calculations
- Attachment B – Waste Management, Valencia Regional Landfill & Recycling Facility
Approval
- Attachment C – Truck Route Directions and Map
- Attachment D – Waste Manifest
- Attachment E – Waste Activated Sludge Laboratory Analysis
- Attachment F – Transporter Contingency Plan

SPECIAL WASTE MANIFEST		Manifest Document No.		Page 1 of	
Generator's Name		Generator's Address		Generator's Telephone No.	
Origin of Special Waste (Project or Spill Location):					
Transporter #1 Company Name		Address		Telephone No.	
Transporter #2 Company Name		Address		Telephone No.	
Destination Facility Name/Site Address		Facility ID (Permit) Number		Telephone No.	
Type and Proper Name of Special Waste				Container(s) No.	Type
				Total Quantity	Unit Wt/Vol
Additional Descriptions for Special Waste Listed Above:					
Special Handling Instructions:					
GENERATOR'S CERTIFICATION: I hereby certify that the contents of this shipment are fully and accurately described above by type and proper name of the special waste, and that such waste has been managed, packaged, containerized and labeled in accordance with the requirements of 20.9.8 NMAC (Special Waste Requirements) in addition to any other applicable federal, state or local regulations.					
Printed/Typed Name:		Signature:		Date:	
Transporter 1 Acknowledgement of Receipt of Special Waste					
Printed/Typed Name:		Signature:		Date:	
Transporter 2 Acknowledgement of Receipt of Special Waste					
Printed/Typed Name:		Signature:		Date:	
Discrepancy Indication Space:					
Facility Owner or Operator: <i>I hereby acknowledge receipt of the special waste as indicated upon this manifest, except as noted above in the Discrepancy Indication Space.</i>					
Printed/Typed Name:		Signature:		Date:	

GENERATOR

TRANSPORTER

FACILITY

Appendix J

Financial Data

Annual Operating and Maintenance Costs

ANNUAL OPERATING DATA JUL 01, 2007 THRU JUN 30, 2008

Item	o/o Spent	Annual Budget	Remaining/ <Over> Budget
Waste Water Treatment Plant			
Office Supplies	125.1	\$ 2,500.00	-\$ 537.12
Data Processing	40.4	\$ 5,022.00	\$ 2,821.03
Books & Manuals	56.6	\$ 500.00	\$ 216.78
Gas & Oil For Vehicles	114.7	\$ 15,000.00	-\$ 2,205.49
Training & Seminars	81.2	\$ 10,000.00	\$ 1,994.50
Printing & Copying	0	\$ 900.00	\$ 900.00
Professional Services	5.7	\$ 100,000.00	\$ 94,346.33
Postage	10.9	\$ 1,300.00	\$ 1,158.02
Utilities	86.7	\$ 170,000.00	\$ 22,539.04
Telephone Expense	89.8	\$ 7,800.00	\$ 797.83
Subscriptions & Dues	83.7	\$ 800.00	\$ 130.75
Insurance & Bonds	97.5	\$ 26,500.00	\$ 663.93
Publications & Advertising	133	\$ 1,100.00	-\$ 363.05
Building & Grounds Maint.	104.1	\$ 19,500.00	-\$ 322.69
Road Equipment Repairs	115.2	\$ 24,500.00	-\$ 4,959.75
Janitorial Supplies/Service	59.8	\$ 2,600.00	\$ 1,044.28
WWTP Gas/Water Exp	65.3	\$ 4,000.00	\$ 1,387.21
Uniform Allowance	82	\$ 3,500.00	\$ 478.69
Travel Expenses	73.6	\$ 4,000.00	\$ 1,056.69
Tools & Equipment	78.5	\$ 5,000.00	\$ 2,039.85
Safety Equipment	110	\$ 5,000.00	-\$ 587.42
Chemicals	105.6	\$ 19,000.00	-\$ 2,628.79
Systems Maintenance	96	\$ 85,000.00	\$ 613.80
Laboratory Supplies	83.8	\$ 25,000.00	\$ 3,364.97
Lease Payments	0.8	\$ 16,800.00	\$ 16,937.08
Admin/Bookkeeping Charges	100	\$ 282,070.00	\$ 0.04
Interest Expense	0	\$ -	-\$ 69,145.43
Depreciation Expense	0	\$ -	-\$ 17,265.00
SRF Loan Payment	0	\$ 222,151.00	\$ 222,150.99
FINAL TOTALS	73.4%	\$ 1,059,543.00	\$ 276,627.07

ANNUAL OPERATING DATA JUL 01, 2008 THRU JUN 30, 2009

Item	% Spent	Annual Budget	Remaining/ <Over> Budget
Waste Water Treatment Plant			
Office Supplies	100.5	\$ 2,500.00	-\$ 22.34
Data Processing	13.3	\$ 5,525.00	\$ 4,729.58
Books & Manuals	51.5	\$ 500.00	\$ 242.56
Gas & Oil For Vehicles	76.3	\$ 23,000.00	\$ 5,462.48
Training & Seminars	83.0	\$ 10,000.00	\$ 1,075.10
Printing & Copying	0.0	\$ 900.00	\$ 900.00
Professional Services	6.0	\$ 30,000.00	\$ 28,187.58
Postage	43.1	\$ 1,300.00	\$ 739.82
Utilities	98.4	\$ 180,000.00	\$ 2,874.94
Telephone Expense	86.4	\$ 7,800.00	\$ 886.16
Subscriptions & Dues	32.3	\$ 800.00	\$ 542.00
Insurance & Bonds	101.8	\$ 28,500.00	-\$ 510.99
Publications & Advertising	76.7	\$ 2,100.00	\$ 489.77
Building & Grounds Maint.	66.0	\$ 19,500.00	\$ 288.24
Road Equipment Repairs	78.9	\$ 25,000.00	\$ 3,947.31
Janitorial Supplies/Service	75.5	\$ 2,600.00	\$ 636.10
WWTP Gas/Water Exp	52.4	\$ 4,000.00	\$ 1,905.67
Uniform Allowance	95.4	\$ 4,000.00	\$ 95.96
Travel Expenses	94.7	\$ 4,000.00	\$ 210.95
Tools & Equipment	84.4	\$ 5,000.00	\$ 778.84
Safety Equipment	109.3	\$ 6,000.00	-\$ 779.27
Chemicals	105.0	\$ 25,000.00	-\$ 20.14
Systems Maintenance	107.4	\$ 99,000.00	-\$ 7,414.23
Laboratory Supplies	90.3	\$ 20,000.00	\$ 2,165.29
Lease Payments	9.3	\$ 26,800.00	\$ 24,303.93
Admin/Bookkeeping Charges	100.0	\$ 296,175.00	\$ -
Interest Expense	0.0	\$ -	-\$ 66,394.90
Depreciation Expense	0.0	\$ -	-\$ 23,200.00
SRF Loan Payment	0.0	\$ 222,151.00	\$ 222,151.00
FINAL TOTALS	79.9%	\$ 1,052,151.00	\$ 204,271.41

ANNUAL OPERATING DATA JUL 01, 2009 THRU JUN 30, 2010

Item	% Spent	Annual Budget	Remaining/ <Over> Budget
Waste Water Treatment Plant			
Office Supplies	88.1	\$ 2,500.00	\$ 58.64
Data Processing	26.1	\$ 2,328.00	\$ 1,956.27
Books & Manuals	21.4	\$ 500.00	\$ 392.93
Gas & Oil For Vehicles	122.2	\$ 21,000.00	-\$ 4,653.07
Training & Seminars	92.7	\$ 10,000.00	\$ 1,354.87
Printing & Copying	69.8	\$ 500.00	\$ 151.00
Professional Services	76.8	\$ 8,000.00	\$ 1,856.71
Postage	43.4	\$ 1,300.00	\$ 735.35
Utilities	110.5	\$ 210,000.00	-\$ 22,105.96
Telephone Expense	78.7	\$ 7,800.00	\$ 1,835.68
Subscriptions & Dues	0.0	\$ 500.00	\$ 500.00
Insurance & Bonds	66.6	\$ 50,000.00	\$ 16,714.60
Publications & Advertising	16.9	\$ 2,100.00	\$ 1,625.22
Building & Grounds Maint.	117.5	\$ 21,500.00	\$ 2,663.74
Road Equipment Repairs	57.8	\$ 25,000.00	\$ 10,924.75
Janitorial Supplies/Service	79.7	\$ 2,000.00	\$ 406.89
WWTP Gas/Water Exp	154.5	\$ 4,000.00	-\$ 2,180.08
Uniform Allowance	74.0	\$ 4,000.00	\$ 1,279.70
Travel Expenses	58.8	\$ 4,000.00	\$ 1,646.50
Tools & Equipment	107.4	\$ 3,000.00	-\$ 221.44
Safety Equipment	87.3	\$ 6,000.00	\$ 1,040.84
Chemicals	70.3	\$ 40,000.00	\$ 10,890.81
Systems Maintenance	95.8	\$ 90,000.00	\$ 4,550.89
Laboratory Supplies	117.6	\$ 14,000.00	-\$ 2,063.14
Lease Payments	41.4	\$ 31,125.00	\$ 18,243.40
Admin/Bookkeeping Charges	100.0	\$ 319,869.00	\$ -
Interest Expense	0.0	\$ -	-\$ 39,988.51
Depreciation Expense	0.0	\$ -	-\$ 29,295.00
SRF Loan Payment	0.0	\$ 222,151.00	\$ 222,151.00
FINAL TOTALS	82.6%	\$ 1,103,173.00	\$ 200,472.59

ANNUAL OPERATING DATA JUL 01, 2010 THRU JUN 30, 2011

Item	% Spent	Annual Budget	Remaining/ <Over> Budget
Waste Water Treatment Plant			
Office Supplies	57.2	\$ 4,000.00	\$ 6,509.94
Data Processing	58.7	\$ 2,902.00	\$ 1,198.65
Books & Manuals	9.6	\$ 500.00	\$ 452.25
Gas & Oil For Vehicles	121.2	\$ 20,000.00	-\$ 4,238.50
Training & Seminars	112.7	\$ 10,000.00	-\$ 1,271.64
Printing & Copying	45.1	\$ 500.00	\$ 274.48
Professional Services	70.7	\$ 20,000.00	\$ 5,860.03
Postage	60.1	\$ 1,300.00	\$ 518.18
Utilities	87.8	\$ 288,000.00	\$ 35,065.18
Telephone Expense	93.8	\$ 7,900.00	\$ 487.46
Subscriptions & Dues	93.9	\$ 500.00	\$ 30.50
Insurance & Bonds	100.0	\$ 44,389.00	-\$ 3.46
Publications & Advertising	44.8	\$ 1,500.00	\$ 948.04
Building & Grounds Maint.	86.6	\$ 21,500.00	\$ 2,812.56
Road Equipment Repairs	66.8	\$ 31,000.00	\$ 11,439.66
Janitorial Supplies/Service	110.7	\$ 2,000.00	-\$ 213.35
WWTP Gas/Water Exp	116.5	\$ 8,000.00	-\$ 1,318.93
Uniform Allowance	76.9	\$ 4,000.00	\$ 923.75
Travel Expenses	111.3	\$ 3,000.00	-\$ 339.98
Tools & Equipment	101.1	\$ 4,000.00	-\$ 45.46
Safety Equipment	107.7	\$ 5,500.00	-\$ 391.96
Chemicals	103.5	\$ 30,000.00	-\$ 514.95
Systems Maintenance	143.0	\$ 90,000.00	-\$ 38,298.55
Laboratory Supplies	80.5	\$ 14,000.00	-\$ 1,820.95
Lease Payments	0.3	\$ 21,465.00	\$ 21,525.58
Admin/Bookkeeping Charges	100.0	\$ 335,862.00	\$ -
Interest Expense	0.0	\$ -	-\$ 34,837.67
Depreciation Expense	0.0	\$ -	-\$ 14,708.00
SRF Loan Expens/USDA Loan Expe	72.1	\$ 1,075,451.00	\$ 299,970.31
SRF Loan Payment	0.0	\$ 222,151.00	\$ 222,151.00
FINAL TOTALS	77.3%	\$ 2,269,420.00	\$ 512,164.17

ANNUAL OPERATING DATA JUL 01, 2011 THRU JUN 30, 2012

Item	% Spent	Annual Budget	Remaining/ <Over> Budget
Waste Water Treatment Plant			
Office Supplies	83.0	\$ 3,500.00	\$ 561.64
Data Processing	71.1	\$ 7,343.00	\$ 2,122.81
Books & Manuals	85.4	\$ 500.00	\$ 73.22
Gas & Oil For Vehicles	102.0	\$ 34,000.00	-\$ 685.72
Training & Seminars	99.4	\$ 9,700.00	\$ 60.13
Printing & Copying	87.1	\$ 1,300.00	\$ 168.01
Professional Services	209.8	\$ 16,566.00	-\$ 18,219.89
Postage	69.8	\$ 1,300.00	\$ 392.19
Utilities	100.4	\$ 308,000.00	-\$ 1,165.77
Telephone Expense	114.8	\$ 6,500.00	-\$ 959.30
Subscriptions & Dues	67.4	\$ 700.00	\$ 228.00
Insurance & Bonds	99.9	\$ 44,500.00	\$ 48.51
Publications & Advertising	70.1	\$ 2,000.00	\$ 597.21
Building & Grounds Maint.	70.3	\$ 30,500.00	\$ 9,145.18
Road Equipment Repairs	66.7	\$ 30,400.00	\$ 11,154.64
Janitorial Supplies/Service	94.8	\$ 2,600.00	\$ 29.42
WWTP Gas/Water Exp	92.3	\$ 10,000.00	\$ 771.61
Uniform Allowance	85.5	\$ 4,000.00	\$ 224.60
Travel Expenses	7.0	\$ 4,000.00	\$ 3,683.59
Tools & Equipment	12.9	\$ 4,000.00	\$ 3,483.44
Safety Equipment	108.6	\$ 6,500.00	-\$ 561.67
Chemicals	87.4	\$ 30,000.00	-\$ 7,497.16
Systems Maintenance	98.1	\$ 140,000.00	\$ 4,788.76
Laboratory Supplies	115.1	\$ 23,000.00	\$ 1,027.80
Lease Payments	9.6	\$ 14,469.00	\$ 15,857.02
Admin/Bookkeeping Charges	100.0	\$ 352,655.00	\$ -
Interest Expense	0.0	\$ -	-\$ 438,657.87
Depreciation Expense	0.0	\$ -	-\$ 16,124.00
SRF Loan Expens/USDA Loan Expe	6.5	\$ 1,070,441.00	\$ 1,001,069.71
SRF Loan Payment	0.0	\$ 222,151.00	\$ 222,151.00
FINAL TOTALS	66.5%	\$ 2,380,625.00	\$ 793,767.11

Appendix K

Engineer's Opinion of Cost for Capacity Expansion of the Existing MBR Plant (MBR-1)

**Los Lunas Wastewater and Sludge Management PER
Engineer's Opinion of Probable Cost
MBR Capacity Expansion - Upper Cassettes**

<u>Item</u>	<u>Estimated Cost</u>
MBR Capacity Expansion of Existing MBR Facility	\$1,854,000
Construction Contingencies @ 2%	\$37,000
Subtotal	\$1,891,000
Allowance for legal services	\$10,000
Subtotal	\$1,901,000
NMGRT @7.5625%	\$144,000
Total Construction Costs	 \$2,045,000
 <u>Professional Engineering Services</u>	
Basic Design Services	\$97,600
Construction Observation Services (4 months)	\$56,000
Construction Phase Engineering Services	\$32,000
Subtotal Engineering Services	\$185,600
NMGRT @ 7.0000%	\$13,000
Total Professional Engineering Services	 \$198,600
 Total Project Costs	 \$2,243,600

Capacity Expansion of Existing MBR Plant
MBR Expansion - Upper Cassettes

DATE: 03/15/13

ITEM	UNIT	QUANT	UNIT PRICE	COST ESTIMATE
Upper membrane cassettes to be installed in existing MBR basins. Proposal by Ovivo (Feb. 2012) includes: Nine MBR upper cassettes, including delivery; in-basin piping and supports, plant process control programming, training and start-up.	ls	1	\$1,254,900	\$1,254,900
Equipment installation	%	20	\$1,254,900	\$251,000
Electrical work	%	3	\$1,254,900	\$37,600
<u>Remove and replace valve actuators for lower cassettes</u>				
Actuator Material Cost	ea	12	\$3,500	\$42,000
Actuator Removal Cost	days	4	\$1,400	\$5,600
Actuator Installation Cost	ls	0.4	\$42,000	\$16,800
Remove/re-install as needed to clean existing MBR cassettes	days	10	\$1,800	\$18,000
SUBTOTAL				\$1,625,900
Undefined Elements	8.00%			\$130,100
General Conditions	2.00%			\$32,500
Mobilization, Bonds, Shakedown	4.00%			\$65,000
TOTAL				\$1,854,000

Appendix L

Engineer's Opinion of Cost for One New MBR Plant (MBR-2) and Improvements to the Existing Entrance Works

**Los Lunas Wastewater and Sludge Management PER
Membrane Biological Reactor Basin and Building**

DATE: 06/05/12

ITEM	UNIT	QUANT	UNIT PRICE	COST ESTIMATE
Structural: Bacchus 08/31/07				
<u>Concrete</u>				
\$1,192,326 1919 \$621 cy	cy	1919	\$1,192,326	n/a
Concrete: MCA Adjusted (May 2012)	cy	1919	\$650	\$1,247,350
<u>Masonry</u> \$306,000 Sep-07	ls	1	\$306,000	\$306,000
<u>Metals</u>				
Stairs, grating, ladders, columns, roof joists, floor decking, guardrailing, crane beams & columns, misc \$320,500 Sep-07	ls	1	\$320,500	\$320,500
<u>Earthwork</u>				
Excavation \$103,725 \$10.33	cy	10044	\$13	\$130,572
Select Backfill \$82,380 \$13.21	cy	6235	\$23	\$143,405
Compaction \$7,529 \$1.21	cy	6235	\$5	\$31,175
Subtotal \$193,634				
<u>Dewatering</u>				
Install Dewatering System	ls	1	\$80,000	\$80,000
Remove Dewatering System	ls	1	\$15,000	\$15,000
Dewatering Equipment	ls	1	\$11,000	\$11,000
Building Hoists (Industrial Electric)				
3-ton single hook electric bridge crane: MBR	ls	1	\$19,819	\$19,819
Installation	ls	1	\$8,400	\$8,400
Runway beams and columns for 3-ton hoist	ls	1	n/a	n/a
Installation	ls	1	\$39,875	\$39,875
1.5 ton geared bridge crane and trolley	ls	1	\$12,773	\$12,773
Installation	ls	1	\$8,400	\$8,400
Transfer Pumps: 1 ton Davit Crane	ls	1.25	\$2,200	\$2,750
Hoist Contractor Markup	ls	0.2	\$22,569	\$4,514
<u>Architectural</u> 09/10/07				
Subtotal with Contingency \$390,045		1	\$390,045	\$390,045
Contractor Markup	ls	0.2	\$390,045	\$78,009
HVAC 08/31/07 \$155,158	ls	1	\$155,158	\$155,158
Building Driveways	cy	7	\$500	\$3,500
Basins: Interior Coating System	ls	1	\$28,000	\$28,000
Basins: Exterior Coating System	ls	1	\$25,000	\$25,000
Equipment				
Ovivo MBR Proposal (April 30, 2012)				
MBR Package including the following: MBR Blowers, Pre-aeration Blowers, lower MBR cassettes, all in-side the walls piping and valves, flow control valves, mag meters, turbidimeter, CIP cleaning inplace unit, controls for MBR's. All blowers include: sound enclosures, shutoff valves, rubber expansion joints, and accessories. Anoxic and pre-aeration basin covers. Pre-aeration basins air supply system. WAS flow control valves. Instrumentation, hardware, software and controls.		1	\$3,986,821	\$3,986,821
MBR Installation and Profit	ls	0.3	\$3,986,821	\$1,196,046

**Los Lunas Wastewater and Sludge Management PER
Membrane Biological Reactor Basin and Building**

DATE: 06/05/12

ITEM	UNIT	QUANT	UNIT PRICE	COST ESTIMATE
<u>Submersible Mixers</u> JCH: 08-25-07				
Pre-Aeration Basin Mixer \$12,606 1.1	ea	4	\$13,867	\$55,466
Anoxic Basin Mixer \$10,947 1.1	ea	4	\$12,042	\$48,167
Spare Parts \$1,060 1.1	ea	2	\$1,166	\$2,332
Portable Hoist	ea	2	\$3,000	\$6,000
Installation	ls	0.35	\$111,965	\$39,188
<u>Anoxic Re-cycle Pumps and Accessories</u>				
14" Submersible sewage pumps w/ accessories	ea	4	\$27,000	\$108,000
14" check valve, HDL, flg ends	ea	4	\$10,300	\$41,200
Installation	ls	0.3	\$149,200	\$44,760
Pre-Aeration Basin: aeration equipment	ls	1	Included in MBR Proposal Price	
Weir Gates stainless steel, 3x3	ea	2	Included in MBR Proposal Price	
<u>Basin Covers</u>				
Anoxic Basin Covers	sf	1280	Included in MBR Proposal Price	
Pre-Aeration Basin Covers	sf	1920	Included in MBR Proposal Price	
<u>MBR Blowers (3) Piping Outside the Basins</u>				
<u>Blower Discharge Fittings:</u>				
Check valves, shutoff valves, expansion joints are include in Ovivo MBR Proposal				n/a
10" 90 degree bends, HDG steel, flg ends	ea	3	\$415	\$1,245
10x12 90 degree bends, HDG steel, flg ends	ea	3	\$560	\$1,680
12" 90 degree bends, HDG steel, flg ends	ea	2	\$594	\$1,188
14x14x14 tee, HDG, steel, flg ends	ea	2	\$1,150	\$2,300
14x14x10 tee, HDG, steel, flg ends	ea	2	\$1,098	\$2,196
12x12x10 tee, HDG steel, flg ends	ea	3	\$830	\$2,490
14x12 reducer, HDG steel, flg ends	ea	4	\$710	\$2,840
12x8 reducer, HDG steel, flg ends	ea	2	\$400	\$800
8" 90 degree bends, HDG steel, flg ends	ea	2	\$380	\$760
12" mega flange	ea	4	\$380	\$1,520
14" mega flange	ea	1	\$450	\$450
<u>Blower Discharge Pipe Common:</u>				
10" HDG steel, horizontal, 5 feet long, flg	ea	3	\$550	\$1,650
12" HDG steel, vertical, 11 feet long, flg x pe	ea	1	\$1,100	\$1,100
12" HDG steel, vertical, 7 feet long, flg x pe	ea	1	\$700	\$700
12" HDG steel, vertical, 3 feet long, flg x pe	ea	1	\$300	\$300
12" HDG steel, vertical, 14 feet long, flg x pe	ea	1	\$1,400	\$1,400
14" HDG steel, vertical, 1ft 6in long, flg	ea	1	\$350	\$350
14" HDG steel, vertical, 8ftlong, flg x pe	ea	1	\$1,200	\$1,200
14" HDG steel, vertical, 2ftlong, flg x pe	ea	1	\$400	\$400
12" HDG steel, vertical, 16 feet long, flg	ea	1	\$1,800	\$1,800
12" HDG steel, vertical, 15 feet long, flg	ea	1	\$1,700	\$1,700
8" HDG steel, vertical, 1ft 6in long, flg	ea	2	\$240	\$480
Pipe Supports	ea	25	\$300	\$7,500
Miscellaneous Additional Fittings & Inflation	ls	0.2	\$36,049	\$7,210
MBR Air Piping: Installation	ls	0.35	\$43,259	\$15,141

**Los Lunas Wastewater and Sludge Management PER
Membrane Biological Reactor Basin and Building**

DATE: 06/05/12

ITEM	UNIT	QUANT	UNIT PRICE	COST ESTIMATE
Pre-Aeration Basin Piping Outside the Basins from Blowers (2)				
Check valves, shutoff valves, expansion joints are include in Ovivo MBR Proposal				n/a
Blower Discharge Fittings:				
10" 90 degree bends, HDG steel, flg ends	ea	5	\$415	\$2,075
10x10x10 tee, HDG steel, flg ends	ea	3	\$600	\$1,800
10" 45 degree bends, HDG steel, flg ends	ea	2	\$380	\$760
8" 90 degree bends, HDG steel, flg ends	ea	6	\$220	\$1,320
10x8 reducer, HDG steel, flg ends	ea	1	\$330	\$330
10" mega flange	ea	2	\$300	\$600
Blower Discharge Pipe Common:				
10" HDG steel, vertical, 6 feet long, flg	ea	2	\$580	\$1,160
10" HDG steel, 2 feet long, flg	ea	1	\$250	\$250
10" HDG steel, 10 feet long, flg x pe	ea	1	\$880	\$880
10" HDG steel, 8 feet long, flg x pe	ea	1	\$710	\$710
10" HDG steel, 2 feet long, flg x pe	ea	1	\$240	\$240
10" HDG steel, 18 feet long, flg	ea	1	\$1,370	\$1,370
10" HDG steel, 14 feet long, flg	ea	1	\$1,060	\$1,060
10" HDG steel, 8 feet long, flg	ea	1	\$610	\$610
10" HDG steel, 12 feet long, flg	ea	1	\$910	\$910
10" HDG steel, 6 feet long, flg	ea	2	\$500	\$1,000
10" HDG steel, 4 feet - 6inches long, flg	ea	1	\$400	\$400
10" HDG steel, 3 feet - 6inches long, flg	ea	2	\$350	\$700
8" HDG steel, 18 feet long, flg	ea	2	\$950	With Ovivo Proposal
8" HDG steel, 5 feet long, flg	ea	1	\$450	\$450
Pipe Supports	ea	20	\$300	\$6,000
Miscellaneous Additional Fittings & Inflation	ls	0.2	\$22,625	\$4,525
Pre-Aeration Air Piping: Installation	ls	0.35	\$27,150	\$9,503
Permeate Piping System				
3" ductile iron wall pipe, 3ft long, flg ends	ea	72	\$133	\$9,576
3" plug valves, flg ends	ea	72	\$296	With Ovivo Proposal
3x4 increaser, ductile iron, flg ends	ea	72	\$153	With Ovivo Proposal
8x4 90 degree bend, flg ends	ea	8	\$80	With Ovivo Proposal
8x8x4 tees DI, flg ends	ea	64	\$140	With Ovivo Proposal
8" DI pipe spool, flg ends, 2 ft long	ea	72	\$105	With Ovivo Proposal
8" DI wall pipe, flg ends, 3 ft long	ea	8	\$258	With Ovivo Proposal
8" 90 degree bend, flg ends	ea	32	\$105	With Ovivo Proposal
8" DI wall pipe, flg ends, 3 ft long	ea	4	\$252	With Ovivo Proposal
8" DI pipe spool, flg ends, 5 ft long	ea	4	\$239	With Ovivo Proposal
8x12 increaser, ductile iron, flg ends	ea	4	\$190	\$760
12x12x8 tees DI, flg ends	ea	4	\$420	\$1,680
12" 90 degree bend, flg ends	ea	4	\$235	\$940
12x20 increaser, flg ends	ea	1	\$341	\$341
20x24 increaser, flg ends	ea	1	\$341	\$341
20x20x12" tees DI, flg ends	ea	2	\$2,400	\$4,800
24x24x12" tees DI, flg ends	ea	1	\$2,400	\$2,400
12" ductile iron, flg ends, 20 feet long	ea	2	\$1,200	\$2,400
20" ductile iron, flg ends, 20 feet long	ea	2	\$2,400	\$4,800
Miscellaneous Additional Fittings & Inflation	ls	0.2	\$28,038	\$5,608
Permeate Piping: Installation	ls	0.35	\$33,646	\$11,776

**Los Lunas Wastewater and Sludge Management PER
Membrane Biological Reactor Basin and Building**

DATE: 06/05/12

ITEM	UNIT	QUANT	UNIT PRICE	COST ESTIMATE
<u>18" INLET PIPING TO INLET SPLITTER BOX</u>				
<u>Fittings:</u>				
18" 90 degree bend, mj ends	ea	1	\$1,900	\$1,900
18" 45 degree bend, mj ends	ea	1	\$1,054	\$1,054
18" DI wall pipe, pe x pe, 2 ft long	ea	1	\$453	\$453
18" mega lugs	ea	4	\$202	\$808
18" pipe spool, pe x pe, 5 ft long	ea	1	\$517	\$517
Miscellaneous Additional Fittings & Inflation	ls	0.25	\$4,732	\$1,183
Installation	ls	0.35	\$5,915	\$2,070
<u>MBR RECYCLE PIPING</u>				
<u>Fittings:</u>				
12" DI 90 degree bend, flg ends	ea	8	\$504	\$4,032
12" DI 45 degree bend, flg ends	ea	2	\$452	\$904
12x18 DI Reducer, flg ends	ea	2	\$1,863	\$3,726
18x18x12 DI Wye, flg ends	ea	2	\$3,350	\$6,700
18" DI 90 degree bend, flg ends	ea	4	\$1,889	\$7,556
12" DI wall pipe, flg x flg, 2ft - 6in long	ea	4	\$686	\$2,744
12" DI wall pipe, flg x flg, 2ft - 6in long	ea	2	\$686	\$1,372
18" DI wall pipe, flg x pe, 4ft long	ea	2	\$993	\$1,986
<u>Pipe Spools:</u>				
Telescoping valves are included in Enviroquip MBR Proposal Price				n/a
12" DI pipe spool, flg x flg, 16ft - 6in long	ea	2	\$1,265	\$2,530
12" DI pipe spool, flg x flg, 20ft - 4in long	ea	2	\$1,395	\$2,790
12" DI pipe spool, flg x flg, 8ft long	ea	2	\$805	\$1,610
18" DI pipe spool, flg x flg, 6ft long	ea	2	\$1,310	\$2,620
18" DI pipe spool, flg x flg, 13ft - 2in long	ea	2	\$2,057	\$4,114
18" DI pipe spool, flg x flg, 19ft - 9in long	ea	2	\$2,625	\$5,250
Miscellaneous Additional Fittings & Inflation	ls	0.2	\$47,934	\$9,587
Installation	ls	0.35	\$57,521	\$20,132
<u>ANOXIC BASIN LIFT PUMPS PIPING</u>				
<u>Fittings:</u>				
14" DI 90 degree bend, flg	ea	6	\$1,032	\$6,192
14" DI Tee, flg	ea	2	\$1,670	\$3,340
14" DI Wall pipe, flg x pe, 2ft - 6in long	ea	2	\$538	\$1,076
14" mega flanges	ea	8	\$595	\$4,760
14" mag meter, flg ends	ea	2	Included in Enviroquip Package	
<u>Pipe Spools:</u>				
14" DI pipe spool, flg x pe, 12inches long	ea	2	\$286	\$572
14" DI pipe, flg x pe, 17ft - 8 in long	ea	2	\$1,195	\$2,390
14" DI pipe, flg x pe, 1ft - 6 in long	ea	2	\$321	\$642
14" DI pipe, flg x pe, 9ft - 4 in long	ea	2	\$746	\$1,492
14" DI pipe, flg x pe, 3ft - 6 in long	ea	2	\$427	\$854
Miscellaneous Additional Fittings & Inflation	ls	0.2	\$21,318	\$4,264
Installation	ls	0.35	\$25,582	\$8,954
<u>PRE-AERATION BASIN PIPING</u>				
<u>Pipe Spools:</u>				
6" DI pipe spool, flg x flg, 2ft - 6in long	ea	2	\$226	\$452
6" DI blind flange	ea	2	\$47.00	\$94
Miscellaneous Additional Fittings & Inflation	ls	0.25	\$546	\$137
Installation & Inflation	ls	0.35	\$683	\$239

**Los Lunas Wastewater and Sludge Management PER
Membrane Biological Reactor Basin and Building**

DATE: 06/05/12

ITEM	UNIT	QUANT	UNIT PRICE	COST ESTIMATE
<u>DRAIN PIPING SYSTEM</u>				
<u>Fittings:</u>				
6" DI wall pipe, pe x mj, 4ft long	ea	6	\$313	\$1,878
6" DI wall pipe, pe x mj, 6ft long	ea	2	\$365	\$730
6" DI tee, mj ends	ea	8	\$175	\$1,400
6" DI 45 degree bends, mj ends	ea	5	\$90	\$450
6" mega lugs	ea	50	\$29	\$1,450
<u>Valves:</u>				
6" plug valves, buried service, mj ends with valve	ea	8	\$915	\$7,320
<u>Pipe Spools and Piping:</u>				
6" DIP, pe x pe, 5 ft long	ea	5	\$138	\$690
6" DIP, pe x pe, 1 ft long	ea	3	\$40	\$120
6" DIP, pe x pe, 3 ft long	ea	4	\$88	\$352
6" DI pipe, push on joints	lf	160	\$10	\$1,568
Miscellaneous Additional Fittings & Inflation	ls	0.2	\$15,958	\$3,192
Installation	ls	0.35	\$19,150	\$6,702
<u>WAS Pumping</u>				
WAS Pumps	ea	2	\$35,000	\$70,000
WAS Pump Installation	ls	0.3	\$70,000	\$21,000
WAS Piping and Valves	ls	1	\$8,800	\$8,800
WAS Hoist Installed	ea	1.35	\$4,500	\$6,075
<u>Washwater Pumps and Piping</u>				
Washwater Pumps	ea	2	\$8,700	\$17,400
Pressure Tanks	ls	1	\$9,600	\$9,600
WW piping and valves	ls	1	\$6,000	\$6,000
Installation	ls	0.35	\$33,000	\$11,550
<u>UV Structure and UV System</u>				
<u>UV Equipment</u>				
UV equipment open channel	ls	1	\$145,000	\$145,000
Stainless steel inlet screen	ls	1	\$3,000	\$3,000
9" parshall flume	ls	1	\$4,500	\$4,500
UV Installation	ls	0.3	\$152,500	\$45,750
<u>UV Structure</u>				
Earthwork	ls	1	\$15,000	\$15,000
Concrete	ls	45	\$600	\$27,000
Metals	ls	1	\$4,500	\$4,500
Covers	sf	300	\$90	\$27,000
Piping and Motorized Control Gates	ls	1	\$32,000	\$32,000
Coatings	ls	1	\$8,000	\$8,000
SUBTOTAL				\$9,338,800
Undefined Elements			8.00%	\$747,100
General Conditions			2.00%	\$186,800
Mobilization, Bonds, Shakedown			4.00%	\$373,600
TOTAL				\$10,646,000

Los Lunas Wastewater and Sludge Management PER
Expansion of Entrance Works Capacity - New fine screen

DATE: 06/05/12

ITEM	UNIT	QUANT	UNIT PRICE	COST ESTIMATE
<u>Rotary Drum Screen Equipment</u>				
Material Costs	ls	1	\$191,284	\$191,284
Equipment: installation	ls	0.35	\$191,284	\$66,949
<u>Piping System</u>				
20" Plug valve w/ motorized actuator	ea	1	\$14,000	\$14,000
Miscellaneous piping and fittings	ls	1	\$7,500	\$7,500
Installation	ls	0.35	\$21,500	\$7,525
SUBTOTAL				\$287,300
Undefined Elements 8.00%				\$23,000
General Conditions 2.00%				\$5,700
Mobilization, Bonds, Shakedown 4.00%				\$11,500
TOTAL				\$328,000

**Los Lunas Wastewater and Sludge Management PER
Engineer's Opinion of Probable Cost
New Complete MBR Plant**

<u>Construction Costs</u>	<u>Amount</u>
Addition of One Fine Screen at Existing Entrance Works	\$328,000
Membrane Biological Reactor Facilities and Building	\$10,646,000
Site Improvements	\$566,000
Yard Piping Improvements	\$337,000
Electrical	\$1,697,000
Electrical Service Allowance	\$85,000
Laboratory Testing Allowance	\$70,000
Relocation of Existing Utilities Allowance	\$30,000
Subtotal	<u>\$13,759,000</u>
Construction Contingencies @ 2%	<u>\$275,000</u>
Subtotal	<u>\$14,034,000</u>
Allowance for legal services	<u>\$10,000</u>
Subtotal	<u>\$14,044,000</u>
NMGRT @ 7.5625%	<u>\$1,062,000</u>
Total Construction Costs	<u>\$15,106,000</u>

<u>Professional Engineering Services @ 9.5%</u>	
Basic Engineering Services, Soils Investigation, Aerial Photography and Mapping, Surveying Services, Specialty Inspection, Operation and Maintenance Manual, Startup, and Video Taping of Training to Operators	\$ 1,435,000
Construction Observation Services (18-months)	<u>\$252,000</u>
Subtotal	<u>\$ 1,687,000</u>
NMGRT @ 7.0000%	<u>\$ 118,000</u>
Total Professional Engineering Services	<u>\$ 1,805,000</u>

Total Estimated Project Costs for Construction and Engineering Services	\$ 16,911,000

**Los Lunas Wastewater and Sludge Management PER
Yard Piping**

DATE: 06/05/12

ITEM	UNIT	QUANT	UNIT PRICE	COST
Line 1 - 18" Entrance Works to MBR Plant Influent				
18" DIP: material costs	lf	86	\$60	\$5,160
18" DIP: Contractor markup and installation	ls	\$5,160	40.00%	\$2,064
Trench work: normal	lf	86	\$25	\$2,150
Fittings				
18" DI 45 degree bend, mj ends	ea	1	\$1,353	\$1,353
18" mega lugs	ea	16	\$228	\$3,648
18" plug valves, mj ends	ea	1	\$9,600	\$9,600
18" bends, mj ends	ea	8	\$900	\$7,200
Installation	ls	0.4	\$21,801	\$8,720
Pavement removal and replacement	ls	1	\$2,800	\$2,800
Line 2 - 8" Drain Line - MBR Plant to Existing Drain Station				
8" DIP: material costs	lf	440	\$25	\$11,000
8" DIP: Contractor markup and installation	ls	\$11,000	40.00%	\$4,400
Trench work: normal	lf	440	\$20	\$8,800
Fittings:	ls	1	\$3,000	\$3,000
Installation	ls	0.4	\$3,000	\$1,200
Cleanout assembly	ls	4	\$600	\$2,400
Pavement removal and replacement	ls	1	\$2,800	\$2,800
Line 3 - 6" WAS to WAS Junction Valve Building				
6" DIP: material costs	lf	730	\$22	\$16,060
6" DIP: Contractor markup and installation	ls	\$16,060	40.00%	\$6,424
Trench work: normal	lf	730	\$20	\$14,600
Fittings:	ls	1	\$4,000	\$4,000
Installation	ls	0.35	\$4,000	\$1,400
Connect to existing line	ls	1	\$1,200	\$1,200
Pavement removal and replacement	ls	1	\$2,800	\$2,800
4" Washwater Main Plant Structure to Entrance Works				
4" PVC: material costs	lf	500	\$10.00	\$5,000
4" PVC: Contractor markup and installation	ls	\$5,000	40.00%	\$2,000
Trench work: normal	lf	500	\$20	\$10,000
Fittings:				
4" tee	ea	4	\$110	\$440
4" gate valves and valve box	ea	5	\$500	\$2,500
4" 90 degree bend	ea	2	\$85	\$170
4" 45 degree bend	ea	3	\$75	\$225
Yard hydrants	ea	4	\$600	\$2,400
4x4x2 tees	ea	4	\$80	\$320
Installation	ls	0.35	\$6,055	\$2,119
3" Potable Water Service to Main Plant Structure				
3" PVC: material costs	lf	200	\$8.00	\$1,600
3" PVC: Contractor markup and installation	ls	\$1,600	40.00%	\$640
Trench work: normal	lf	200	\$20	\$4,000
Fittings:				
3" gate valve, mj ends and valve box	ea	1	\$300	\$300
3" 90 degree bend, mj end	ea	1	\$55	\$55
3" mega lugs	ea	4	\$19	\$76
Installation	ls	0.35	\$431	\$151

**Los Lunas Wastewater and Sludge Management PER
Yard Piping**

DATE: 06/05/12

ITEM	UNIT	QUANT	UNIT PRICE	COST
3" Washwater at Main Plant Structure				
3" DIP: material costs	lf	300	\$8.00	\$2,400
3" DIP: Contractor markup and installation	ls	\$2,400	40.00%	\$960
Trench work: normal	lf	300	\$20	\$6,000
Fittings:				
3" tee	ea	2	\$300	\$600
3" gate valves and valve box	ea	2	\$73	\$146
Yard hydrants	ea	2	\$600	\$1,200
3x3x2 tees	ea	2	\$80	\$160
Installation	ls	1	\$2,106	\$2,106
12" Potable Water/Fire Protection to New Plant Area				
12" PVC: material costs	lf	500	\$50	\$25,000
12" PVC: Contractor markup and installation	ls	\$25,000	40.00%	\$10,000
Trench work: normal	lf	500	\$30	\$15,000
Fittings:	ls			
12x12x8 DI tee, mj ends	ea	1	\$500	\$500
12" pipe coupling restraint	ea	1	\$200	\$200
8" gate valve, mj ends with valve box	ea	1	\$250	\$250
8" mj cap	ea	1	\$70	\$70
Installation	ls	0.35	\$1,020	\$357
Connect 12" WL to existing 12" WL	ls	1	\$500	\$500
8" Potable Waterline to new Plant Area				
8" PVC: material costs	lf	200	\$24	\$4,800
8" PVC: Contractor markup and installation	ls	\$4,800	40.00%	\$1,920
Trench work: normal	lf	200	\$20	\$4,000
Fittings:	ls	1	\$10,000	\$10,000
Installation	ls	0.4	\$10,000	\$4,000
Fire Hydrant and shut off valve assembly	ea	2	2500	\$5,000
Pavement removal and replacement	ls	1	\$4,000	\$4,000
2" Natural Gas Service to New Plant Area				
2" PVC: material costs	lf	400	\$6	\$2,400
2" PVC: Contractor markup and installation	ls	\$2,400	40.00%	\$960
Trench work: normal	lf	400	\$7	\$2,800
Fittings:	ls	1	\$300	\$300
Trench Dewatering	lf	2956	\$12	\$35,472
SUBTOTAL				\$295,900
Undefined Elements 8.00%				\$23,700
General Conditions 2.00%				\$5,900
Mobilization, Bonds, Shakedo 4.00%				\$11,800

TOTAL

\$337,000

Appendix M

Engineer's Opinion of Cost for New Administration and Laboratory Building

**Los Lunas WW Treatment and Sludge Management PER
Engineer's Opinion of Probable Cost
New Administration/Laboratory Building**

<u>Construction Costs</u>	<u>Amount</u>
Administration/Laboratory Building	\$1,537,000
Laboratory Testing Allowance	<u>\$10,000</u>
Subtotal	\$1,547,000
Construction Contingencies @ 2.0%	<u>\$31,000</u>
Subtotal	\$1,578,000
Allowance for legal services	<u>\$10,000</u>
Subtotal	\$1,588,000
NMGRT @ 7.5625%	<u>\$120,000</u>
Total Construction Costs	\$1,708,000
<u>Professional Services Allowance @ 10.00%</u>	
Basic Design and Construction Services, Soils Investigation, Surveying Services	\$171,000
Construction observation, full time (6 months)	<u>\$84,000</u>
Subtotal	\$255,000
NMGRT @ 7.00000%	<u>\$17,900</u>
Total Professional Services	\$272,900
Total Project Costs	\$1,980,900

Administration/Laboratory Building
Los Lunas WW Treatment and Sludge Management

DATE: 06/22/12

ITEM	UNIT	QUANT	UNIT PRICE	COST ESTIMATE
Laboratory	SF	920		
Lab Equipment Allowance Digital Imaging Microscope, Fume Hoods, Chemical Storage and Washing, Balance Table other equipment based on tests performed	EA	1	\$125,000	\$110,000
Wastewater Testing: Counter, Cabinets, Sinks, Compressed Air, Lab Gas, RO Water, Adjustable Stools	SF	600	\$300	\$180,000
Storage Room: Adjustable Shelving	SF	100	\$150	\$15,000
Office: Day Lighting, Private, Desk, Task seating, Guest seating, File, Bookcase	SF	120	\$275	\$33,000
Mechanical: Water Heater, Water Softener	SF	100	\$150	\$15,000
Administration & Operations	SF	1,925		
Administration FF&E	EA	1	\$45,000	\$45,000
Appliances	EA	1	\$8,000	\$8,000
Conference AV system	EA	1	\$30,000	\$30,000
SCADA Control Room Equipment	EA	1	\$40,000	\$40,000
Lead Operator's Office: Day Lighting, Private, Computer, Desk, Task seating, Conferencing, Filing	SF	220	\$275	\$60,500
Support Operations Office: Day Lighting, Private, Computer, Desk, Task seating, Guest seating, File, Bookcase	SF	150	\$275	\$41,250
Waiting: Lounge seating, Occasional tables	SF	75	\$225	\$16,875
Copy Area: Copier, Printer, Scanner, Fax, Wall mounted shelving	SF	50	\$225	\$11,250
SCADA/Control Room: Operator use, 42" wall-mount screen, Computers, 2 to 3 Workstations, Task seating	SF	150	\$225	\$33,750
Training: Flexible for Workshops, Presentations, 30-36 persons A/V system, Overhead Projection system and screen, Computer and printer, Reconfigurable tables, Task seating	SF	800	\$300	\$240,000

Administration/Laboratory Building
Los Lunas WW Treatment and Sludge Management

DATE: 06/22/12

ITEM	UNIT	QUANT	UNIT PRICE	COST ESTIMATE
Break: Kitchen & Dining Area for 10 persons Stove, Oven, Microwave, Refridgerator, Dishwasher, Coffee maker, Café Tables and Dining Chairs/Stools	SF	480	\$300	\$144,000
Support	SF	760		
Appliances	EA	1	\$6,000	\$6,000
Janitor: Cleaning Supplies, Cleaning Equipment, Maintenance Supplies Mop sink, Storage shelving	SF	50	\$150	\$7,500
General Storage: Storage, Heavy Duty Shelving	SF	50	\$150	\$7,500
Laundry/Mud Room: Washer, Dryer, Utility sink, Clothing rack, Bench	SF	100	\$175	\$17,500
Locker/Shower Rooms: Showers, Toilet Fixtures, Counters Lockers, Mirrors, Toilet accessories, Shelving, Benches	SF	560	\$300	\$168,000
Tare	SF	587		
Interior: Walls, Halls	SF	587	\$150	\$88,050
Dewatering	ls	1	\$30,000	\$30,000
SUBTOTAL				\$1,348,175
Undefined Elements 8.00%				\$107,854
General Conditions 2.00%				\$26,964
Mobilization, Bonds, Shakedown 4.00%				\$53,927

TOTAL	\$1,537,000

Appendix N

Engineer's Opinion of Cost for New Effluent Discharge Line

**Los Lunas WW Treatment and Sludge Management PER
Engineer's Opinion of Probable Cost
New Effluent Discharge Line**

<u>Construction Costs</u>	<u>Amount</u>
Effluent Line Replacement	\$343,000
Laboratory Testing Allowance	<u>\$10,000</u>
Subtotal	\$353,000
Construction Contingencies @ 2.0%	<u>\$7,000</u>
Subtotal	\$360,000
Allowance for Legal Services	<u>\$10,000</u>
Subtotal	\$370,000
NMGRT @ 7.5625%	<u>\$28,000</u>
Total Construction Costs	\$398,000
<u>Professional Engineering Services Allowance @ 16.50%</u>	
Basic Engineering Services, Soils Investigation, Surveying Services, Agency Coordination	\$66,000
Construction observation, full time (4 months)	<u>\$56,000</u>
Subtotal	\$122,000
NMGRT @ 7.0000%	<u>\$8,500</u>
Total Professional Engineering Services	\$130,500
Total Project Costs	\$528,500

24-inch Plant Effluent Line to River

DATE: 06/22/12

Los Lunas WW Treatment and Sludge Management

ITEM	UNIT	QUANT	UNIT PRICE	COST ESTIMATE
<u>Plant Effluent Line</u>				
24" DIP: material costs	lf	1,430	\$76.00	\$108,680
24" DIP: Contractor markup and installation	ls	\$108,680	30.00%	\$32,604
Trench work: normal	lf	1,430	\$25	\$35,750
Fittings: Materials	ea			
24" 45 degree bends, mj ends	ea	6	\$608	\$3,648
24" mega lugs	ea	14	\$355	\$4,970
Bolt set for 24" fittings	ls	1	\$36	\$36
24" wall pipe, flg x pe, 24" long	ea	1	\$1,120	\$1,120
24" flab valve, ductile iron, flange end	ea	1	\$1,830	\$1,830
Blot set for flange piping	ls	1	\$143	\$143
Poly wrap pipe and fittings	ls	1	\$1,820	\$1,820
Detection tape	ls	1	\$40	\$40
Combination Air Release Valves	ea	2	\$750	\$1,500
Air Release Valve Enclosures	ea	2	\$3,000	\$6,000
Installation	ls	1.4	\$21,107	\$29,550
<u>Jack and Bore Under Riverside Drain</u>				
24" DI carrier pipe in 36" casing	lf	60	\$350	\$21,000
Bore Pits	ea	2	\$7,500	\$15,000
Outlet Structure	ls	1	\$8,000	\$7,400
Dewatering	ls	1	\$30,000	\$30,000
SUBTOTAL				\$301,091
Undefined Elements 8.00%				\$24,087
General Conditions 2.00%				\$6,022
Mobilization, Bonds, Shake 4.00%				\$12,044

TOTAL	\$343,000

Appendix O

Engineer's Opinion of Cost for Option A – 100% Sludge Surface Disposal

**Los Lunas Wastewater and Sludge Management PER
Engineer's Opinion of Probable Cost
Sludge Management - Thickening and 100% Surface Disposal**

<u>Construction Costs</u>	<u>Amount</u>
Rehabilitation and Modifications to Existing Digesters	\$1,039,000
Replace Gravity Belt Thickener in Old Thickener Building	\$526,000
New Sludge Handling and Blower Building	\$1,582,000
New Plant Washwater Pump Building	\$117,000
Digested Sludge Pump Building	\$231,000
Waste Activated Sludge Junction Valve Building	\$42,000
Site Improvements	\$187,000
Yard Piping	\$163,000
Electrical	\$561,000
Demolition of Existing Sludge Beds	\$40,000
Electrical Service Allowance	\$80,000
Laboratory Testing Allowance	\$60,000
Relocation of Existing Utilities Allowance	\$30,000
Subtotal	<u>\$4,658,000</u>
Construction Contingencies @ 2%	\$93,000
Subtotal	<u>\$4,751,000</u>
Allowance for Legal Services	\$10,000
Subtotal	<u>\$4,761,000</u>
NMGRT @ 7.5625%	\$360,000
Total Construction Costs	<u>\$5,121,000</u>

Professional Engineering Services Allowance @ 11.00%

Basic Engineering Services, Soils Investigation, Aerial Photography and Mapping, Surveying Services, Specialty Inspection, Operation and Maintenance Manual, Startup, and Video Taping of Training to Operators	\$563,000
Construction observation, full time (18-months)	\$252,000
Subtotal	\$815,000
NMGRT @ 7.0000%	\$57,000
Total Professional Engineering Services	<u>\$872,000</u>

Land Cost – 185 acres @ \$2,000/acre	\$370,000
Total Project Costs	\$6,363,000

Appendix P

Engineer's Opinion of Cost for One New Aerobic Digestion System

**Los Lunas Wastewater and Sludge Management PER
Engineer's Opinion of Probable Cost
New Aerobic Digesters**

<u>Construction Costs</u>	<u>Amount</u>
New Aerobic Digester	\$2,075,000
Yard Piping	\$228,000
Site Improvements	\$115,000
Electrical	\$230,000
Laboratory Testing Allowance	\$45,000
Subtotal	<u>\$2,693,000</u>
Construction Contingencies @ 2%	\$54,000
Subtotal	<u>\$2,747,000</u>
Allowance for Legal Services	\$10,000
Subtotal	<u>\$2,757,000</u>
NMGRT @ 7.5625%	<u>\$208,000</u>
Total Construction Costs	\$2,965,000
 <u>Professional Engineering Services Allowance @ 11.70%</u>	
Basic Engineering Services, Soils Investigation, Surveying Services, Specialty Inspection, Operation and Maintenance Manual, Startup, and Video Taping of Training to Operators	\$347,000
 Construction observation, full time (12-months)	 <u>\$168,000</u>
Subtotal	<u>\$515,000</u>
NMGRT @ 7.0000%	<u>\$36,000</u>
Total Professional Engineering Services	\$551,000
 Total Project Costs	 \$3,516,000

Los Lunas Wastewater and Sludge Management PER
New Aerobic Digester
New Aerobic Digesters

DATE: 06/22/12

ITEM	UNIT	QUANT	UNIT PRICE	COST ESTIMATE
New Digester Aeration Equipment and Air Piping				
Aeration system and all piping and valves on top of digester	ea	1	\$425,000	\$425,000
Elevated Walkway Between Digesters	ls	1	\$150,000	\$150,000
Equipment Installation	ls	0.3	\$575,000	\$172,500
Digester Structure				
Concrete	cy	630	\$650	\$409,500
Earthwork				
Excavation	cy	2,510	\$12.00	\$30,120
Structural Backfill	cy	610	\$22.00	\$13,420
Ordinary Fill	cy	1,280	\$8.00	\$10,240
Subgrade	cy	190	\$8.00	\$1,520
Compaction	cy	2,080	\$5.00	\$10,400
Blowers	ea	2	\$103,000	\$206,000
Equipment Installation	ls	0.25	\$271,700	\$67,925
Air Piping for PD Blowers (2)				
Blower discharge piping and high temp valves	ls	1	\$30,000	\$30,000
Pipe Supports	ea	3	\$2,400	\$7,200
Piping Installation	ls	0.3	\$37,200	\$11,160
Other Equipment for Digester				
Mechanical Mixers: with hoist, spare parts	ea	4	\$27,000	\$108,000
Mechanical Mixers: installation	ls	0.3	\$108,000	\$32,400
Probes and sensors for monitoring	ea	4	\$3,000	\$12,000
Submersible skimmer pump assembly	ls	1.3	\$7,000	\$9,100
Structure Improvements				
Handrail	lf	304	\$70	\$21,280
Handrail swing gates for mixers	ea	4	\$300	\$1,200
Elevated walkways (grating)	sf	224	\$30	\$6,720
Coating				
Interior Painting	sf	6,180	\$8.00	\$49,440
Exterior Painting	sf	4,320	\$5.00	\$21,600
Piping Systems				\$13,200
SUBTOTAL				\$1,819,925
Undefined Elements 8.00%				\$145,594
General Conditions 2.00%				\$36,399
Mobilization, Bonds, Shakedown 4.00%				\$72,797
TOTAL				\$2,075,000

Los Lunas Wastewater and Sludge Management PER
Yard Piping
New Aerobic Digesters

DATE: 06/05/12

ITEM	UNIT	QUANT	UNIT PRICE	COST ESTIMATE
Line 04 - 4" TWAS from Old Thickener Bldg				
4" DIP: material costs	lf	300	\$14	\$4,200
4" DIP: Contractor markup and installation	ls	\$4,200	40.00%	\$1,680
Trench work: normal	lf	300	\$20	\$6,000
Fittings and Valves	ls	1	\$4,000	\$4,000
Double Cleanouts	ea	4	\$4,000	\$16,000
Line 06 - 6" Digested Sludge to Loading Pump				
6 DIP: material costs	lf	25	\$18.00	\$450
6" DIP: Contractor markup and installation	ls	\$450	40.00%	\$180
Trench work: normal	lf	25	\$20	\$500
Buired Plug Valves	ea	2	\$700	\$1,400
Fittings, mj ends	ea	4	\$180	\$720
6" DIP flange piping	lf	20	\$40	\$800
6" plug valves, flange ends	ea	3	\$800	\$2,400
Fittings, flange ends	ea	6	\$200	\$1,200
Sludge loading pump, concrete, insulated	ls1	1	\$40,000	\$40,000
Line 09 - 6" Digested Sludge for Digester				
6" DIP: material costs	lf	150	\$18.00	\$2,700
6" DIP: Contractor markup and installation	ls	\$2,700	40.00%	\$1,080
Trench work: normal	lf	150	\$20	\$3,000
Buired Plug Valves	ea	4	\$700	\$2,800
Fittings	ls	12	\$180	\$2,160
Cleanouts	ea	4	\$3,000	\$12,000
Line 10 - 6" Digester Drain Line to Line 06				
6" DIP: material costs	lf	80	\$18.00	\$1,440
6" DIP: Contractor markup and installation	ls	\$1,440	40.00%	\$576
Trench work: normal	lf	80	\$20	\$1,600
Buired Plug Valves	ea	3	\$700	\$2,100
Fittings	ls	1	\$2,800	\$2,800
Cleanouts	ea	3	\$3,000	\$9,000
Line 14 - 6" New Digester Decant Drain to Line 07				
6" DIP: material costs	lf	25	\$18.00	\$450
6" DIP: Contractor markup and installation	ls	\$450	40.00%	\$180
Trench work: normal	lf	25	\$20	\$500
Fittings	ls	1	\$1,600	\$1,600
Cleanouts	ea	1	\$3,000	\$3,000
Line 15 - 4" From Line 13 to New Digester				
4" DIP: material costs	lf	20	\$14	\$280
4" DIP: Contractor markup and installation	ls	\$280	40.00%	\$112
Trench work: normal	lf	20	\$20	\$400
Fittings and Valves	ls	1	\$1,500	\$1,500

Los Lunas Wastewater and Sludge Management PER
Yard Piping
New Aerobic Digesters

DATE: 06/05/12

ITEM	UNIT	QUANT	UNIT PRICE	COST ESTIMATE
12" Galvanized Steel Process Air to New Digester				
12" Galvanized Steel flanged piping: material costs	lf	40	\$80	\$3,200
12" Galvanized Steel: Contractor markup and installation	ls	3200	\$0	\$1,280
Fittings:	ls	1	\$2,000	\$2,000
Valves:	ls	1	\$1,500	\$1,500
Fixed pipe support, 9.5' height	ea	4	\$1,800	\$7,200
Concrete Bases	ea	4	\$500	\$2,000
Line 18 - 4" Drain from Sludge Loading Station				
4" DIP: material costs	lf	70	\$14	\$980
4" DIP: Contractor markup and installation	ls	\$980	40.00%	\$392
Trench work: normal	lf	70	\$20	\$1,400
Fittings	ls	1	\$800	\$800
Cleanouts	ea	2	\$2,500	\$5,000
Line 19 - 8" DS By-pass from Sludge Loading Pump				
8" DIP: material costs	lf	50	\$25.00	\$1,250
8" DIP: Contractor markup and installation	ls	\$1,250	40.00%	\$500
Trench work: normal	lf	50	\$20	\$1,000
Fittings	ls	1	\$400	\$400
General Washwater Distribution and Hose Bibbs	ls	1	\$8,000	\$8,000
8" Drain Line for WAS Junction Building				
8" DIP: material costs	lf	300	\$25.00	\$7,500
8" DIP: Contractor markup and installation	ls	\$7,500	40.00%	\$3,000
Trench work: normal	lf	300	\$24	\$7,200
Manhole	ea	1	\$4,000	\$4,000
Trench Dewatering	lf	1020	\$12	\$12,240
SUBTOTAL				\$199,700
Undefined Elements 8.00%				\$16,000
General Conditions 2.00%				\$4,000
Mobilization, Bonds, Shakedown 4.00%				\$8,000
TOTAL				\$228,000

Appendix Q

Engineer's Opinion of Cost for Option B – 100% Sludge Landfill Disposal

**Los Lunas Wastewater and Sludge Management PER
Engineer's Opinion of Probable Cost
Sludge Management - Dewatering and 100% Landfill Disposal**

<u>Construction Costs</u>	<u>Amount</u>
Rehabilitation and Modifications to Existing Digesters	\$1,039,000
Replace Gravity Belt Thickener in Old Thickener Building	\$526,000
New Sludge Handling and Blower Building	\$3,008,000
New Plant Washwater Pump Building	\$117,000
Digested Sludge Pump Building	\$231,000
Waste Activated Sludge Junction Valve Building	\$42,000
Site Improvements	\$258,000
Yard Piping	\$163,000
Electrical	\$775,000
Demolition of Existing Sludge Beds	\$40,000
Electrical Service Allowance	\$80,000
Laboratory Testing Allowance	\$60,000
Relocation of Existing Utilities Allowance	\$30,000
Subtotal	<u>\$6,369,000</u>
Construction Contingencies @ 2%	\$127,000
Subtotal	<u>\$6,496,000</u>
Allowance for Legal Services	\$10,000
Subtotal	<u>\$6,506,000</u>
NMGRT @ 7.5625%	\$492,000
Total Construction Costs	<u>\$6,998,000</u>
 <u>Professional Engineering Services Allowance @ 9.50%</u>	
Basic Engineering Services, Soils Investigation, Aerial Photography and Mapping, Surveying Services, Specialty Inspection, Operation and Maintenance Manual, Startup, and Video Taping of Training to Operators	\$665,000
Construction observation, full time (18-months)	\$252,000
Subtotal	<u>\$917,000</u>
NMGRT @ 7.0000%	\$64,000
Total Professional Engineering Services	<u>\$981,000</u>
 Total Project Costs	 \$7,979,000

Los Lunas Wastewater and Sludge Management PER
Rehabilitation and Modifications to Existing Digesters

DATE: 06/22/12

Sludge Management - Dewatering and 100% Landfill Disposal

ITEM	UNIT	QUANT	UNIT PRICE	COST ESTIMATE
New Digester Aeration Equipment and Air Piping				
Aeration system and all piping and valves on top of digester	ea	1	\$425,000	\$425,000
Aeration System Installation	ls	0.3	\$425,000	\$127,500
Other Equipment for Digester				
Mechanical Mixers: with hoist, spare parts	ea	4	\$27,000	\$108,000
Mechanical Mixers: installation	ls	0.3	\$108,000	\$32,400
Probes and sensors for monitoring	ea	4	\$3,000	\$12,000
Submersible skimmer pump assembly	ls	1.3	\$7,000	\$9,100
Structure Improvements				
Handrail	lf	304	\$70	\$21,280
Handrail swing gates for mixers	ea	4	\$300	\$1,200
Elevated walkways (grating)	sf	224	\$30	\$6,720
Core drill for pipes	ea	2	\$600	\$1,200
Piping Systems				
<u>Air Supply on Side of Digester Wall</u>				\$8,100
Rehabilitation of Existing Basins				
Recondition top 5 feet of interior walls	sf	2,000	\$12	\$24,000
Coat top 10 feet of interior walls	sf	4,000	\$8	\$32,000
Miscellaneous concrete work and walkways	ls	1	\$20,000	\$20,000
Coat exterior walls	sf	4,320	\$5	\$21,600
Remove Existing Piping, Valves, Fittings, Covers, and Aeration Equipment				
<u>Basin Cleaning</u>				
Pump out sludges from digester basins	days	3	\$1,800	\$5,400
Wash down all exposed surfaces in basins	days	2	\$1,800	\$3,600
Equipment, pump, hoses and tools	days	5	\$800	\$4,000
<u>Remove Basin Cover and Process Piping</u>				
Removal Crew	days	12	\$2,400	\$28,800
Removal Equipment and Materials	days	12	\$1,600	\$19,200
SUBTOTAL				\$911,100
Undefined Elements 8.00%				\$72,900
General Conditions 2.00%				\$18,200
Mobilization, Bonds, Shakedown 4.00%				\$36,400
TOTAL				\$1,039,000

Los Lunas Wastewater and Sludge Management PER
Replace Gravity Belt Thickener in Old Thickener Building

DATE: 06/05/12

ITEM	UNIT	QUANT	UNIT PRICE	COST ESTIMATE
Equipment in Old Thickener Building				
New 2-meter Gravity Belt Thickener - replacement of the existing GBT currently installed in the sludge handling building	ea	1	\$200,000	\$200,000
New GBT - Stairs, handrails, walkways (materials only)	ea	1	\$25,000	\$25,000
New GBT - Stainless steel thickener hopper (materials	ea	1	\$4,000	\$4,000
New GBT - Polymer feed system	ea	1	\$20,000	\$20,000
Installation	ls	0.35	\$249,000	\$87,150
TWAS Pump and Piping				
TWAS Pump	ea	1	\$36,000	\$36,000
TWAS Piping	ls	1	\$10,200	\$10,200
Installation	ls	0.3	\$46,200	\$13,860
Washwater Booster Pumps and Piping				
Booster Pumps	ls	1	\$17,000	\$17,000
Piping, Valves, Fittings	ls	1	\$14,800	\$14,800
Installation	ls	0.3	\$31,800	\$9,540
Painting	ls	1	\$1,800	\$1,800
Polymer Piping	ls	1	\$4,400	\$4,400
Equipment Removal				
Remove WAS inlet piping and pumps	days	3	\$1,800	\$5,400
Remove TWAS pump and piping	days	2	\$1,800	\$3,600
Remove GBT and Platforms	days	5	\$1,800	\$9,000
SUBTOTAL				\$461,800
Undefined Elements	8.00%			\$36,900
General Conditions	2.00%			\$9,200
Mobilization, Bonds, Shakedown	4.00%			\$18,500
TOTAL				
				\$526,000

Los Lunas Wastewater and Sludge Management PER
New Sludge Handling and Blower Building
Sludge Management - Dewatering and 100% Landfill Disposal

DATE: 06/22/12

ITEM	UNIT	QUANT	UNIT PRICE	COST ESTIMATE
Dewatering Equipment in New Sludge Building				
New 2-meter Belt Filter Press	ea	2	\$270,000	\$540,000
New BFP - Stairs, handrails, walkways (materials only)	ea	2	\$40,000	\$80,000
New BFP - Stainless steel thickener hopper (materials only)	ea	2	\$4,000	\$8,000
New BFP - Polymer feed system (materials only)	ea	2	\$20,000	\$40,000
New BFP - Sludge cake conveyor (materials only)	ea	2	\$40,000	\$80,000
New BFP - Macerator/Grinder (materials only)	ea	2	\$20,000	\$40,000
Blower (materials only)	ea	3	\$103,000	\$309,000
Equipment Installation	ls	0.35	\$1,097,000	\$383,950
Thickening/Dewatering Building - For Dewatering Equipment Only				
Thickening/Dewatering Building (w/o elec) 60x90	sf	5,400	\$160	\$864,000
Sludge Loading Bay 36x48	sf	1,730	\$90	\$155,700
Earthwork (Inc. excavation, filling, compaction)	ls	1	\$34,000	\$34,000
Dewatering	ls	1	\$12,500	\$12,500
Piping Under Slab: Material				\$21,000
Belt Filter Press and Polymer Mixing Piping, Fittings, and Valves:				\$5,000
Washwater Supply System				
Piping, Valves, Fittings	ls	1.3	\$10,000	\$13,000
Belt Wash Pumps	ls	1	\$52,000	\$52,000
Belt Wash Booster Pumps Assembly, fittings, valves & Installation				
SUBTOTAL				\$2,638,200
Undefined Elements 8.00%				\$211,100
General Conditions 2.00%				\$52,800
Mobilization, Bonds, Shakedown 4.00%				\$105,500
TOTAL				\$3,008,000

Los Lunas Wastewater and Sludge Management PER

New Plant Washwater Pump Building

DATE: 06/05/12

Sludge Management - Dewatering and 100% Landfill Disposal

ITEM	UNIT	QUANT	UNIT PRICE	COST ESTIMATE
Pump Building				
Building (w/o electrical) 16x18	sf	145	\$140	\$20,300
Earthwork	ls	1	\$7,500	\$7,500
Dewatering	ls	1	\$4,000	\$4,000
Equipment				
Washwater Pumps	ea	2	\$15,000	\$30,000
Pressure Tanks	ea	2	\$7,500	\$15,000
Installation	ls	0.35	\$45,000	\$15,750
Piping and Fittings	ls	1	\$9,800	\$9,800
SUBTOTAL				\$102,400
Undefined Elements 8.00%				\$8,200
General Conditions 2.00%				\$2,000
Mobilization, Bonds, Shakedown 4.00%				\$4,100
TOTAL				\$117,000

Los Lunas Wastewater and Sludge Management PER
Digested Sludge Pump Building
Sludge Management - Dewatering and 100% Landfill Disposal

DATE: 06/05/12

ITEM	UNIT	QUANT	UNIT PRICE	COST ESTIMATE
Pump Building				
Building (w/o electrical) 18x24	sf	432	\$140	\$60,480
Earthwork	ls	1	\$18,000	\$18,000
Dewatering	ls	1	\$9,000	\$9,000
Equipment				
Digested Sludge Pumps	ea	2	\$36,000	\$72,000
Installation	ls	0.3	\$72,000	\$21,600
Digested Sludge Pumps - Piping, Fittings, Valves				
<u>Fittings</u>				
6" DI 90 degree bend, mj ends	ea	2	\$105	\$210
6" DI 90 degree bend, flg ends	ea	3	\$99	\$297
6" DI Tee, flg ends	ea	2	\$145	\$290
4"x6" Expansion joint, flg ends	ea	2	\$1,210	\$2,420
6" Expansion joint, flg ends	ea	2	\$1,540	\$3,080
4" DI 90 degree bend, flg ends	ea	2	\$68	\$136
4" DI 90 degree bend, mj ends	ea	1	\$72	\$72
4" DI Tee, flg ends	ea	2	\$99	\$198
4" DI Campanion Flange	ea	1	\$44	\$44
Tapping saddle for pressure switch	ea	2	\$132	\$264
6" mega flange	ea	1	\$99	\$99
4" Mega flange	ea	4	\$68	\$272
<u>Piping</u>				
4" DIP, flg x pe, 12in long	ea	2	\$110	\$220
4" DIP, flg x pe, 2 ft long	ea	1	\$130	\$130
6" DI, flg x flg, 1 ft long	ea	1	\$180	\$180
6" DI, flg x flg, 1.5 ft long	ea	1	\$190	\$190
6" DI, flg x flg, 2 ft long	ea	1	\$210	\$210
6" DI, flg x flg, 2.5 ft long	ea	1	\$220	\$220
Piping Under Slab	ls	1	\$1,800	\$1,800
Pipe Supports	ea	5	\$120	\$600
<u>Valves</u>				
6" Plug valve, flg ends	ea	2	\$640	\$1,280
4" Check valve, flg ends	ea	2	\$720	\$1,440
4" Plug valve, flg ends	ea	2	\$400	\$800
1" Ball valve w/ 1" dia. pipe nipple	ea	1	\$50	\$50
Digested Sludge Piping Installation	ls	0.45	\$14,502	\$6,526
Digested Sludge Piping - Painting	ls	1	\$800	\$800
SUBTOTAL				\$202,900
Undefined Elements 8.00%				\$16,200
General Conditions 2.00%				\$4,100
Mobilization, Bonds, Shakedown 4.00%				\$8,100
TOTAL				\$231,000

Los Lunas Wastewater and Sludge Management PER**WAS Junction Valve Building**

DATE: 06/05/12

Sludge Management - Dewatering and 100% Landfill Disposal

ITEM	UNIT	QUANT	UNIT PRICE	COST ESTIMATE
Pump Building				
Building (w/o electrical) 14x16	sf	112	\$140	\$15,680
Earthwork	ls	1	\$4,750	\$4,750
Dewatering	ls	1	\$2,250	\$2,250
Piping, Fittings, Valves	ls	1	\$14,000	\$14,000
SUBTOTAL				\$36,680
Undefined Elements 8.00%				\$2,900
General Conditions 2.00%				\$700
Mobilization, Bonds, Shakedown 4.00%				\$1,500
TOTAL				\$42,000

Los Lunas Wastewater and Sludge Management PER**Yard Piping**

DATE: 06/07/12

Sludge Management - Dewatering and 100% Landfill Disposal

ITEM	UNIT	QUANT	UNIT PRICE	COST ESTIMATE
Line 03 - 4" TWAS from WAS Junction Box				\$20,000
Line 05 - 4" Digested Sludge from Old Digester				\$7,000
Line 07 - 6" Combined Decant from Old Digester				\$15,000
Line 08 - 10" Thickener Bldg Drain/Decant Drain				\$20,000
Line 11 - 4" TWAS from Old Thickener Building (East Portion Only)				\$9,000
Line 12 - 12" Washwater Supply				\$6,000
Line 13 - 6" Washwater Supply				\$22,000
General Washwater Distribution and Hose Bibbs				\$6,000
Extend Potable Water Supply for Fire Protection				\$10,000
2" Natural Gas Service to New Thickener Building				\$4,000
Line 17 - 24" Galvanized Steel Process Air to Process Basins				\$24,000
SUBTOTAL				\$143,000
Undefined Elements 8.00%				\$11,400
General Conditions 2.00%				\$2,900
Mobilization, Bonds, Shakedown 4.00%				\$5,700
TOTAL				\$163,000

Appendix R

Engineer's Opinion of Cost for Option C – Combined Surface Disposal and Landfill Disposal of Sludge

**Los Lunas Wastewater and Sludge Management PER
Engineer's Opinion of Probable Cost
Rehabilitation of Existing Aerobic Digesters and New Thickening and
Dewatering Building**

<u>Construction Costs</u>	<u>Amount</u>
Rehabilitation and Modifications to Existing Digesters	\$1,039,000
Replace Gravity Belt Thickener in Old Thickener Building	\$526,000
New Sludge Handling and Blower Building	\$2,777,000
New Plant Washwater Pump Building	\$153,000
Digested Sludge Pump Building	\$231,000
Waste Activated Sludge Junction Valve Building	\$83,000
Site Improvements	\$259,000
Yard Piping	\$326,000
Electrical	\$776,000
Demolition of Existing Sludge Beds	\$40,000
Electrical Service Allowance	\$80,000
Laboratory Testing Allowance	\$60,000
Relocation of Existing Utilities Allowance	\$30,000
Subtotal	<u>\$6,380,000</u>
Construction Contingencies @ 2%	<u>\$128,000</u>
Subtotal	<u>\$6,508,000</u>
Allowance for Legal Services	<u>\$10,000</u>
Subtotal	<u>\$6,518,000</u>
NMGRT @ 7.5625%	<u>\$493,000</u>
Total Construction Costs	<u>\$7,011,000</u>

Professional Engineering Services Allowance @ 9.50%

Basic Engineering Services, Soils Investigation, Aerial Photography and Mapping, Surveying Services, Specialty Inspection, Operation and Maintenance Manual, Startup, and Video Taping of Training to Operators	\$666,000
Construction observation, full time (18-months)	<u>\$252,000</u>
Subtotal	<u>\$918,000</u>
NMGRT @ 7.0000%	<u>\$64,000</u>
Total Professional Engineering Services	<u>\$982,000</u>

Land Cost – 65 acres @ \$2,000/acre	\$130,000

Total Project Costs	\$8,123,000

**Los Lunas Wastewater and Sludge Management PER
Rehabilitation and Modifications to Existing Digesters**

DATE: 06/22/12

Rehabilitation of Existing Aerobic Digesters and New Thickening and Dewatering Building

ITEM	UNIT	QUANT	UNIT PRICE	COST ESTIMATE
New Digester Aeration Equipment and Air Piping				
Aeration system and all piping and valves on top of digester	ea	1	\$425,000	\$425,000
Aeration System Installation	ls	0.3	\$425,000	\$127,500
Other Equipment for Digester				
Mechanical Mixers: with hoist, spare parts	ea	4	\$27,000	\$108,000
Mechanical Mixers: installation	ls	0.3	\$108,000	\$32,400
Probes and sensors for monitoring	ea	4	\$3,000	\$12,000
Submersible skimmer pump assembly	ls	1.3	\$7,000	\$9,100
Structure Improvements				
Handrail	lf	304	\$70	\$21,280
Handrail swing gates for mixers	ea	4	\$300	\$1,200
Elevated walkways (grating)	sf	224	\$30	\$6,720
Core drill for pipes	ea	2	\$600	\$1,200
Piping Systems				
<u>Air Supply on Side of Digester Wall</u>				
12" Air piping and fittings, welded GSP	lf	27	\$90	\$2,430
12" Galv steel fittings	ea	1	\$450	\$450
Supports	ea	3	\$250	\$750
Installation	ls	0.35	\$3,630	\$1,271
Drain Line Piping and Valves	ls	1	\$3,200	\$3,200
Rehabilitation of Existing Basins				
Recondition top 5 feet of interior walls	sf	2,000	\$12	\$24,000
Coat top 10 feet of interior walls	sf	4,000	\$8	\$32,000
Miscellaneous concrete work and walkways	ls	1	\$20,000	\$20,000
Coat exterior walls	sf	4,320	\$5	\$21,600
Remove Existing Piping, Valves, Fittings, Covers, and Aeration Equipment				
<u>Basin Cleaning</u>				
Pump out sludges from digester basins	days	3	\$1,800	\$5,400
Wash down all exposed surfaces in basins	days	2	\$1,800	\$3,600
Equipment, pump, hoses and tools	days	5	\$800	\$4,000
<u>Remove Basin Cover and Process Piping</u>				
Removal Crew	days	12	\$2,400	\$28,800
Removal Equipment and Materials	days	12	\$1,600	\$19,200
SUBTOTAL				\$911,100
Undefined Elements	8.00%			\$72,900
General Conditions	2.00%			\$18,200
Mobilization, Bonds, Shakedown	4.00%			\$36,400
TOTAL				
				\$1,039,000

Los Lunas Wastewater and Sludge Management PER
Replace Gravity Belt Thickener in Old Thickener Building

DATE: 06/05/12

ITEM	UNIT	QUANT	UNIT PRICE	COST ESTIMATE
Equipment in Old Thickener Building				
New 2-meter Gravity Belt Thickener - replacement of the existing GBT currently installed in the sludge handling building	ea	1	\$200,000	\$200,000
New GBT - Stairs, handrails, walkways (materials only)	ea	1	\$25,000	\$25,000
New GBT - Stainless steel thickener hopper (materials	ea	1	\$4,000	\$4,000
New GBT - Polymer feed system	ea	1	\$20,000	\$20,000
Installation	ls	0.35	\$249,000	\$87,150
TWAS Pump and Piping				
TWAS Pump	ea	1	\$36,000	\$36,000
TWAS Piping	ls	1	\$10,200	\$10,200
Installation	ls	0.3	\$46,200	\$13,860
Washwater Booster Pumps and Piping				
Booster Pumps	ls	1	\$17,000	\$17,000
Piping, Valves, Fittings	ls	1	\$14,800	\$14,800
Installation	ls	0.3	\$31,800	\$9,540
Painting	ls	1	\$1,800	\$1,800
Polymer Piping	ls	1	\$4,400	\$4,400
Equipment Removal				
Remove WAS inlet piping and pumps	days	3	\$1,800	\$5,400
Remove TWAS pump and piping	days	2	\$1,800	\$3,600
Remove GBT and Platforms	days	5	\$1,800	\$9,000
SUBTOTAL				\$461,800
Undefined Elements				\$36,900
General Conditions				\$9,200
Mobilization, Bonds, Shakedown				\$18,500
TOTAL				\$526,000

Los Lunas Wastewater and Sludge Management PER

New Sludge Handling and Blower Building

DATE: 06/22/12

Rehabilitation of Existing Aerobic Digesters and New Thickening and Dewatering Building

ITEM	UNIT	QUANT	UNIT PRICE	COST ESTIMATE
Equipment in New Sludge Building				
New 2-meter Belt Filter Press	ea	1	\$270,000	\$270,000
New BFP - Stairs, handrails, walkways (materials only)	ea	1	\$40,000	\$40,000
New BFP - Stainless steel thickener hopper (materials only)	ea	1	\$4,000	\$4,000
New BFP - Polymer feed system (materials only)	ea	1	\$20,000	\$20,000
New BFP - Sludge cake conveyor (materials only)	ea	1	\$40,000	\$40,000
New BFP - Macerator/Grinder (materials only)	ea	1	\$20,000	\$20,000
Dewatering Equipment Installation	ls	0.35	\$394,000	\$137,900
New 2-meter Gravity Belt Thickener in new building (to match new digesters capacity)				
	ea	1	\$200,000	\$200,000
New GBT - Stairs, handrails, walkways (materials only)	ea	1	\$25,000	\$25,000
New GBT - Stainless steel thickener hopper (materials only)	ea	1	\$4,000	\$4,000
New GBT - Polymer feed system	ea	1	\$20,000	\$20,000
Thickening Equipment Installation	ls	0.35	\$249,000	\$87,150
Thickening/Dewatering Building				
Thickening/Dewatering Building (w/o elec) 56x86	sf	4,800	\$160	\$768,000
Sludge Loading Bay 36x48	sf	1,730	\$90	\$155,700
Earthwork				
Excavation	cy	1,990	\$12	\$23,880
Structural Backfill	cy	1,190	\$22	\$26,180
Ordinary Fill	cy	480	\$8	\$3,840
Subgrade Fill	cy	430	\$8	\$3,440
Compaction	cy	2,100	\$5	\$10,500
Dewatering	ls	1	\$25,000	\$25,000
Piping Under Slab: Material	ls	1	\$21,000	\$21,000
Gravity Belt Thickener Piping, Fittings, Valves:	ls	1	\$6,000	\$6,000
Belt Filter Press and Polymer Mixing Piping, Fittings, and Valves:				
Fittings and valves	ls	1	\$4,000	\$4,000
Washwater Supply System				
Piping, Fitting, Valves	ls	1.3	\$10,000	\$13,000
Belt Wash Pumps				
Belt Wash Booster Pumps Assembly & Installation	ls	1.4	\$17,000	\$23,800
Fittings and valves	ls	1	\$13,600	\$13,600
Pipe Supports	ls	1	\$1,500	\$1,500
Polymer System Piping	ls	1.3	\$4,400	\$5,720

New Sludge Handling and Blower Building

DATE: 06/22/12

Rehabilitation of Existing Aerobic Digesters and New Thickening and Dewatering Building

ITEM	UNIT	QUANT	UNIT PRICE	COST ESTIMATE
Blowers (to replace existing digester blowers; materials only)	ea	3	\$103,000	\$309,000
Equipment Installation	ls	0.25	\$309,000	\$77,250
Air Piping for Digester PD Blowers (3) - Piping				
Blower discharge piping and high temp valves	ls	1	\$47,000	\$47,000
Pipe Supports	ea	5	\$2,400	\$12,000
Piping Installation	ls	0.3	\$59,000	\$17,700
SUBTOTAL				\$2,436,200
Undefined Elements 8.00%				\$194,900
General Conditions 2.00%				\$48,700
Mobilization, Bonds, Shakedown 4.00%				\$97,400
TOTAL				\$2,777,000

Los Lunas Wastewater and Sludge Management PER**New Plant Washwater Pump Building**

DATE: 06/05/12

Rehabilitation of Existing Aerobic Digesters and New Thickening and Dewatering Building

ITEM	UNIT	QUANT	UNIT PRICE	COST ESTIMATE
Pump Building				
Building (w/o electrical) 16x18	sf	288	\$140	\$40,320
Earthwork	ls	1	\$15,000	\$15,000
Dewatering	ls	1	\$8,000	\$8,000
Equipment				
Washwater Pumps	ea	2	\$15,000	\$30,000
Pressure Tanks	ea	2	\$7,500	\$15,000
Installation	ls	0.35	\$45,000	\$15,750
Piping and Fittings	ls	1	\$9,800	\$9,800
SUBTOTAL				\$133,900
Undefined Elements 8.00%				\$10,700
General Conditions 2.00%				\$2,700
Mobilization, Bonds, Shakedown 4.00%				\$5,400
TOTAL				\$153,000

Los Lunas Wastewater and Sludge Management PER
Digested Sludge Pump Building

DATE: 06/05/12

Rehabilitation of Existing Aerobic Digesters and New Thickening and Dewatering Building

ITEM	UNIT	QUANT	UNIT PRICE	COST ESTIMATE
Pump Building				
Building (w/o electrical) 18x24	sf	432	\$140	\$60,480
Earthwork	ls	1	\$18,000	\$18,000
Dewatering	ls	1	\$9,000	\$9,000
Equipment				
Digested Sludge Pumps	ea	2	\$36,000	\$72,000
Installation	ls	0.3	\$72,000	\$21,600
Digested Sludge Pumps - Piping, Fittings, Valves				
<u>Fittings</u>				
6" DI 90 degree bend, mj ends	ea	2	\$105	\$210
6" DI 90 degree bend, flg ends	ea	3	\$99	\$297
6" DI Tee, flg ends	ea	2	\$145	\$290
4"x6" Expansion joint, flg ends	ea	2	\$1,210	\$2,420
6" Expansion joint, flg ends	ea	2	\$1,540	\$3,080
4" DI 90 degree bend, flg ends	ea	2	\$68	\$136
4" DI 90 degree bend, mj ends	ea	1	\$72	\$72
4" DI Tee, flg ends	ea	2	\$99	\$198
4" DI Campanion Flange	ea	1	\$44	\$44
Tapping saddle for pressure switch	ea	2	\$132	\$264
6" mega flange	ea	1	\$99	\$99
4" Mega flange	ea	4	\$68	\$272
<u>Piping</u>				
4" DIP, flg x pe, 12in long	ea	2	\$110	\$220
4" DIP, flg x pe, 2 ft long	ea	1	\$130	\$130
6" DI, flg x flg, 1 ft long	ea	1	\$180	\$180
6" DI, flg x flg, 1.5 ft long	ea	1	\$190	\$190
6" DI, flg x flg, 2 ft long	ea	1	\$210	\$210
6" DI, flg x flg, 2.5 ft long	ea	1	\$220	\$220
Piping Under Slab	ls	1	\$1,800	\$1,800
Pipe Supports	ea	5	\$120	\$600
<u>Valves</u>				
6" Plug valve, flg ends	ea	2	\$640	\$1,280
4" Check valve, flg ends	ea	2	\$720	\$1,440
4" Plug valve, flg ends	ea	2	\$400	\$800
1" Ball valve w/ 1" dia. pipe nipple	ea	1	\$50	\$50
Digested Sludge Piping Installation	ls	0.45	\$14,502	\$6,526
Digested Sludge Piping - Painting	ls	1	\$800	\$800
SUBTOTAL				\$202,900
Undefined Elements 8.00%				\$16,200
General Conditions 2.00%				\$4,100
Mobilization, Bonds, Shakedown 4.00%				\$8,100
TOTAL				\$231,000

Los Lunas Wastewater and Sludge Management PER**WAS Junction Valve Building**

DATE: 06/05/12

Rehabilitation of Existing Aerobic Digesters and New Thickening and Dewatering Building

ITEM	UNIT	QUANT	UNIT PRICE	COST ESTIMATE
Pump Building				
Building (w/o electrical) 14x16	sf	224	\$140	\$31,360
Earthwork	ls	1	\$9,500	\$9,500
Dewatering	ls	1	\$4,500	\$4,500
Piping, Fittings, Valves				
Piping Under Building	ls	1.3	\$2,200	\$2,860
<u>Fittings & Piping Spools</u>	1			
4" DI 90 degree bend, flg ends	ea	4	\$68	\$272
4" DI 90 degree bend, flg ends	ea	2	\$68	\$136
4" Plug valve, flg ends	ea	4	\$400	\$1,600
4" Mega flange	ea	12	\$68	\$816
Piping Spools	ls	1	\$1,800	\$1,800
Pipe Supports	ea	6	\$120	\$720
Motorized Valve Operator	ea	4	\$2,800	\$11,200
Piping Installation	ls	0.45	\$16,544	\$7,445
Exposed Piping - Painting	ls	1	\$600	\$600
SUBTOTAL				\$72,809
Undefined Elements 8.00%				\$5,800
General Conditions 2.00%				\$1,500
Mobilization, Bonds, Shakedown 4.00%				\$2,900
TOTAL				\$83,000

Los Lunas Wastewater and Sludge Management PER

Yard Piping

DATE: 06/07/12

Rehabilitation of Existing Aerobic Digesters and New Thickening and Dewatering Building

ITEM	UNIT	QUANT	UNIT PRICE	COST ESTIMATE
Line 03 - 4" TWAS from WAS Junction Box				
4" DIP: material costs	lf	520	\$14	\$7,280
4" DIP: Contractor markup and installation	ls	\$7,280	40.00%	\$2,912
Trench work: normal	lf	520	\$20	\$10,400
Fittings and Valves	ls	1	\$5,000	\$5,000
Cleanouts	ea	5	\$2,500	\$12,500
Line 05 - 4" Digested Sludge from Old Digester				
4" DIP: material costs	lf	140	\$14	\$1,960
4" DIP: Contractor markup and installation	ls	\$1,960	40.00%	\$784
Trench work: normal	lf	140	\$20	\$2,800
Fittings and Valves	ls	1	\$2,000	\$2,000
Cleanouts	ea	2	\$2,500	\$5,000
Line 07 - 6" Combined Decant from Old Digester				
6" DIP: material costs	lf	240	\$18.00	\$4,320
6" DIP: Contractor markup and installation	ls	\$4,320	40.00%	\$1,728
Trench work: normal	lf	240	\$25	\$6,000
Fittings and Valves	ls	1	\$3,000	\$3,000
Cleanouts	ea	3	\$5,000	\$15,000
Line 08 - 10" Thickener Bldg Drain/Decant Drain				
10" DIP: material costs	lf	260	\$25.00	\$6,500
10" DIP: Contractor markup and installation	ls	\$6,500	40.00%	\$2,600
Trench work: normal	lf	260	\$25	\$6,500
Fittings and Valves	ls	1	\$6,000	\$6,000
Manhole	ea	1	\$6,000	\$6,000
Cleanouts	ea	2	\$6,000	\$12,000
Line 11 - 4" TWAS from Old Thickener Building (East Portion Only)				
4" DIP: material costs	lf	160	\$14	\$2,240
4" DIP: Contractor markup and installation	ls	\$2,240	40.00%	\$896
Trench work: normal	lf	160	\$20	\$3,200
Fittings and Valves	ls	1	\$4,000	\$4,000
Cleanouts	ea	3	\$2,500	\$7,500
Line 12 - 12" Washwater Supply				
12 DIP: material costs	lf	60	\$30.00	\$1,800
12" DIP: Contractor markup and installation	ls	\$1,800	40.00%	\$720
Trench work: normal	lf	60	\$25	\$1,500
Fittings and Valves	ls	1	\$8,000	\$8,000
Line 13 - 6" Washwater Supply				
6 DIP: material costs	lf	800	\$18.00	\$14,400
6" DIP: Contractor markup and installation	ls	\$14,400	40.00%	\$5,760
Trench work: normal	lf	800	\$20	\$16,000
Fittings and Valves	ls	1	\$2,500	\$2,500

Yard Piping

DATE: 06/07/12

Rehabilitation of Existing Aerobic Digesters and New Thickening and Dewatering Building

ITEM	UNIT	QUANT	UNIT PRICE	COST ESTIMATE
General Washwater Distribution and Hose Bibbs	ls	1	\$8,000	\$8,000
Extend Potable Water Supply for Fire Protection	ls	1	\$15,000	\$15,000
2" Natural Gas Service to New Thickener Building				
2" PVC: material costs	lf	360	\$9	\$3,240
2" PVC: Contractor markup and installation	ls	\$3,240	40.00%	\$1,296
Trench work: normal	lf	360	\$7	\$2,520
Fittings:	ls	1	\$300	\$300
Line 17 - 24" Galvanized Steel Process Air to Process Basins				
24" Galvanized Steel flanged piping: material costs	lf	100	\$120	\$12,000
Contractor markup and installation	ls	\$12,000	40.00%	\$4,800
Fittings:	ls	1	\$9,000	\$9,000
Valves:	ls	1	\$4,500	\$4,500
Fixed pipe support, 9.5' height	ea	8	\$1,800	\$14,400
Concrete Bases	ea	8	\$500	\$4,000
Trench Dewatering	lf	1500	\$12	\$18,000
SUBTOTAL				\$285,900
Undefined Elements			8.00%	\$22,900
General Conditions			2.00%	\$5,700
Mobilization, Bonds, Shakedown			4.00%	\$11,400
TOTAL				\$326,000

Appendix S

Loan Amortization Tables for Priority 1 and Priority 2 Projects

Loan Amortization Table

Priority 1 Capital Cost:	\$2,243,600
Loan Period (Years):	20
Annual Interest Rate:	3.00%

Month	Payment	Principal	Interest	Total Interest	Loan Balance
1	\$12,442.95	\$6,833.95	\$5,609.00	\$5,609.00	\$2,236,766.05
2	\$12,442.95	\$6,851.04	\$5,591.92	\$11,200.92	\$2,229,915.01
3	\$12,442.95	\$6,868.16	\$5,574.79	\$16,775.70	\$2,223,046.85
4	\$12,442.95	\$6,885.33	\$5,557.62	\$22,333.32	\$2,216,161.51
5	\$12,442.95	\$6,902.55	\$5,540.40	\$27,873.72	\$2,209,258.97
6	\$12,442.95	\$6,919.80	\$5,523.15	\$33,396.87	\$2,202,339.16
7	\$12,442.95	\$6,937.10	\$5,505.85	\$38,902.72	\$2,195,402.06
8	\$12,442.95	\$6,954.45	\$5,488.51	\$44,391.22	\$2,188,447.61
9	\$12,442.95	\$6,971.83	\$5,471.12	\$49,862.34	\$2,181,475.78
10	\$12,442.95	\$6,989.26	\$5,453.69	\$55,316.03	\$2,174,486.52
11	\$12,442.95	\$7,006.74	\$5,436.22	\$60,752.25	\$2,167,479.78
12	\$12,442.95	\$7,024.25	\$5,418.70	\$66,170.95	\$2,160,455.53
13	\$12,442.95	\$7,041.81	\$5,401.14	\$71,572.09	\$2,153,413.71
14	\$12,442.95	\$7,059.42	\$5,383.53	\$76,955.62	\$2,146,354.30
15	\$12,442.95	\$7,077.07	\$5,365.89	\$82,321.51	\$2,139,277.23
16	\$12,442.95	\$7,094.76	\$5,348.19	\$87,669.70	\$2,132,182.47
17	\$12,442.95	\$7,112.50	\$5,330.46	\$93,000.16	\$2,125,069.98
18	\$12,442.95	\$7,130.28	\$5,312.67	\$98,312.83	\$2,117,939.70
19	\$12,442.95	\$7,148.10	\$5,294.85	\$103,607.68	\$2,110,791.60
20	\$12,442.95	\$7,165.97	\$5,276.98	\$108,884.66	\$2,103,625.63
21	\$12,442.95	\$7,183.89	\$5,259.06	\$114,143.72	\$2,096,441.74
22	\$12,442.95	\$7,201.85	\$5,241.10	\$119,384.83	\$2,089,239.89
23	\$12,442.95	\$7,219.85	\$5,223.10	\$124,607.93	\$2,082,020.04
24	\$12,442.95	\$7,237.90	\$5,205.05	\$129,812.98	\$2,074,782.14
25	\$12,442.95	\$7,256.00	\$5,186.96	\$134,999.93	\$2,067,526.14
26	\$12,442.95	\$7,274.14	\$5,168.82	\$140,168.75	\$2,060,252.00
27	\$12,442.95	\$7,292.32	\$5,150.63	\$145,319.38	\$2,052,959.68
28	\$12,442.95	\$7,310.55	\$5,132.40	\$150,451.78	\$2,045,649.13
29	\$12,442.95	\$7,328.83	\$5,114.12	\$155,565.90	\$2,038,320.30
30	\$12,442.95	\$7,347.15	\$5,095.80	\$160,661.70	\$2,030,973.15
31	\$12,442.95	\$7,365.52	\$5,077.43	\$165,739.13	\$2,023,607.63
32	\$12,442.95	\$7,383.93	\$5,059.02	\$170,798.15	\$2,016,223.70
33	\$12,442.95	\$7,402.39	\$5,040.56	\$175,838.71	\$2,008,821.31
34	\$12,442.95	\$7,420.90	\$5,022.05	\$180,860.77	\$2,001,400.41
35	\$12,442.95	\$7,439.45	\$5,003.50	\$185,864.27	\$1,993,960.96
36	\$12,442.95	\$7,458.05	\$4,984.90	\$190,849.17	\$1,986,502.91
37	\$12,442.95	\$7,476.69	\$4,966.26	\$195,815.43	\$1,979,026.21
38	\$12,442.95	\$7,495.39	\$4,947.57	\$200,762.99	\$1,971,530.83
39	\$12,442.95	\$7,514.12	\$4,928.83	\$205,691.82	\$1,964,016.70
40	\$12,442.95	\$7,532.91	\$4,910.04	\$210,601.86	\$1,956,483.79

Loan Amortization Table

Priority 1 Capital Cost:	\$2,243,600
Loan Period (Years):	20
Annual Interest Rate:	3.00%

41	\$12,442.95	\$7,551.74	\$4,891.21	\$215,493.07	\$1,948,932.05
42	\$12,442.95	\$7,570.62	\$4,872.33	\$220,365.40	\$1,941,361.43
43	\$12,442.95	\$7,589.55	\$4,853.40	\$225,218.80	\$1,933,771.88
44	\$12,442.95	\$7,608.52	\$4,834.43	\$230,053.23	\$1,926,163.36
45	\$12,442.95	\$7,627.54	\$4,815.41	\$234,868.64	\$1,918,535.82
46	\$12,442.95	\$7,646.61	\$4,796.34	\$239,664.98	\$1,910,889.20
47	\$12,442.95	\$7,665.73	\$4,777.22	\$244,442.20	\$1,903,223.47
48	\$12,442.95	\$7,684.89	\$4,758.06	\$249,200.26	\$1,895,538.58
49	\$12,442.95	\$7,704.11	\$4,738.85	\$253,939.11	\$1,887,834.48
50	\$12,442.95	\$7,723.37	\$4,719.59	\$258,658.70	\$1,880,111.11
51	\$12,442.95	\$7,742.67	\$4,700.28	\$263,358.97	\$1,872,368.44
52	\$12,442.95	\$7,762.03	\$4,680.92	\$268,039.89	\$1,864,606.41
53	\$12,442.95	\$7,781.44	\$4,661.52	\$272,701.41	\$1,856,824.97
54	\$12,442.95	\$7,800.89	\$4,642.06	\$277,343.47	\$1,849,024.08
55	\$12,442.95	\$7,820.39	\$4,622.56	\$281,966.03	\$1,841,203.69
56	\$12,442.95	\$7,839.94	\$4,603.01	\$286,569.04	\$1,833,363.75
57	\$12,442.95	\$7,859.54	\$4,583.41	\$291,152.45	\$1,825,504.20
58	\$12,442.95	\$7,879.19	\$4,563.76	\$295,716.21	\$1,817,625.01
59	\$12,442.95	\$7,898.89	\$4,544.06	\$300,260.28	\$1,809,726.12
60	\$12,442.95	\$7,918.64	\$4,524.32	\$304,784.59	\$1,801,807.49
61	\$12,442.95	\$7,938.43	\$4,504.52	\$309,289.11	\$1,793,869.06
62	\$12,442.95	\$7,958.28	\$4,484.67	\$313,773.78	\$1,785,910.78
63	\$12,442.95	\$7,978.17	\$4,464.78	\$318,238.56	\$1,777,932.60
64	\$12,442.95	\$7,998.12	\$4,444.83	\$322,683.39	\$1,769,934.48
65	\$12,442.95	\$8,018.12	\$4,424.84	\$327,108.23	\$1,761,916.37
66	\$12,442.95	\$8,038.16	\$4,404.79	\$331,513.02	\$1,753,878.20
67	\$12,442.95	\$8,058.26	\$4,384.70	\$335,897.71	\$1,745,819.95
68	\$12,442.95	\$8,078.40	\$4,364.55	\$340,262.26	\$1,737,741.55
69	\$12,442.95	\$8,098.60	\$4,344.35	\$344,606.62	\$1,729,642.95
70	\$12,442.95	\$8,118.84	\$4,324.11	\$348,930.72	\$1,721,524.10
71	\$12,442.95	\$8,139.14	\$4,303.81	\$353,234.53	\$1,713,384.96
72	\$12,442.95	\$8,159.49	\$4,283.46	\$357,518.00	\$1,705,225.47
73	\$12,442.95	\$8,179.89	\$4,263.06	\$361,781.06	\$1,697,045.59
74	\$12,442.95	\$8,200.34	\$4,242.61	\$366,023.67	\$1,688,845.25
75	\$12,442.95	\$8,220.84	\$4,222.11	\$370,245.79	\$1,680,624.41
76	\$12,442.95	\$8,241.39	\$4,201.56	\$374,447.35	\$1,672,383.02
77	\$12,442.95	\$8,261.99	\$4,180.96	\$378,628.31	\$1,664,121.02
78	\$12,442.95	\$8,282.65	\$4,160.30	\$382,788.61	\$1,655,838.38
79	\$12,442.95	\$8,303.36	\$4,139.60	\$386,928.20	\$1,647,535.02
80	\$12,442.95	\$8,324.11	\$4,118.84	\$391,047.04	\$1,639,210.91
81	\$12,442.95	\$8,344.92	\$4,098.03	\$395,145.07	\$1,630,865.98

Loan Amortization Table

Priority 1 Capital Cost:	\$2,243,600
Loan Period (Years):	20
Annual Interest Rate:	3.00%

82	\$12,442.95	\$8,365.79	\$4,077.16	\$399,222.23	\$1,622,500.19
83	\$12,442.95	\$8,386.70	\$4,056.25	\$403,278.48	\$1,614,113.49
84	\$12,442.95	\$8,407.67	\$4,035.28	\$407,313.77	\$1,605,705.83
85	\$12,442.95	\$8,428.69	\$4,014.26	\$411,328.03	\$1,597,277.14
86	\$12,442.95	\$8,449.76	\$3,993.19	\$415,321.23	\$1,588,827.38
87	\$12,442.95	\$8,470.88	\$3,972.07	\$419,293.29	\$1,580,356.50
88	\$12,442.95	\$8,492.06	\$3,950.89	\$423,244.19	\$1,571,864.44
89	\$12,442.95	\$8,513.29	\$3,929.66	\$427,173.85	\$1,563,351.14
90	\$12,442.95	\$8,534.57	\$3,908.38	\$431,082.22	\$1,554,816.57
91	\$12,442.95	\$8,555.91	\$3,887.04	\$434,969.27	\$1,546,260.66
92	\$12,442.95	\$8,577.30	\$3,865.65	\$438,834.92	\$1,537,683.36
93	\$12,442.95	\$8,598.74	\$3,844.21	\$442,679.13	\$1,529,084.62
94	\$12,442.95	\$8,620.24	\$3,822.71	\$446,501.84	\$1,520,464.38
95	\$12,442.95	\$8,641.79	\$3,801.16	\$450,303.00	\$1,511,822.59
96	\$12,442.95	\$8,663.40	\$3,779.56	\$454,082.55	\$1,503,159.19
97	\$12,442.95	\$8,685.05	\$3,757.90	\$457,840.45	\$1,494,474.14
98	\$12,442.95	\$8,706.77	\$3,736.19	\$461,576.64	\$1,485,767.37
99	\$12,442.95	\$8,728.53	\$3,714.42	\$465,291.06	\$1,477,038.84
100	\$12,442.95	\$8,750.35	\$3,692.60	\$468,983.65	\$1,468,288.48
101	\$12,442.95	\$8,772.23	\$3,670.72	\$472,654.37	\$1,459,516.25
102	\$12,442.95	\$8,794.16	\$3,648.79	\$476,303.17	\$1,450,722.09
103	\$12,442.95	\$8,816.15	\$3,626.81	\$479,929.97	\$1,441,905.95
104	\$12,442.95	\$8,838.19	\$3,604.76	\$483,534.74	\$1,433,067.76
105	\$12,442.95	\$8,860.28	\$3,582.67	\$487,117.41	\$1,424,207.48
106	\$12,442.95	\$8,882.43	\$3,560.52	\$490,677.92	\$1,415,325.04
107	\$12,442.95	\$8,904.64	\$3,538.31	\$494,216.24	\$1,406,420.40
108	\$12,442.95	\$8,926.90	\$3,516.05	\$497,732.29	\$1,397,493.50
109	\$12,442.95	\$8,949.22	\$3,493.73	\$501,226.02	\$1,388,544.29
110	\$12,442.95	\$8,971.59	\$3,471.36	\$504,697.38	\$1,379,572.69
111	\$12,442.95	\$8,994.02	\$3,448.93	\$508,146.31	\$1,370,578.67
112	\$12,442.95	\$9,016.51	\$3,426.45	\$511,572.76	\$1,361,562.17
113	\$12,442.95	\$9,039.05	\$3,403.91	\$514,976.67	\$1,352,523.12
114	\$12,442.95	\$9,061.64	\$3,381.31	\$518,357.97	\$1,343,461.48
115	\$12,442.95	\$9,084.30	\$3,358.65	\$521,716.63	\$1,334,377.18
116	\$12,442.95	\$9,107.01	\$3,335.94	\$525,052.57	\$1,325,270.17
117	\$12,442.95	\$9,129.78	\$3,313.18	\$528,365.75	\$1,316,140.40
118	\$12,442.95	\$9,152.60	\$3,290.35	\$531,656.10	\$1,306,987.80
119	\$12,442.95	\$9,175.48	\$3,267.47	\$534,923.57	\$1,297,812.31
120	\$12,442.95	\$9,198.42	\$3,244.53	\$538,168.10	\$1,288,613.89
121	\$12,442.95	\$9,221.42	\$3,221.53	\$541,389.63	\$1,279,392.48
122	\$12,442.95	\$9,244.47	\$3,198.48	\$544,588.11	\$1,270,148.00

Loan Amortization Table

Priority 1 Capital Cost:	\$2,243,600
Loan Period (Years):	20
Annual Interest Rate:	3.00%

123	\$12,442.95	\$9,267.58	\$3,175.37	\$547,763.48	\$1,260,880.42
124	\$12,442.95	\$9,290.75	\$3,152.20	\$550,915.68	\$1,251,589.67
125	\$12,442.95	\$9,313.98	\$3,128.97	\$554,044.66	\$1,242,275.69
126	\$12,442.95	\$9,337.26	\$3,105.69	\$557,150.35	\$1,232,938.43
127	\$12,442.95	\$9,360.61	\$3,082.35	\$560,232.69	\$1,223,577.83
128	\$12,442.95	\$9,384.01	\$3,058.94	\$563,291.64	\$1,214,193.82
129	\$12,442.95	\$9,407.47	\$3,035.48	\$566,327.12	\$1,204,786.35
130	\$12,442.95	\$9,430.99	\$3,011.97	\$569,339.09	\$1,195,355.37
131	\$12,442.95	\$9,454.56	\$2,988.39	\$572,327.48	\$1,185,900.80
132	\$12,442.95	\$9,478.20	\$2,964.75	\$575,292.23	\$1,176,422.60
133	\$12,442.95	\$9,501.90	\$2,941.06	\$578,233.29	\$1,166,920.71
134	\$12,442.95	\$9,525.65	\$2,917.30	\$581,150.59	\$1,157,395.06
135	\$12,442.95	\$9,549.46	\$2,893.49	\$584,044.07	\$1,147,845.59
136	\$12,442.95	\$9,573.34	\$2,869.61	\$586,913.69	\$1,138,272.26
137	\$12,442.95	\$9,597.27	\$2,845.68	\$589,759.37	\$1,128,674.99
138	\$12,442.95	\$9,621.26	\$2,821.69	\$592,581.06	\$1,119,053.72
139	\$12,442.95	\$9,645.32	\$2,797.63	\$595,378.69	\$1,109,408.40
140	\$12,442.95	\$9,669.43	\$2,773.52	\$598,152.21	\$1,099,738.97
141	\$12,442.95	\$9,693.60	\$2,749.35	\$600,901.56	\$1,090,045.37
142	\$12,442.95	\$9,717.84	\$2,725.11	\$603,626.67	\$1,080,327.53
143	\$12,442.95	\$9,742.13	\$2,700.82	\$606,327.49	\$1,070,585.40
144	\$12,442.95	\$9,766.49	\$2,676.46	\$609,003.96	\$1,060,818.91
145	\$12,442.95	\$9,790.90	\$2,652.05	\$611,656.00	\$1,051,028.01
146	\$12,442.95	\$9,815.38	\$2,627.57	\$614,283.57	\$1,041,212.62
147	\$12,442.95	\$9,839.92	\$2,603.03	\$616,886.60	\$1,031,372.70
148	\$12,442.95	\$9,864.52	\$2,578.43	\$619,465.04	\$1,021,508.18
149	\$12,442.95	\$9,889.18	\$2,553.77	\$622,018.81	\$1,011,619.00
150	\$12,442.95	\$9,913.90	\$2,529.05	\$624,547.85	\$1,001,705.10
151	\$12,442.95	\$9,938.69	\$2,504.26	\$627,052.12	\$991,766.41
152	\$12,442.95	\$9,963.54	\$2,479.42	\$629,531.53	\$981,802.87
153	\$12,442.95	\$9,988.44	\$2,454.51	\$631,986.04	\$971,814.43
154	\$12,442.95	\$10,013.42	\$2,429.54	\$634,415.58	\$961,801.01
155	\$12,442.95	\$10,038.45	\$2,404.50	\$636,820.08	\$951,762.56
156	\$12,442.95	\$10,063.55	\$2,379.41	\$639,199.48	\$941,699.02
157	\$12,442.95	\$10,088.70	\$2,354.25	\$641,553.73	\$931,610.31
158	\$12,442.95	\$10,113.93	\$2,329.03	\$643,882.76	\$921,496.39
159	\$12,442.95	\$10,139.21	\$2,303.74	\$646,186.50	\$911,357.18
160	\$12,442.95	\$10,164.56	\$2,278.39	\$648,464.89	\$901,192.62
161	\$12,442.95	\$10,189.97	\$2,252.98	\$650,717.87	\$891,002.65
162	\$12,442.95	\$10,215.45	\$2,227.51	\$652,945.38	\$880,787.20
163	\$12,442.95	\$10,240.98	\$2,201.97	\$655,147.35	\$870,546.22

Loan Amortization Table

Priority 1 Capital Cost:	\$2,243,600
Loan Period (Years):	20
Annual Interest Rate:	3.00%

164	\$12,442.95	\$10,266.59	\$2,176.37	\$657,323.71	\$860,279.63
165	\$12,442.95	\$10,292.25	\$2,150.70	\$659,474.41	\$849,987.38
166	\$12,442.95	\$10,317.98	\$2,124.97	\$661,599.38	\$839,669.40
167	\$12,442.95	\$10,343.78	\$2,099.17	\$663,698.55	\$829,325.62
168	\$12,442.95	\$10,369.64	\$2,073.31	\$665,771.87	\$818,955.98
169	\$12,442.95	\$10,395.56	\$2,047.39	\$667,819.26	\$808,560.42
170	\$12,442.95	\$10,421.55	\$2,021.40	\$669,840.66	\$798,138.87
171	\$12,442.95	\$10,447.60	\$1,995.35	\$671,836.01	\$787,691.27
172	\$12,442.95	\$10,473.72	\$1,969.23	\$673,805.24	\$777,217.54
173	\$12,442.95	\$10,499.91	\$1,943.04	\$675,748.28	\$766,717.63
174	\$12,442.95	\$10,526.16	\$1,916.79	\$677,665.07	\$756,191.48
175	\$12,442.95	\$10,552.47	\$1,890.48	\$679,555.55	\$745,639.00
176	\$12,442.95	\$10,578.85	\$1,864.10	\$681,419.65	\$735,060.15
177	\$12,442.95	\$10,605.30	\$1,837.65	\$683,257.30	\$724,454.85
178	\$12,442.95	\$10,631.81	\$1,811.14	\$685,068.44	\$713,823.03
179	\$12,442.95	\$10,658.39	\$1,784.56	\$686,852.99	\$703,164.64
180	\$12,442.95	\$10,685.04	\$1,757.91	\$688,610.91	\$692,479.60
181	\$12,442.95	\$10,711.75	\$1,731.20	\$690,342.10	\$681,767.85
182	\$12,442.95	\$10,738.53	\$1,704.42	\$692,046.52	\$671,029.31
183	\$12,442.95	\$10,765.38	\$1,677.57	\$693,724.10	\$660,263.94
184	\$12,442.95	\$10,792.29	\$1,650.66	\$695,374.76	\$649,471.64
185	\$12,442.95	\$10,819.27	\$1,623.68	\$696,998.44	\$638,652.37
186	\$12,442.95	\$10,846.32	\$1,596.63	\$698,595.07	\$627,806.05
187	\$12,442.95	\$10,873.44	\$1,569.52	\$700,164.58	\$616,932.61
188	\$12,442.95	\$10,900.62	\$1,542.33	\$701,706.91	\$606,031.99
189	\$12,442.95	\$10,927.87	\$1,515.08	\$703,221.99	\$595,104.12
190	\$12,442.95	\$10,955.19	\$1,487.76	\$704,709.75	\$584,148.93
191	\$12,442.95	\$10,982.58	\$1,460.37	\$706,170.13	\$573,166.35
192	\$12,442.95	\$11,010.04	\$1,432.92	\$707,603.04	\$562,156.32
193	\$12,442.95	\$11,037.56	\$1,405.39	\$709,008.43	\$551,118.75
194	\$12,442.95	\$11,065.15	\$1,377.80	\$710,386.23	\$540,053.60
195	\$12,442.95	\$11,092.82	\$1,350.13	\$711,736.36	\$528,960.78
196	\$12,442.95	\$11,120.55	\$1,322.40	\$713,058.77	\$517,840.23
197	\$12,442.95	\$11,148.35	\$1,294.60	\$714,353.37	\$506,691.88
198	\$12,442.95	\$11,176.22	\$1,266.73	\$715,620.10	\$495,515.66
199	\$12,442.95	\$11,204.16	\$1,238.79	\$716,858.89	\$484,311.50
200	\$12,442.95	\$11,232.17	\$1,210.78	\$718,069.66	\$473,079.32
201	\$12,442.95	\$11,260.25	\$1,182.70	\$719,252.36	\$461,819.07
202	\$12,442.95	\$11,288.40	\$1,154.55	\$720,406.91	\$450,530.67
203	\$12,442.95	\$11,316.63	\$1,126.33	\$721,533.24	\$439,214.04
204	\$12,442.95	\$11,344.92	\$1,098.04	\$722,631.27	\$427,869.12

Loan Amortization Table

Priority 1 Capital Cost:	\$2,243,600
Loan Period (Years):	20
Annual Interest Rate:	3.00%

205	\$12,442.95	\$11,373.28	\$1,069.67	\$723,700.95	\$416,495.85
206	\$12,442.95	\$11,401.71	\$1,041.24	\$724,742.18	\$405,094.13
207	\$12,442.95	\$11,430.22	\$1,012.74	\$725,754.92	\$393,663.92
208	\$12,442.95	\$11,458.79	\$984.16	\$726,739.08	\$382,205.13
209	\$12,442.95	\$11,487.44	\$955.51	\$727,694.59	\$370,717.69
210	\$12,442.95	\$11,516.16	\$926.79	\$728,621.39	\$359,201.53
211	\$12,442.95	\$11,544.95	\$898.00	\$729,519.39	\$347,656.58
212	\$12,442.95	\$11,573.81	\$869.14	\$730,388.53	\$336,082.77
213	\$12,442.95	\$11,602.74	\$840.21	\$731,228.74	\$324,480.03
214	\$12,442.95	\$11,631.75	\$811.20	\$732,039.94	\$312,848.27
215	\$12,442.95	\$11,660.83	\$782.12	\$732,822.06	\$301,187.44
216	\$12,442.95	\$11,689.98	\$752.97	\$733,575.03	\$289,497.46
217	\$12,442.95	\$11,719.21	\$723.74	\$734,298.77	\$277,778.25
218	\$12,442.95	\$11,748.51	\$694.45	\$734,993.22	\$266,029.75
219	\$12,442.95	\$11,777.88	\$665.07	\$735,658.29	\$254,251.87
220	\$12,442.95	\$11,807.32	\$635.63	\$736,293.92	\$242,444.55
221	\$12,442.95	\$11,836.84	\$606.11	\$736,900.03	\$230,607.71
222	\$12,442.95	\$11,866.43	\$576.52	\$737,476.55	\$218,741.27
223	\$12,442.95	\$11,896.10	\$546.85	\$738,023.41	\$206,845.18
224	\$12,442.95	\$11,925.84	\$517.11	\$738,540.52	\$194,919.34
225	\$12,442.95	\$11,955.65	\$487.30	\$739,027.82	\$182,963.68
226	\$12,442.95	\$11,985.54	\$457.41	\$739,485.23	\$170,978.14
227	\$12,442.95	\$12,015.51	\$427.45	\$739,912.67	\$158,962.63
228	\$12,442.95	\$12,045.55	\$397.41	\$740,310.08	\$146,917.09
229	\$12,442.95	\$12,075.66	\$367.29	\$740,677.37	\$134,841.43
230	\$12,442.95	\$12,105.85	\$337.10	\$741,014.47	\$122,735.58
231	\$12,442.95	\$12,136.11	\$306.84	\$741,321.31	\$110,599.47
232	\$12,442.95	\$12,166.45	\$276.50	\$741,597.81	\$98,433.02
233	\$12,442.95	\$12,196.87	\$246.08	\$741,843.89	\$86,236.15
234	\$12,442.95	\$12,227.36	\$215.59	\$742,059.49	\$74,008.79
235	\$12,442.95	\$12,257.93	\$185.02	\$742,244.51	\$61,750.86
236	\$12,442.95	\$12,288.57	\$154.38	\$742,398.88	\$49,462.28
237	\$12,442.95	\$12,319.30	\$123.66	\$742,522.54	\$37,142.99
238	\$12,442.95	\$12,350.09	\$92.86	\$742,615.40	\$24,792.89
239	\$12,442.95	\$12,380.97	\$61.98	\$742,677.38	\$12,411.92
240	\$12,442.95	\$12,411.92	\$31.03	\$742,708.41	\$0.00

Loan Amortization Table

Priority 2 Capital Cost:	\$7,993,000
Loan Period (Years):	20
Annual Interest Rate:	3.00%

Month	Payment	Principal	Interest	Total Interest	Loan Balance
1	\$44,328.99	\$24,346.49	\$19,982.50	\$19,982.50	\$7,968,653.51
2	\$44,328.99	\$24,407.35	\$19,921.63	\$39,904.13	\$7,944,246.16
3	\$44,328.99	\$24,468.37	\$19,860.62	\$59,764.75	\$7,919,777.79
4	\$44,328.99	\$24,529.54	\$19,799.44	\$79,564.19	\$7,895,248.25
5	\$44,328.99	\$24,590.87	\$19,738.12	\$99,302.31	\$7,870,657.38
6	\$44,328.99	\$24,652.34	\$19,676.64	\$118,978.96	\$7,846,005.04
7	\$44,328.99	\$24,713.97	\$19,615.01	\$138,593.97	\$7,821,291.07
8	\$44,328.99	\$24,775.76	\$19,553.23	\$158,147.20	\$7,796,515.31
9	\$44,328.99	\$24,837.70	\$19,491.29	\$177,638.49	\$7,771,677.61
10	\$44,328.99	\$24,899.79	\$19,429.19	\$197,067.68	\$7,746,777.82
11	\$44,328.99	\$24,962.04	\$19,366.94	\$216,434.62	\$7,721,815.78
12	\$44,328.99	\$25,024.45	\$19,304.54	\$235,739.16	\$7,696,791.33
13	\$44,328.99	\$25,087.01	\$19,241.98	\$254,981.14	\$7,671,704.32
14	\$44,328.99	\$25,149.73	\$19,179.26	\$274,160.40	\$7,646,554.60
15	\$44,328.99	\$25,212.60	\$19,116.39	\$293,276.79	\$7,621,342.00
16	\$44,328.99	\$25,275.63	\$19,053.36	\$312,330.14	\$7,596,066.37
17	\$44,328.99	\$25,338.82	\$18,990.17	\$331,320.31	\$7,570,727.55
18	\$44,328.99	\$25,402.17	\$18,926.82	\$350,247.13	\$7,545,325.38
19	\$44,328.99	\$25,465.67	\$18,863.31	\$369,110.44	\$7,519,859.71
20	\$44,328.99	\$25,529.34	\$18,799.65	\$387,910.09	\$7,494,330.37
21	\$44,328.99	\$25,593.16	\$18,735.83	\$406,645.92	\$7,468,737.21
22	\$44,328.99	\$25,657.14	\$18,671.84	\$425,317.76	\$7,443,080.07
23	\$44,328.99	\$25,721.29	\$18,607.70	\$443,925.46	\$7,417,358.78
24	\$44,328.99	\$25,785.59	\$18,543.40	\$462,468.86	\$7,391,573.19
25	\$44,328.99	\$25,850.05	\$18,478.93	\$480,947.79	\$7,365,723.14
26	\$44,328.99	\$25,914.68	\$18,414.31	\$499,362.10	\$7,339,808.46
27	\$44,328.99	\$25,979.46	\$18,349.52	\$517,711.62	\$7,313,829.00
28	\$44,328.99	\$26,044.41	\$18,284.57	\$535,996.19	\$7,287,784.59
29	\$44,328.99	\$26,109.52	\$18,219.46	\$554,215.65	\$7,261,675.06
30	\$44,328.99	\$26,174.80	\$18,154.19	\$572,369.84	\$7,235,500.26
31	\$44,328.99	\$26,240.24	\$18,088.75	\$590,458.59	\$7,209,260.03
32	\$44,328.99	\$26,305.84	\$18,023.15	\$608,481.74	\$7,182,954.19
33	\$44,328.99	\$26,371.60	\$17,957.39	\$626,439.13	\$7,156,582.59
34	\$44,328.99	\$26,437.53	\$17,891.46	\$644,330.58	\$7,130,145.06
35	\$44,328.99	\$26,503.62	\$17,825.36	\$662,155.95	\$7,103,641.44
36	\$44,328.99	\$26,569.88	\$17,759.10	\$679,915.05	\$7,077,071.56
37	\$44,328.99	\$26,636.31	\$17,692.68	\$697,607.73	\$7,050,435.25
38	\$44,328.99	\$26,702.90	\$17,626.09	\$715,233.82	\$7,023,732.35
39	\$44,328.99	\$26,769.66	\$17,559.33	\$732,793.15	\$6,996,962.70
40	\$44,328.99	\$26,836.58	\$17,492.41	\$750,285.56	\$6,970,126.12

Loan Amortization Table

Priority 2 Capital Cost:	\$7,993,000
Loan Period (Years):	20
Annual Interest Rate:	3.00%

41	\$44,328.99	\$26,903.67	\$17,425.32	\$767,710.87	\$6,943,222.45
42	\$44,328.99	\$26,970.93	\$17,358.06	\$785,068.93	\$6,916,251.52
43	\$44,328.99	\$27,038.36	\$17,290.63	\$802,359.56	\$6,889,213.16
44	\$44,328.99	\$27,105.95	\$17,223.03	\$819,582.59	\$6,862,107.20
45	\$44,328.99	\$27,173.72	\$17,155.27	\$836,737.86	\$6,834,933.49
46	\$44,328.99	\$27,241.65	\$17,087.33	\$853,825.19	\$6,807,691.83
47	\$44,328.99	\$27,309.76	\$17,019.23	\$870,844.42	\$6,780,382.08
48	\$44,328.99	\$27,378.03	\$16,950.96	\$887,795.38	\$6,753,004.05
49	\$44,328.99	\$27,446.48	\$16,882.51	\$904,677.89	\$6,725,557.57
50	\$44,328.99	\$27,515.09	\$16,813.89	\$921,491.78	\$6,698,042.48
51	\$44,328.99	\$27,583.88	\$16,745.11	\$938,236.89	\$6,670,458.60
52	\$44,328.99	\$27,652.84	\$16,676.15	\$954,913.03	\$6,642,805.76
53	\$44,328.99	\$27,721.97	\$16,607.01	\$971,520.05	\$6,615,083.79
54	\$44,328.99	\$27,791.28	\$16,537.71	\$988,057.76	\$6,587,292.51
55	\$44,328.99	\$27,860.75	\$16,468.23	\$1,004,525.99	\$6,559,431.76
56	\$44,328.99	\$27,930.41	\$16,398.58	\$1,020,924.57	\$6,531,501.35
57	\$44,328.99	\$28,000.23	\$16,328.75	\$1,037,253.32	\$6,503,501.12
58	\$44,328.99	\$28,070.23	\$16,258.75	\$1,053,512.07	\$6,475,430.89
59	\$44,328.99	\$28,140.41	\$16,188.58	\$1,069,700.65	\$6,447,290.48
60	\$44,328.99	\$28,210.76	\$16,118.23	\$1,085,818.88	\$6,419,079.72
61	\$44,328.99	\$28,281.29	\$16,047.70	\$1,101,866.58	\$6,390,798.43
62	\$44,328.99	\$28,351.99	\$15,977.00	\$1,117,843.57	\$6,362,446.44
63	\$44,328.99	\$28,422.87	\$15,906.12	\$1,133,749.69	\$6,334,023.57
64	\$44,328.99	\$28,493.93	\$15,835.06	\$1,149,584.75	\$6,305,529.64
65	\$44,328.99	\$28,565.16	\$15,763.82	\$1,165,348.57	\$6,276,964.48
66	\$44,328.99	\$28,636.57	\$15,692.41	\$1,181,040.98	\$6,248,327.91
67	\$44,328.99	\$28,708.17	\$15,620.82	\$1,196,661.80	\$6,219,619.74
68	\$44,328.99	\$28,779.94	\$15,549.05	\$1,212,210.85	\$6,190,839.80
69	\$44,328.99	\$28,851.89	\$15,477.10	\$1,227,687.95	\$6,161,987.92
70	\$44,328.99	\$28,924.02	\$15,404.97	\$1,243,092.92	\$6,133,063.90
71	\$44,328.99	\$28,996.33	\$15,332.66	\$1,258,425.58	\$6,104,067.57
72	\$44,328.99	\$29,068.82	\$15,260.17	\$1,273,685.75	\$6,074,998.76
73	\$44,328.99	\$29,141.49	\$15,187.50	\$1,288,873.25	\$6,045,857.27
74	\$44,328.99	\$29,214.34	\$15,114.64	\$1,303,987.89	\$6,016,642.93
75	\$44,328.99	\$29,287.38	\$15,041.61	\$1,319,029.50	\$5,987,355.55
76	\$44,328.99	\$29,360.60	\$14,968.39	\$1,333,997.89	\$5,957,994.95
77	\$44,328.99	\$29,434.00	\$14,894.99	\$1,348,892.87	\$5,928,560.95
78	\$44,328.99	\$29,507.58	\$14,821.40	\$1,363,714.28	\$5,899,053.37
79	\$44,328.99	\$29,581.35	\$14,747.63	\$1,378,461.91	\$5,869,472.01
80	\$44,328.99	\$29,655.31	\$14,673.68	\$1,393,135.59	\$5,839,816.71
81	\$44,328.99	\$29,729.44	\$14,599.54	\$1,407,735.13	\$5,810,087.26

Loan Amortization Table

Priority 2 Capital Cost:	\$7,993,000
Loan Period (Years):	20
Annual Interest Rate:	3.00%

82	\$44,328.99	\$29,803.77	\$14,525.22	\$1,422,260.35	\$5,780,283.50
83	\$44,328.99	\$29,878.28	\$14,450.71	\$1,436,711.06	\$5,750,405.22
84	\$44,328.99	\$29,952.97	\$14,376.01	\$1,451,087.07	\$5,720,452.25
85	\$44,328.99	\$30,027.86	\$14,301.13	\$1,465,388.20	\$5,690,424.39
86	\$44,328.99	\$30,102.93	\$14,226.06	\$1,479,614.26	\$5,660,321.47
87	\$44,328.99	\$30,178.18	\$14,150.80	\$1,493,765.07	\$5,630,143.28
88	\$44,328.99	\$30,253.63	\$14,075.36	\$1,507,840.42	\$5,599,889.66
89	\$44,328.99	\$30,329.26	\$13,999.72	\$1,521,840.15	\$5,569,560.39
90	\$44,328.99	\$30,405.09	\$13,923.90	\$1,535,764.05	\$5,539,155.31
91	\$44,328.99	\$30,481.10	\$13,847.89	\$1,549,611.94	\$5,508,674.21
92	\$44,328.99	\$30,557.30	\$13,771.69	\$1,563,383.62	\$5,478,116.91
93	\$44,328.99	\$30,633.69	\$13,695.29	\$1,577,078.91	\$5,447,483.22
94	\$44,328.99	\$30,710.28	\$13,618.71	\$1,590,697.62	\$5,416,772.94
95	\$44,328.99	\$30,787.05	\$13,541.93	\$1,604,239.56	\$5,385,985.89
96	\$44,328.99	\$30,864.02	\$13,464.96	\$1,617,704.52	\$5,355,121.86
97	\$44,328.99	\$30,941.18	\$13,387.80	\$1,631,092.32	\$5,324,180.68
98	\$44,328.99	\$31,018.53	\$13,310.45	\$1,644,402.78	\$5,293,162.15
99	\$44,328.99	\$31,096.08	\$13,232.91	\$1,657,635.68	\$5,262,066.07
100	\$44,328.99	\$31,173.82	\$13,155.17	\$1,670,790.85	\$5,230,892.25
101	\$44,328.99	\$31,251.76	\$13,077.23	\$1,683,868.08	\$5,199,640.49
102	\$44,328.99	\$31,329.88	\$12,999.10	\$1,696,867.18	\$5,168,310.61
103	\$44,328.99	\$31,408.21	\$12,920.78	\$1,709,787.96	\$5,136,902.40
104	\$44,328.99	\$31,486.73	\$12,842.26	\$1,722,630.21	\$5,105,415.67
105	\$44,328.99	\$31,565.45	\$12,763.54	\$1,735,393.75	\$5,073,850.22
106	\$44,328.99	\$31,644.36	\$12,684.63	\$1,748,078.38	\$5,042,205.86
107	\$44,328.99	\$31,723.47	\$12,605.51	\$1,760,683.89	\$5,010,482.39
108	\$44,328.99	\$31,802.78	\$12,526.21	\$1,773,210.10	\$4,978,679.61
109	\$44,328.99	\$31,882.29	\$12,446.70	\$1,785,656.80	\$4,946,797.32
110	\$44,328.99	\$31,961.99	\$12,366.99	\$1,798,023.79	\$4,914,835.33
111	\$44,328.99	\$32,041.90	\$12,287.09	\$1,810,310.88	\$4,882,793.43
112	\$44,328.99	\$32,122.00	\$12,206.98	\$1,822,517.86	\$4,850,671.43
113	\$44,328.99	\$32,202.31	\$12,126.68	\$1,834,644.54	\$4,818,469.12
114	\$44,328.99	\$32,282.81	\$12,046.17	\$1,846,690.71	\$4,786,186.31
115	\$44,328.99	\$32,363.52	\$11,965.47	\$1,858,656.18	\$4,753,822.79
116	\$44,328.99	\$32,444.43	\$11,884.56	\$1,870,540.73	\$4,721,378.36
117	\$44,328.99	\$32,525.54	\$11,803.45	\$1,882,344.18	\$4,688,852.82
118	\$44,328.99	\$32,606.85	\$11,722.13	\$1,894,066.31	\$4,656,245.97
119	\$44,328.99	\$32,688.37	\$11,640.61	\$1,905,706.93	\$4,623,557.59
120	\$44,328.99	\$32,770.09	\$11,558.89	\$1,917,265.82	\$4,590,787.50
121	\$44,328.99	\$32,852.02	\$11,476.97	\$1,928,742.79	\$4,557,935.48
122	\$44,328.99	\$32,934.15	\$11,394.84	\$1,940,137.63	\$4,525,001.34

Loan Amortization Table

Priority 2 Capital Cost:	\$7,993,000
Loan Period (Years):	20
Annual Interest Rate:	3.00%

123	\$44,328.99	\$33,016.48	\$11,312.50	\$1,951,450.13	\$4,491,984.86
124	\$44,328.99	\$33,099.02	\$11,229.96	\$1,962,680.09	\$4,458,885.83
125	\$44,328.99	\$33,181.77	\$11,147.21	\$1,973,827.31	\$4,425,704.06
126	\$44,328.99	\$33,264.73	\$11,064.26	\$1,984,891.57	\$4,392,439.33
127	\$44,328.99	\$33,347.89	\$10,981.10	\$1,995,872.67	\$4,359,091.45
128	\$44,328.99	\$33,431.26	\$10,897.73	\$2,006,770.40	\$4,325,660.19
129	\$44,328.99	\$33,514.84	\$10,814.15	\$2,017,584.55	\$4,292,145.35
130	\$44,328.99	\$33,598.62	\$10,730.36	\$2,028,314.91	\$4,258,546.73
131	\$44,328.99	\$33,682.62	\$10,646.37	\$2,038,961.28	\$4,224,864.11
132	\$44,328.99	\$33,766.83	\$10,562.16	\$2,049,523.44	\$4,191,097.29
133	\$44,328.99	\$33,851.24	\$10,477.74	\$2,060,001.18	\$4,157,246.04
134	\$44,328.99	\$33,935.87	\$10,393.12	\$2,070,394.30	\$4,123,310.17
135	\$44,328.99	\$34,020.71	\$10,308.28	\$2,080,702.57	\$4,089,289.46
136	\$44,328.99	\$34,105.76	\$10,223.22	\$2,090,925.79	\$4,055,183.70
137	\$44,328.99	\$34,191.03	\$10,137.96	\$2,101,063.75	\$4,020,992.67
138	\$44,328.99	\$34,276.50	\$10,052.48	\$2,111,116.24	\$3,986,716.17
139	\$44,328.99	\$34,362.20	\$9,966.79	\$2,121,083.03	\$3,952,353.97
140	\$44,328.99	\$34,448.10	\$9,880.88	\$2,130,963.91	\$3,917,905.87
141	\$44,328.99	\$34,534.22	\$9,794.76	\$2,140,758.68	\$3,883,371.65
142	\$44,328.99	\$34,620.56	\$9,708.43	\$2,150,467.10	\$3,848,751.09
143	\$44,328.99	\$34,707.11	\$9,621.88	\$2,160,088.98	\$3,814,043.99
144	\$44,328.99	\$34,793.88	\$9,535.11	\$2,169,624.09	\$3,779,250.11
145	\$44,328.99	\$34,880.86	\$9,448.13	\$2,179,072.22	\$3,744,369.25
146	\$44,328.99	\$34,968.06	\$9,360.92	\$2,188,433.14	\$3,709,401.19
147	\$44,328.99	\$35,055.48	\$9,273.50	\$2,197,706.64	\$3,674,345.70
148	\$44,328.99	\$35,143.12	\$9,185.86	\$2,206,892.51	\$3,639,202.58
149	\$44,328.99	\$35,230.98	\$9,098.01	\$2,215,990.51	\$3,603,971.60
150	\$44,328.99	\$35,319.06	\$9,009.93	\$2,225,000.44	\$3,568,652.54
151	\$44,328.99	\$35,407.35	\$8,921.63	\$2,233,922.07	\$3,533,245.19
152	\$44,328.99	\$35,495.87	\$8,833.11	\$2,242,755.19	\$3,497,749.32
153	\$44,328.99	\$35,584.61	\$8,744.37	\$2,251,499.56	\$3,462,164.70
154	\$44,328.99	\$35,673.57	\$8,655.41	\$2,260,154.97	\$3,426,491.13
155	\$44,328.99	\$35,762.76	\$8,566.23	\$2,268,721.20	\$3,390,728.37
156	\$44,328.99	\$35,852.17	\$8,476.82	\$2,277,198.02	\$3,354,876.21
157	\$44,328.99	\$35,941.80	\$8,387.19	\$2,285,585.21	\$3,318,934.41
158	\$44,328.99	\$36,031.65	\$8,297.34	\$2,293,882.55	\$3,282,902.76
159	\$44,328.99	\$36,121.73	\$8,207.26	\$2,302,089.81	\$3,246,781.03
160	\$44,328.99	\$36,212.03	\$8,116.95	\$2,310,206.76	\$3,210,569.00
161	\$44,328.99	\$36,302.56	\$8,026.42	\$2,318,233.18	\$3,174,266.43
162	\$44,328.99	\$36,393.32	\$7,935.67	\$2,326,168.85	\$3,137,873.11
163	\$44,328.99	\$36,484.30	\$7,844.68	\$2,334,013.53	\$3,101,388.81

Loan Amortization Table

Priority 2 Capital Cost:	\$7,993,000
Loan Period (Years):	20
Annual Interest Rate:	3.00%

164	\$44,328.99	\$36,575.51	\$7,753.47	\$2,341,767.00	\$3,064,813.30
165	\$44,328.99	\$36,666.95	\$7,662.03	\$2,349,429.03	\$3,028,146.35
166	\$44,328.99	\$36,758.62	\$7,570.37	\$2,356,999.40	\$2,991,387.72
167	\$44,328.99	\$36,850.52	\$7,478.47	\$2,364,477.87	\$2,954,537.21
168	\$44,328.99	\$36,942.64	\$7,386.34	\$2,371,864.21	\$2,917,594.57
169	\$44,328.99	\$37,035.00	\$7,293.99	\$2,379,158.20	\$2,880,559.57
170	\$44,328.99	\$37,127.59	\$7,201.40	\$2,386,359.60	\$2,843,431.98
171	\$44,328.99	\$37,220.41	\$7,108.58	\$2,393,468.18	\$2,806,211.57
172	\$44,328.99	\$37,313.46	\$7,015.53	\$2,400,483.71	\$2,768,898.12
173	\$44,328.99	\$37,406.74	\$6,922.25	\$2,407,405.95	\$2,731,491.37
174	\$44,328.99	\$37,500.26	\$6,828.73	\$2,414,234.68	\$2,693,991.12
175	\$44,328.99	\$37,594.01	\$6,734.98	\$2,420,969.66	\$2,656,397.11
176	\$44,328.99	\$37,687.99	\$6,640.99	\$2,427,610.65	\$2,618,709.12
177	\$44,328.99	\$37,782.21	\$6,546.77	\$2,434,157.42	\$2,580,926.90
178	\$44,328.99	\$37,876.67	\$6,452.32	\$2,440,609.74	\$2,543,050.23
179	\$44,328.99	\$37,971.36	\$6,357.63	\$2,446,967.37	\$2,505,078.87
180	\$44,328.99	\$38,066.29	\$6,262.70	\$2,453,230.06	\$2,467,012.58
181	\$44,328.99	\$38,161.45	\$6,167.53	\$2,459,397.60	\$2,428,851.13
182	\$44,328.99	\$38,256.86	\$6,072.13	\$2,465,469.72	\$2,390,594.27
183	\$44,328.99	\$38,352.50	\$5,976.49	\$2,471,446.21	\$2,352,241.77
184	\$44,328.99	\$38,448.38	\$5,880.60	\$2,477,326.81	\$2,313,793.39
185	\$44,328.99	\$38,544.50	\$5,784.48	\$2,483,111.30	\$2,275,248.89
186	\$44,328.99	\$38,640.86	\$5,688.12	\$2,488,799.42	\$2,236,608.02
187	\$44,328.99	\$38,737.47	\$5,591.52	\$2,494,390.94	\$2,197,870.56
188	\$44,328.99	\$38,834.31	\$5,494.68	\$2,499,885.62	\$2,159,036.25
189	\$44,328.99	\$38,931.40	\$5,397.59	\$2,505,283.21	\$2,120,104.85
190	\$44,328.99	\$39,028.72	\$5,300.26	\$2,510,583.47	\$2,081,076.13
191	\$44,328.99	\$39,126.30	\$5,202.69	\$2,515,786.16	\$2,041,949.83
192	\$44,328.99	\$39,224.11	\$5,104.87	\$2,520,891.03	\$2,002,725.72
193	\$44,328.99	\$39,322.17	\$5,006.81	\$2,525,897.85	\$1,963,403.55
194	\$44,328.99	\$39,420.48	\$4,908.51	\$2,530,806.36	\$1,923,983.07
195	\$44,328.99	\$39,519.03	\$4,809.96	\$2,535,616.31	\$1,884,464.04
196	\$44,328.99	\$39,617.83	\$4,711.16	\$2,540,327.47	\$1,844,846.22
197	\$44,328.99	\$39,716.87	\$4,612.12	\$2,544,939.59	\$1,805,129.35
198	\$44,328.99	\$39,816.16	\$4,512.82	\$2,549,452.41	\$1,765,313.19
199	\$44,328.99	\$39,915.70	\$4,413.28	\$2,553,865.70	\$1,725,397.48
200	\$44,328.99	\$40,015.49	\$4,313.49	\$2,558,179.19	\$1,685,381.99
201	\$44,328.99	\$40,115.53	\$4,213.45	\$2,562,392.64	\$1,645,266.46
202	\$44,328.99	\$40,215.82	\$4,113.17	\$2,566,505.81	\$1,605,050.64
203	\$44,328.99	\$40,316.36	\$4,012.63	\$2,570,518.44	\$1,564,734.28
204	\$44,328.99	\$40,417.15	\$3,911.84	\$2,574,430.27	\$1,524,317.13

Loan Amortization Table

Priority 2 Capital Cost:	\$7,993,000
Loan Period (Years):	20
Annual Interest Rate:	3.00%

205	\$44,328.99	\$40,518.19	\$3,810.79	\$2,578,241.07	\$1,483,798.94
206	\$44,328.99	\$40,619.49	\$3,709.50	\$2,581,950.56	\$1,443,179.45
207	\$44,328.99	\$40,721.04	\$3,607.95	\$2,585,558.51	\$1,402,458.41
208	\$44,328.99	\$40,822.84	\$3,506.15	\$2,589,064.66	\$1,361,635.57
209	\$44,328.99	\$40,924.90	\$3,404.09	\$2,592,468.75	\$1,320,710.67
210	\$44,328.99	\$41,027.21	\$3,301.78	\$2,595,770.52	\$1,279,683.46
211	\$44,328.99	\$41,129.78	\$3,199.21	\$2,598,969.73	\$1,238,553.69
212	\$44,328.99	\$41,232.60	\$3,096.38	\$2,602,066.12	\$1,197,321.09
213	\$44,328.99	\$41,335.68	\$2,993.30	\$2,605,059.42	\$1,155,985.40
214	\$44,328.99	\$41,439.02	\$2,889.96	\$2,607,949.38	\$1,114,546.38
215	\$44,328.99	\$41,542.62	\$2,786.37	\$2,610,735.75	\$1,073,003.76
216	\$44,328.99	\$41,646.48	\$2,682.51	\$2,613,418.26	\$1,031,357.28
217	\$44,328.99	\$41,750.59	\$2,578.39	\$2,615,996.65	\$989,606.69
218	\$44,328.99	\$41,854.97	\$2,474.02	\$2,618,470.67	\$947,751.72
219	\$44,328.99	\$41,959.61	\$2,369.38	\$2,620,840.05	\$905,792.11
220	\$44,328.99	\$42,064.51	\$2,264.48	\$2,623,104.53	\$863,727.61
221	\$44,328.99	\$42,169.67	\$2,159.32	\$2,625,263.85	\$821,557.94
222	\$44,328.99	\$42,275.09	\$2,053.89	\$2,627,317.74	\$779,282.85
223	\$44,328.99	\$42,380.78	\$1,948.21	\$2,629,265.95	\$736,902.07
224	\$44,328.99	\$42,486.73	\$1,842.26	\$2,631,108.20	\$694,415.34
225	\$44,328.99	\$42,592.95	\$1,736.04	\$2,632,844.24	\$651,822.39
226	\$44,328.99	\$42,699.43	\$1,629.56	\$2,634,473.80	\$609,122.96
227	\$44,328.99	\$42,806.18	\$1,522.81	\$2,635,996.61	\$566,316.78
228	\$44,328.99	\$42,913.19	\$1,415.79	\$2,637,412.40	\$523,403.59
229	\$44,328.99	\$43,020.48	\$1,308.51	\$2,638,720.91	\$480,383.11
230	\$44,328.99	\$43,128.03	\$1,200.96	\$2,639,921.86	\$437,255.08
231	\$44,328.99	\$43,235.85	\$1,093.14	\$2,641,015.00	\$394,019.24
232	\$44,328.99	\$43,343.94	\$985.05	\$2,642,000.05	\$350,675.30
233	\$44,328.99	\$43,452.30	\$876.69	\$2,642,876.74	\$307,223.00
234	\$44,328.99	\$43,560.93	\$768.06	\$2,643,644.80	\$263,662.07
235	\$44,328.99	\$43,669.83	\$659.16	\$2,644,303.95	\$219,992.24
236	\$44,328.99	\$43,779.01	\$549.98	\$2,644,853.93	\$176,213.24
237	\$44,328.99	\$43,888.45	\$440.53	\$2,645,294.46	\$132,324.78
238	\$44,328.99	\$43,998.17	\$330.81	\$2,645,625.28	\$88,326.61
239	\$44,328.99	\$44,108.17	\$220.82	\$2,645,846.09	\$44,218.44
240	\$44,328.99	\$44,218.44	\$110.55	\$2,645,956.64	\$0.00