

WASHOE COUNTY, NEVADA
SEWER ASSESSMENT DISTRICT NO. 9

SOUTH TRUCKEE MEADOWS
WASTEWATER TREATMENT PLANT

DRAFT

EFFLUENT MANAGEMENT PLAN



BLACK & VEATCH
PROGRESS BY DESIGN

1991

B&V Project 16908.300

Contents

1.0 Introduction and Background	1-1
Background	1-1
Purpose	1-1
Report Organization	1-3
South Truckee Meadows Wastewater Treatment Plant	1-3
2.0 Regulatory Requirements	2-1
Nevada Division of Environmental Protection (NDEP)	2-1
Current Discharge Requirements	2-1
Reuse Guidelines	2-3
3.0 Effluent Management Plan	3-1
Plot Plan	3-1
Irrigation Agreement	3-1
Storage Ponds	3-1
Effluent Transfer	3-3
Flow Measuring	3-4
Crops	3-4
Irrigation Scheduling	3-4
Runoff Prevention	3-7
Aerosol Drift Prevention	3-7
Emergency Procedures	3-7
Monitoring Requirements	3-8
Public Notification	3-9
Record Keeping	3-9
4.0 Treatment Alternatives	4-1
Existing Facilities	4-1
Treatment Levels	4-1
Secondary Treatment (Level 1)	4-2
Disinfection (Level 2)	4-2
Direct Filtration (Level 3)	4-5
Tertiary Treatment (Level 4)	4-7
5.0 Initial Reuse Facilities	5-1
Storage Reservoir	5-1
Water Balance	5-3



Contents (Continued)

CDB Treatment Facility and Land Application Site	5-3
Previous Studies	5-10
Climate	5-10
Groundwater	5-13
Soils	5-13
Crop	5-13
Topography	5-14
Irrigation System	5-14
Storage	5-15
Capacity Analysis	5-15
6.0 Future Reuse Opportunities	6-1
General Considerations For Reuse Options	6-1
Future Reuse Opportunities	6-1
Golf Course Irrigation	6-3
Crop Irrigation	6-3
Open and Wetlands Area Irrigation	6-4
Site Reuse Capacities	6-4
7.0 Preliminary Conveyance Facilities	7-1
Expansion Schedule	7-1
Conveyance Facilities	7-1
Preliminary Conveyance Facilities Cost Opinion	7-3

Appendix A Discharge Permit

Appendix B Effluent Reuse Guidelines

Contents (Continued)

List of Tables

Table 1-1	South Truckee Meadows Wastewater Treatment Plant . .	1-8
	Design Criteria	
Table 2-1	Discharge Permit Effluent Limitations	2-2
Table 2-2	Effluent Reuse Guidelines	2-4
Table 3-1	CDB Pond Capacity	3-3
Table 3-2	Preliminary Irrigation Schedule	3-6
Table 4-1	Treatment Levels and Processes	4-2
Table 4-2	Facilities Required for Each 1.5 MGD of Capacity at . .	4-9
	Required Treatment Levels	
Table 5-1	Reservoir Water Balance @ 0.75 MGD Plant Capacity .	5-5
Table 5-2	Reservoir Water Balance @ 1.5 MGD Plant Capacity . .	5-6
Table 5-3	Reservoir Water Balance @ 3.0 MGD Plant Capacity . .	5-7
Table 5-4	Reservoir Water Balance @ 4.5 MGD Plant Capacity . .	5-8
Table 5-5	Reservoir Water Balance @ 6.0 MGD Plant Capacity . .	5-9
Table 5-6	Reservoir Water Balance Summary	5-10
Table 5-7	Meteorological Data for the CDB Site	5-12
Table 5-8	CDB Pond Capacity	5-15
Table 5-9	CDB Land Application Site Water Balance	5-17
Table 5-10	Water Balance @ CDB Agronomic Capacity	5-19
Table 6-1	Potential Future Reuse Sites and Capacity	6-5
Table 7-1	Schedule of Expansion for STM Wastewater	7-2
Table 7-2	Conveyance System Mainline Sizes	7-5
Table 7-3	Conveyance System Lateral Sizes	7-6
Table 7-4	Site Elevations	7-7
Table 7-5	Preliminary Opinion of Pipeline Costs	7-8
Table 7-6	Conveyance Facilities Cost Summary	7-9

Contents (Continued)

List of Figures

Figure 1-1	County Sewer Assessment District No. 9	1-2
Figure 1-2	STMWWTP Site Location	1-5
Figure 1-3	STMWWTP Layout	1-6
Figure 1-4	STMWWTP Process Schematic	1-7
Figure 3-1	CDB Irrigation Site Plot Plan	3-2
Figure 4-1	STMWWTP Effluent Management Plan	4-3
	Level 1 - No Disinfection	
Figure 4-2	STMWWTP Effluent Management Plan	4-4
	Level 2 - Disinfection	
Figure 4-3	STMWWTP Effluent Management Plan	4-6
	Level 3 - Direct Filtration	
Figure 4-4	STMWWTP Effluent Management Plan	4-8
	Level 4 - Full Treatment	
Figure 5-1	Reservoir Storage Capacity Curves	5-2
Figure 5-2	CDB Irrigation Site Layout	5-4
Figure 6-1	Potential Reuse Sites	6-2
Figure 7-1	Preliminary Conveyance Facilities	7-4

1.0 Introduction and Background

This section presents the background, purpose, and study methodology for this plan, and a description of the South Truckee Meadows Wastewater Treatment Plant.

Background

In early 1991, Washoe County intends to start operation of the South Truckee Meadows Wastewater Treatment Plant. The initial 0.75 million gallons per day (mgd) capacity phase of the plant will provide wastewater treatment service to existing and new developments in the County's Sewer Assessment District No. 9 (SAD 9). As shown on Figure 1-1, SAD 9 is located south of the City of Reno, generally northwest of the intersection of U.S. Highway 395 and Nevada Highway 341. The County intends to reuse treated wastewater from the treatment plant for irrigation at various sites in or near SAD 9.

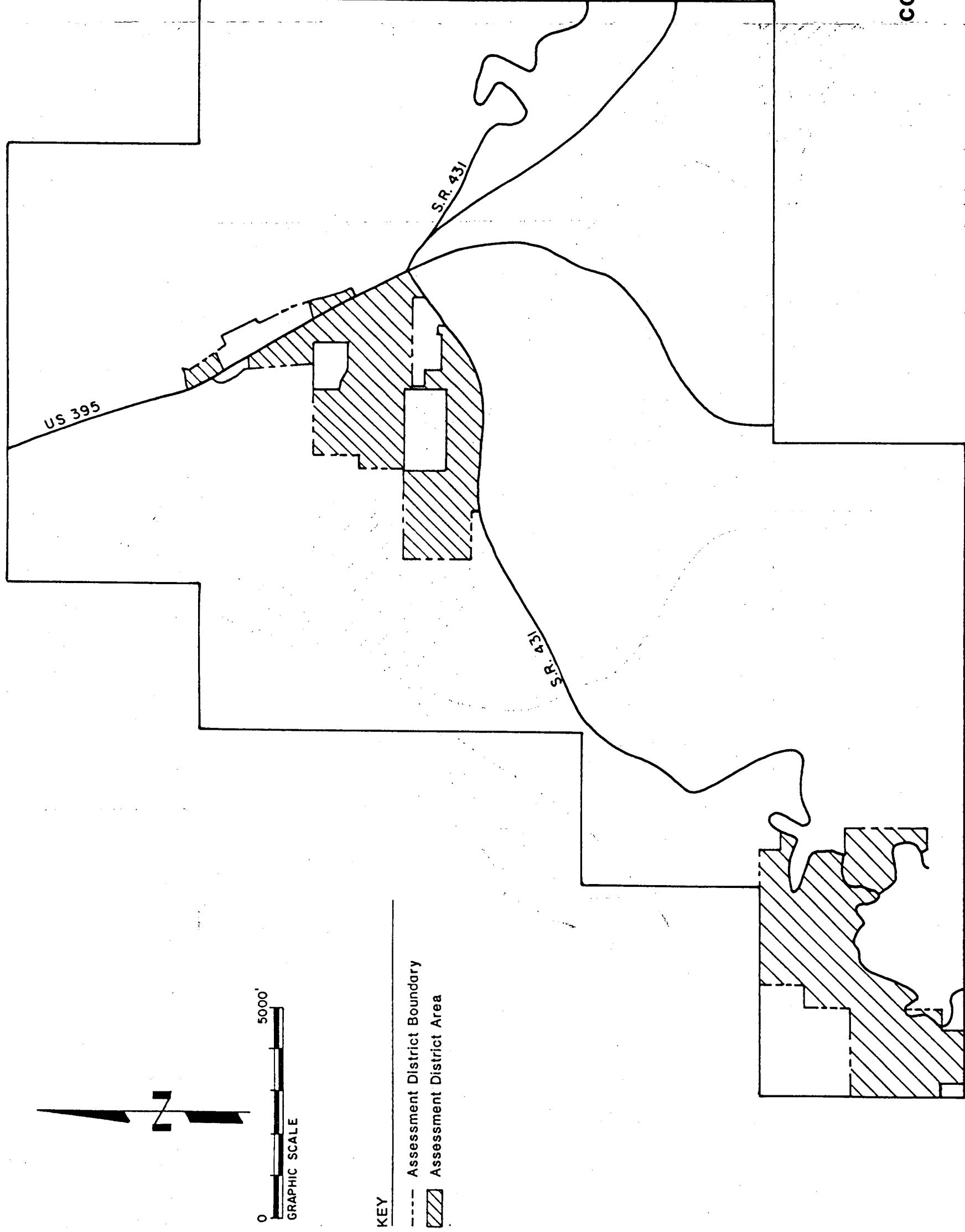
Washoe County has received a discharge permit for the treatment plant from the Nevada Division of Environmental Protection (NDEP). The permit allows the County, after making additional improvements at the treatment plant and irrigation site, to discharge up to 1.5 mgd of treated wastewater (effluent) to groundwater under the County's CDB irrigation site. It also requires the County to prepare and receive NDEP approval of an effluent management plan prior to starting operation of the plant.

Since water is a critical resource for Nevada in general, the County has adopted a policy toward beneficial reuse of treated wastewater, particularly for uses which will enhance groundwater recharge within the service area.

Purpose

The purpose of this plan is to accomplish the following objectives:

- Document guidelines for management of effluent from the South Truckee Meadows Wastewater Treatment Plant, in order to comply with the NPDES permit.
- Investigate the reuse capacity of the existing CDB irrigation site.
- Present treatment facility improvements necessary to meet effluent limitations for reuse alternatives.
- Identify future reuse opportunities.



COUNTY SEWER ASSESSMENT
DISTRICT NO. 9

- Develop preliminary capital improvements to distribute effluent to potential reuse sites.

Report Organization

This report is organized in the following sections:

- **Section 1 - Introduction and Background.** Discusses the background, purpose and report organization. Also describes the South Truckee Meadows Wastewater Treatment Plant.
- **Section 2 - Effluent Management Plan.** Presents management guidelines for handling and reuse of the plant effluent.
- **Section 3 - Regulatory Requirements.** Summarizes the discharge limitations established by the NPDES permit and Nevada Department of Environmental Protection effluent reuse guidelines.
- **Section 4 - Treatment Alternatives.** Discusses treatment facilities required to meet various treatment levels required by NDEP reuse guidelines.
- **Section 5 - Current Reuse Facilities.** Describes the current effluent handling facilities, including the storage reservoir currently under construction, as well as the pumping, conveyance, and application facilities. Investigates the capacity of the CDB land application site.
- **Section 6 - Future Reuse Opportunities.** Discusses additional reuse opportunities, including additional irrigation sites and their capacity. Presents preliminary capital improvements and associated costs for conveying effluent to these sites. Estimates the capacity of the sites.
- **Appendix A - Includes the current NPDES permit for the South Truckee Meadows Wastewater Treatment Plant.**
- **Appendix B - Contains the effluent draft reuse guidelines prepared by the Nevada Department of Environmental Protection.**

South Truckee Meadows Wastewater Treatment Plant

The South Truckee Meadows Wastewater Treatment Plant is located on County-owned property on the north boundary of the Double Diamond Ranch south of the Huffaker Hills as indicated on Figure 1-2. The plant has the following major facilities: headworks, oxidation ditch with intrachannel clarifier, chlorine contact basin, effluent pump station, administration building, blower and generator building,

sludge drying beds, and associated piping. The general layout and process schematic for the treatment plant are shown on Figures 1-3 and 1-4.

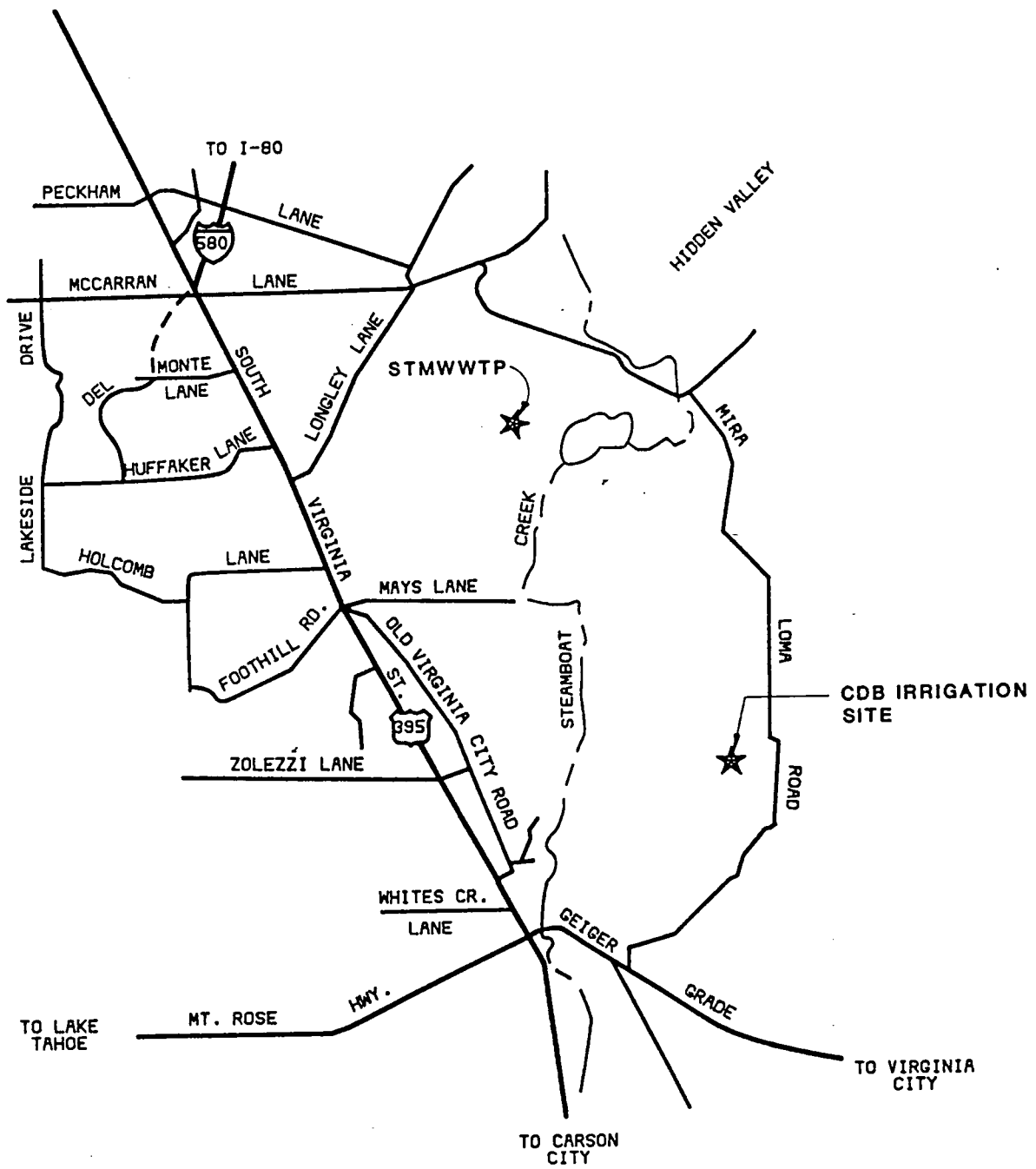
The treatment plant is sized for a liquid treatment capacity of 1.5 mgd and a solids treatment capacity of 0.75 mgd. Raw wastewater is conveyed to the plant through a 36-inch diameter interceptor. The headworks includes influent pumping using enclosed screw pumps, Parshall flume metering, screening, and influent distribution. Provisions have been made for future installation of grit removal facilities.

The oxidation ditch and intrachannel (boat) clarifier are designed to produce treated wastewater having characteristics of 30 milligrams per liter (mg/L) BOD, 30 mg/L suspended solids, and less than 10 mg/L total nitrogen. The ditch is designed for both carbonaceous BOD and nitrogen removal using biological processes, and uses extended aeration for up to 0.75 mgd of solids treatment. Oxygen is supplied to the process using centrifugal blowers connected to a coarse bubble diffusion aeration system.

After chlorination, effluent may be pumped to either the effluent storage reservoir north of the treatment plant or south to CDB using vertical column pumps. Piping to the reservoir includes two parallel 24-inch pipes to allow simultaneous inflow and outflow from the reservoir.

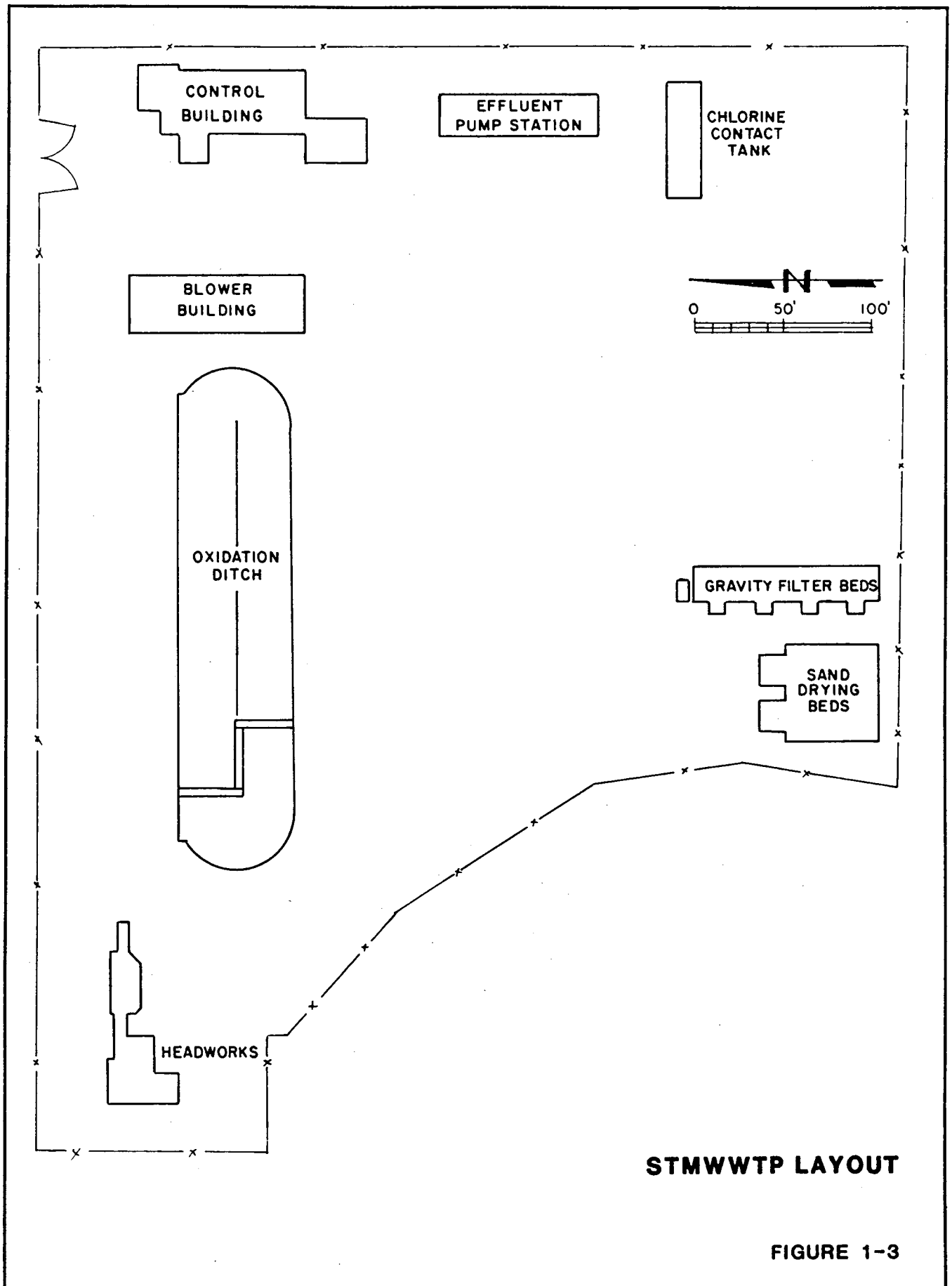
Sludge can be wasted directly from the clarifier, conditioned with polymer, and applied to the sludge beds. The normal-use sludge beds utilize a plastic filter media for drying, while two sand beds are provided for scum drying and standby sludge drying capacity. Sludge will be removed from the beds and hauled to landfill.

Design criteria for the treatment plant are summarized in Table 1-1.



STMWWTP LOCATION

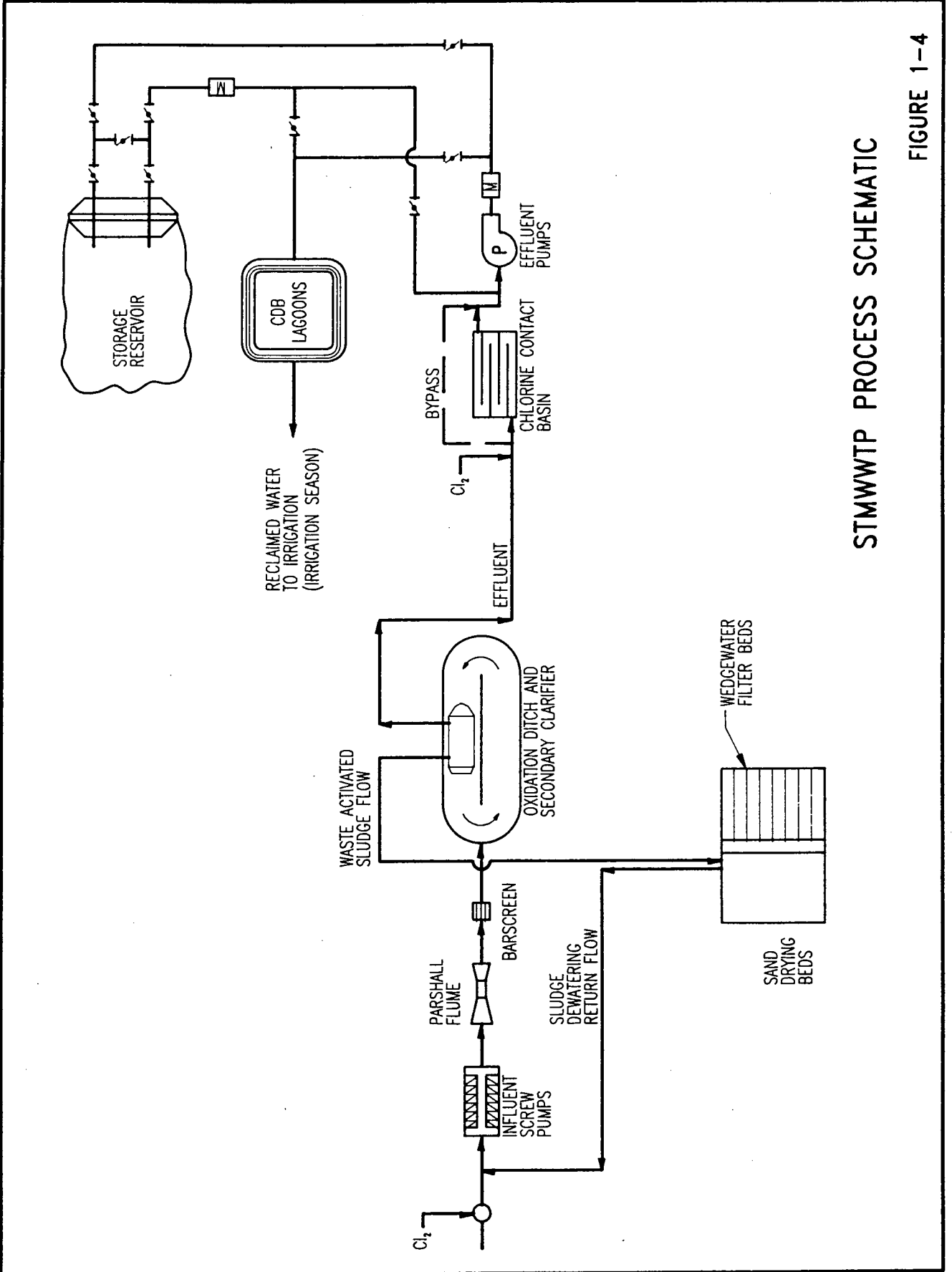
FIGURE 1-2



STMWWTP LAYOUT

FIGURE 1-3





STMWWTP PROCESS SCHEMATIC



Table 1-1
South Truckee Meadows Wastewater Treatment Plant
Design Criteria

	<u>Initial Phase</u>	<u>Second Phase</u>	<u>Ultimate</u>
<u>Wastewater Characteristics</u>			
Flow			
Annual average, mgd	0.75	1.5	6.0
Peak wet weather, mgd		4.5	16.0
Biochemical oxygen demand (BOD)			
Annual average, mg/L		205	
Maximum month, mg/L		265	
Suspended Solids			
Annual average, mg/L		215	
Maximum month,		280	
Ammonia Nitrogen			
Annual average, mg/L		25	
Waste Activated Sludge			
Annual average, mg/L	1,040	2,300	9,200
Maximum month, ppd	1,400	2,970	11,880
<u>Effluent Limitations</u>			
Biochemical oxygen demand, mg/L	30	30	30
Suspended solids, mg/L	30	30	30
Total nitrogen, mg/L	<10	<10	<10
<u>Facilities</u>			
Influent Pumps			
Number		2	4
Capacity, each, gpm		3,750	
Mechanical Screen	1	1	2

Table 1-1 (Continued)
South Truckee Meadows Wastewater Treatment Plant
Design Criteria

	<u>Initial Phase</u>	<u>Second Phase</u>	<u>Ultimate</u>
Oxidation Ditch			
Number		1	4
Volume, total x 1,000 cubic feet	212	212	848
Sidewater depth, feet		14	
Submersible Mixers			
Number		3	312
Intrachannel Clarifier			
Number		1	4
Surface overflow rate			
Annual average flow, gpd/ft ²		715	715
Centrifugal Compressors			
Number			
@ 1,450 scfm	2	2	
@ 2,850 scfm	1	2	
@ 4,280 scfm			5
Chlorine Contact Tank			
Volume x 1,000 cubic feet		10.5	*
Detention time			
@ annual average flow, min		75	*
@ peak wet weather flow, min		25	*
Effluent Pumps			
Number			
@ 1,040 gpm, each		4	
@ 2,780 gpm, each			5

Table 1-1 (Continued)
South Truckee Meadows Wastewater Treatment Plant
Design Criteria

	<u>Initial Phase</u>	<u>Second Phase</u>	<u>Ultimate</u>
Solids Dewatering System			
Filter beds			
Number	4		*
Area, total, sq ft	2,500		*
Solids loading			
WAS, pounds/cycle/sq ft	2		*
Cycle per week	2		*
Sand beds			
Number	2		*
Area, total, sq ft	2,500		*

* To be determined based on future treatment requirements.

2.0 Regulatory Requirements

To protect and preserve surface and groundwater quality, federal and state regulations have been established to govern disposal and reuse of treated municipal wastewaters to the environment. This plan must provide for management of South Truckee Meadows' effluent in compliance with appropriate regulations. This section reviews existing regulatory requirements governing discharge and reuse, and establishes standards for development of effluent reuse alternatives for the existing and expanded wastewater treatment plant.

Nevada Division of Environmental Protection (NDEP)

Under authority assigned by the United States Environmental Protection Agency (EPA), wastewater treatment and effluent discharge operations in Nevada are regulated by the Division of Environmental Protection (NDEP) of the Nevada Department of Conservation and Natural Resources. NDEP authorizes and establishes requirements for effluent discharge under the guidelines of the National Pollution Discharge Elimination System (NPDES) promulgated by the United States Environmental Protection Agency (EPA).

Current Discharge Requirements

The discharge requirements for the South Truckee Meadows Wastewater Treatment Plant are delineated in NPDES Permit Number NEV40024, which expires on September 8, 1994. A copy of the permit is included in Appendix A. The permit authorizes Washoe County to discharge treated effluent to the groundwaters of Nevada at the CDB treatment ponds and irrigation site located on the Damonte Ranch.

The NPDES permit establishes specific requirements depending on the type of discharge covered. Regulations require that the permit be renewed after every five-year period or prior to placing expanded facilities into operation. Of primary importance to this plan are the treatment levels to be achieved prior to discharge. For clarity, these limitations are summarized in Table 2-1 below.



Table 2-1
Discharge Permit Effluent Limitations

Effluent Characteristic Monitored	Limits	Limits	Monitoring Requirements	
	30-Day Avg Conc.(MG/L)	Daily Max Conc.(MG/L)	Sample Frequency	Sample Type
Flow (influent)	1.5 mgd**	-	Continuous	Composite
Flow (effluent)	1.5 mgd**	-	Continuous	Composite
BOD (5-day)	30	45	1/week	Composite
Suspended Solid	30	45	1/week	Composite
Total P	-	-	1/month	Composite
TDS	-	-	Quarterly	Composite
Chlorine Residual	-	-	1/month	Discrete
Fecal Coliform	200/100ml	400/100ml	1/month	Discrete
Ammonia Nitrogen	-	-	1/month	Composite
Nitrates	-	-	1/month	Composite
Dissolved Oxygen	-	-	1/month	Discrete
ph	Not less than 6 SU nor greater than 9 SU		1/month	Discrete
Arsenic	-	-	Quarterly	Composite
Boron	-	-	Quarterly	Composite

** The flow shall be limited to 0.2 mgd, the existing approved disposal capacity of the irrigation site adjacent to the CDB ponds until plans and specifications from additional disposal capacity are approved and constructed; the flow shall be limited to 0.3 mgd, the existing capacity of the CDB holding ponds, until plans and specifications for additional storage capacity are approved and constructed. The CDB holding ponds must be renovated for storage of effluent from the South Truckee Meadows plant before the 0.3 mgd flow is permitted; the flow shall be limited to 0.75 mgd until additional sludge stabilization facilities, sludge dewatering facilities, blower capacity (to meet standby requirements), and effluent disposal/storage capacity correspond to a flow of 1.5 mgd.



The following additional permit requirements are critical to this plan:

- There shall be no objectionable odors generated in the collection system, at the treatment plant or land application site.
- The treatment facility must be operated by a Nevada Class III operator.
- There shall be no runoff from the irrigation site and no standing water for prolonged periods.

Reuse Guidelines

During 1989, NDEP issued guidelines for the reuse of treated wastewater. These guidelines establish detailed requirements for treatment and application of effluent for reuse, and, in conjunction with the NDPES permit, will control reuse discharges for all facilities in the State of Nevada. A copy of these guidelines is included in Appendix B (at the time of this report, these guidelines are still in draft form). The critical guidelines affecting this plan are summarized below and in Table 2-2.

Some key general requirements include the following:

- Wastewater effluent for reuse must be treated to at least a secondary level.
- A discharge permit must be obtained before work on reuse equipment and treatment can be done.
- Irrigation of food crops for human consumption with wastewater effluent is not permitted.
- Public access to areas irrigated with effluent must be controlled.
- For spray irrigation a suitable buffer zone must be established in order to prevent a health hazard to the public.
- Effluent storage reservoir requirements must be met.

Normal means of effluent reuse include irrigation, industrial or commercial process water, or impoundment. Effluent quality guidelines are established for fecal coliform content, turbidity (N.T.U.), and buffer zones as indicated in Table 2-2 below.



Table 2-2
Effluent Reuse Guidelines

<u>Irrigation Method</u>	<u>Fecal Coliform (c.f.u./100ml)</u>		N.T.U.
	<u>30-Day Mean</u>	<u>Max Value</u>	<u>Max Value</u>
Spray Irrigation			
A. Pasture, Forage, Fiber Seed Crops, and Greenbelt			
1. Buffer Zone $\geq 800'$	-	-	-
2. Buffer Zone $\geq 400'$	200	400	-
3. Buffer Zone $\geq 100'$	23	240	5
4. Buffer Zone = 0	2.2	23	3
B. Landscape at Golf Courses, Cemeteries			
1. Buffer Zone $\geq 100'$	23	240	5
2. Buffer Zone = 0	2.2	23	3
3. Buffer Zone = 0	2.2 (Total Col.)	23	2
C. Landscape at Highway Islands, Medians, Lawns			
1. Buffer Zone = 0	2.2	23	3
2. Buffer Zone = 0	2.2 (Total Col.)	23	2
Surface Irrigation			
A. Pasture, Forage, Fiber, and Seed Crops			
	-	-	-
B. Unrestricted Public Access Areas			
	200	400	-
Industrial or Commercial Reuse			
A. No aerosols	200	400	-
B. Aerosols	200	400	-
Impoundments			
A. Recreational	23	240	5
B. Landscape	2.2	23	3
C. Unrestricted Recreational	2.2	23	2

Appendix B may be referenced for a full presentation of the reuse guidelines.

Discussions with NDEP indicate that the fecal coliform limits shall be the governing standard for determining treatment requirements for reuse. The NTU limits are not intended to be limiting, but may be used by the operator as another sampling parameter to determine level of disinfection. Some studies have shown a correlation between the fecal coliform and NTU limits shown in Table 2-2. Thus, the operator may include NTU analysis in his overall sampling program as another indication of disinfection level.

NDEP also indicates that fecal coliform sampling at the treatment plant, instead of the reuse site, is acceptable under the present guidelines. However, the operator may want to sample coliform levels after storage to ensure that there is no additional coliform growth in the reservoir.

3.0 Effluent Management Plan

This section establishes requirements for the operation of the irrigation site in accordance with the NPDES discharge permit and NDEP effluent management guidelines.

Plot Plan

Figure 3-1 is the plot plan of the irrigation site. It indicates the locations of storage ponds, irrigation pump station, spray irrigation fields, sprinkler header lines, groundwater monitoring wells, and the buffer zone along Mira Loma Road. Effluent is pumped from STMWWTP through a 24-inch force main along the east side of the Double Diamond Ranch and a 12-inch force main across the Damonte Ranch into Pond 3 at CDB.

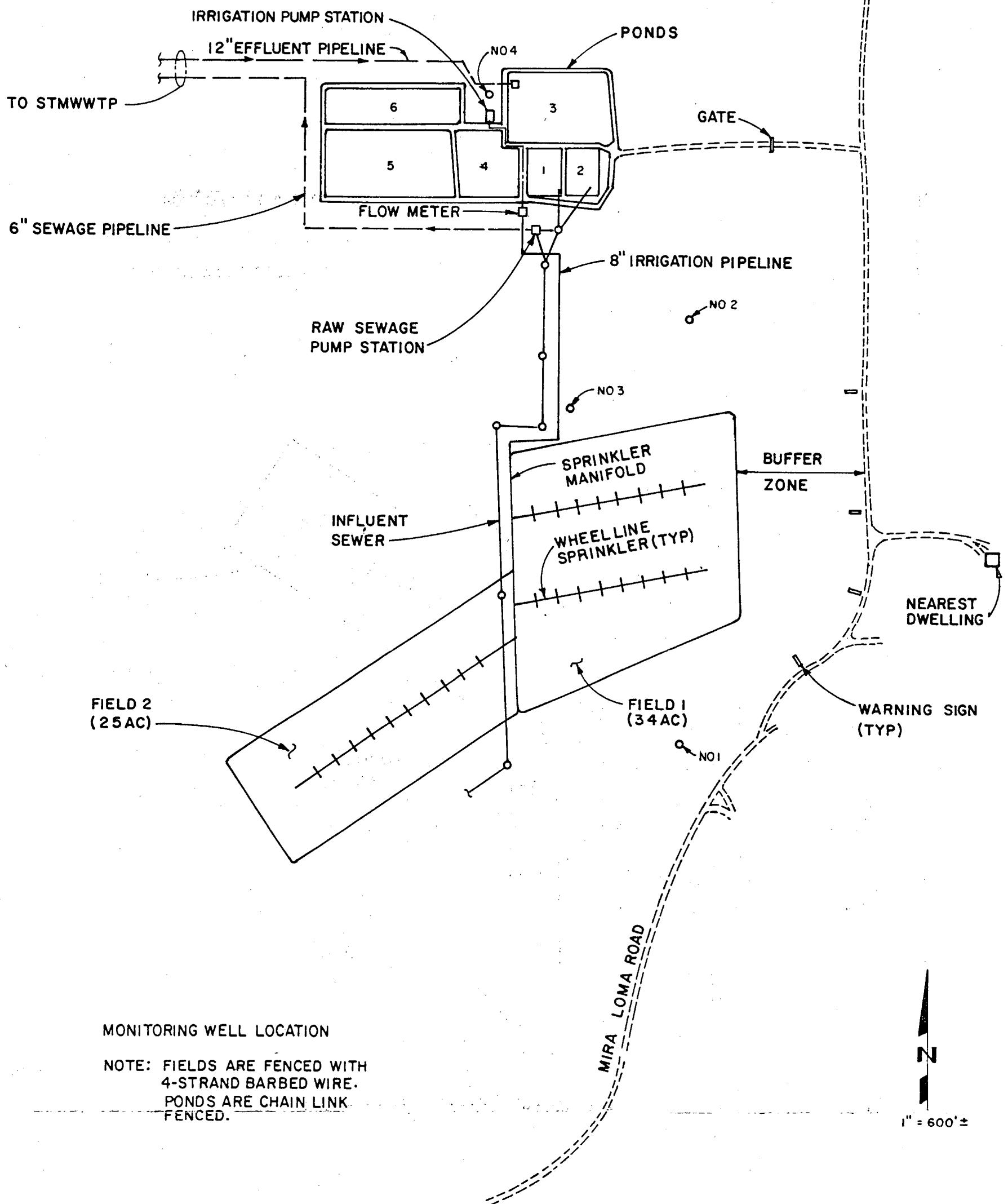
Irrigation Agreements

Irrigation operations shall be in accordance with two governing agreements. The lease agreement between Washoe County and the property owner is dated May 18, 1987. It sets forth the rights and the responsibilities of Washoe County and the property owner with respect to the use of the property and the management of effluent. The CDB plant is operated by SPB Utilities under an agreement with Washoe County dated December 1, 1984. This agreement establishes responsibility for monitoring of the irrigation system. Copies of both agreements are included at the end of this plan.

Storage Ponds

During normal operation CDB will have 5 ponds available for storage of effluent; these ponds are numbered 2 through 6 on the plot plan. Pond 1 will be reserved and isolated for emergency storage of raw wastewater which may overflow in the event of failure of the sewage pumping station. The capacity of Ponds 2 through 6 with 3 feet of freeboard is about 128 acre-feet. Pond capacities are summarized in Table 3-1.





**CDB IRRIGATION
SITE PLOT PLAN**

FIGURE 3-1

Figure 3-1

Table 3-1
CDB Pond Capacity

Pond <u>No.</u>	Surface <u>Area</u> (acres)	<u>Volume</u> (acre-feet)
1	1.3	8.6
2	1.3	8.6
3	5.4	42.6
4	4.2	13.0
5	7.3	42.7
6	<u>4.2</u>	<u>21.2</u>
Total	23.7	136.7

Six transfer manholes permit effluent to flow among ponds. The manholes have receptacles which receive standpipes of varying lengths. By using stand pipes of appropriate length in proper receptacles, the ponds can be operated in the following manner:

1. Pond levels can be raised or lowered.
2. All ponds except Pond 4 can be bypassed.
3. Flows can be equalized or split into two or more ponds simultaneously.
4. Effluent can be directed into the irrigation pump station.

Each transfer manhole is equipped with a 6-foot long Stevens staff gauge which permits SPB to record pond depths.

Effluent Transfer

SPB Utilities will control the transfer of effluent from the STMWWTP to the CDB storage ponds. The farm operator will operate the irrigation pump station and wheel line spray system at CDB. During the irrigation season, SPB shall pump all



plant effluent to the CDB ponds. Transfer structures in the ponds shall remain open during normal operation to allow effluent to flow automatically between ponds and utilize all storage capacity. Should the ponds become full (reach 3 feet of freeboard), the farm operator shall notify SPB, who shall monitor pond filling and divert flow to the effluent storage reservoir at the treatment plant if necessary.

During the off-irrigation season, SPB shall pump effluent to the CDB ponds until they are full to a safe freeboard level. From then on, effluent shall be pumped to the effluent storage reservoir at the treatment plant.

Flow Measuring

Water pumped to irrigation is measured by a propeller meter in the 8-inch pipeline from the irrigation pump station to the irrigation headers in the fields. Total flow measured by the meter will be recorded weekly by SPB.

Crops

Under the lease agreement, the farm operator is restricted from growing crops which "are not compatible with the County's Discharge Permit." It is anticipated that the farm operator will continue with cropping patterns similar to past years, which have been mainly alfalfa with some oat hay. These crops are compatible with the discharge permit. If the farm operator intends to grow other crops, he shall notify the County of his intent to do so at least 60 days prior to the start of the growing season. In no case shall crops to be consumed by humans be grown and irrigated with effluent.

Irrigation Scheduling

Irrigation scheduling involves determining the depth of water applied per irrigation and the frequency with which to apply it. The depth of water applied during an irrigation event depends on the available water capacity (AWC) of the soil in the root zone of the plant and the management-allowed deficit of water in the root zone before irrigation. The AWC varies primarily as a function of soil texture. The AWC for various soils can be found in *Reclaimed Municipal Wastewater, A Guidance Manual*, published by the State of California Water Resources Control Board. The following calculations on irrigation scheduling are based on the methods used in this guidance manual.

Conditions at CDB

1. Effective rooting depth = 3 feet for alfalfa.
2. AWC of sandy clay loam = 1.95 inches/foot.
3. Management allowed deficit (MAD) = 40 percent of available root zone.
4. Leaching requirement = 15 percent.
5. Application efficiency = 85 percent.

Calculations

1. Determine total available water in root zone.
$$\begin{aligned}\text{TAW} &= (\text{AWC})(\text{Depth of root zone}) \\ &= (1.95''/\text{ft})(3 \text{ ft}) \\ &= 5.85 \text{ inches}\end{aligned}$$
2. Calculate the net depth of applied water.
$$\begin{aligned}\text{Dnet} &= (\text{TAW})(\text{MAD}/100) \\ &= (5.85'')(40/100) \\ &= 2.34 \text{ inches}\end{aligned}$$
3. Determine depth of water applied during one irrigation:
$$\begin{aligned}\text{D} &= (\text{Dnet} + (\text{Dnet})(\text{LR}/100))/\text{Efficiency}/100 \\ &= 3.17 \text{ inches}\end{aligned}$$

The depth applied during one irrigation should not change a great deal during the irrigation season. Instead, the irrigation frequency will vary as the weather conditions (evapotranspiration rates) change. The CDB site has peak evapotranspiration rates in the month of August (0.28 inches/day) and minimum rates in April (0.1 inches/day). The maximum and minimum times between irrigations are calculated by the following methods:

$$\begin{aligned}\text{Min time} &= (\text{Dnet}/\text{ETpeak})(\text{Peak factor})(\text{Factor for downtime}) \\ &= (2.34''/(0.28''/\text{day})(1.2))(1.00, \text{No downtime because of backup flood irrigation system}) \\ &= 7 \text{ days} \\ \text{Max time} &= (\text{Dnet}/\text{ETmin})(\text{Factor for downtime}) \\ &= (2.34''/0.1''/\text{day})(1.00) \\ &= 23 \text{ days}\end{aligned}$$



It is evident that as conditions change at the CDB site, so will the application frequency. The application period, on the other hand, should not change significantly unless application rates are modified. The Thunderbird wheel line spray system in current use supplies 0.24 inches of effluent per hour. Therefore, an adequate application period would be 13 hours.

$$\begin{aligned}\text{Application period} &= (3.17 \text{ inches}/0.24 \text{ inches/hour}) \\ &= 13 \text{ hours}\end{aligned}$$

A preliminary monthly irrigation schedule based on evapotranspiration rates and the net depth of effluent applied per irrigation is shown in Table 3-2.

Table 3-2
Preliminary Irrigation Schedule

<u>Month</u>	<u>Amount/ Application (inches)</u>	<u>Period (hours)</u>	<u>Frequency (days)</u>
April	3.17	13	23
May	3.17	13	10
June	3.17	13	10
July	3.17	13	9
August	3.17	13	7
September	3.17	13	13
October	3.17	13	22

It is important to note that application frequency and duration are variable and will be governed by crop conditions, antecedent weather conditions, field moisture, and time of the year. Over the last few years at the CDB site, the Thunderbird system was normally operated on 12-hour sets that were repeated every 12 to 20 days. The preceding analysis indicates that 13-hour sets repeated every 7 to 23 days will be required and should be used as a guideline. The farm operator will have

to determine the exact set time and frequency through continuous monitoring of field conditions.

Runoff Prevention

The farm operator shall not over-irrigate so as to cause any runoff or prolonged standing effluent in the fields. The County will spot check during irrigation operations to ensure this requirement is met. During the irrigation season, should SPB Utilities detect groundwater levels in either of Monitoring Wells 1, 2, and 3 to be above 5 feet below grade, they shall notify the farm operator. In this event, the farm operator shall more closely monitor his irrigation operations to ensure that runoff and standing effluent conditions are avoided. The farm operator shall not irrigate during times when the soil is frozen.

Aerosol Drift Prevention

Excessive wind will cause drift of aerosol from spray heads and disrupt irrigation spray patterns. To minimize health hazards which might arise from drift of effluent aerosol, a buffer zone has been established between the irrigation area and the nearest residence along Mira Loma Road to the east. If crop requirements will allow, irrigation operations will normally be suspended during periods of excessive winds to minimize aerosol drift and uneven irrigation. However, should crop irrigation be necessary despite wind conditions, the farm operator may irrigate; however, during this time he will closely monitor his operations to ensure that aerosols are not carried beyond the Mira Loma Road buffer zone to the east.

Emergency Procedures

In the event of a spray system or storage pond failure, the farm operator shall immediately contact Washoe County and SPB Utilities. SPB shall assess the situation, determine appropriate corrective measures, and recommend a corrective plan of action to the County. The plan shall include appropriate measures to ensure that effluent is not discharged in violation of the discharge permit. Should an unauthorized discharge occur due to conditions beyond the control of the County, the County shall notify NDEP of the circumstances leading to the discharge and corrective measures being taken.



The farm operator shall also coordinate with SPB during times of crop harvesting to ensure that additional attention is given to monitoring fill levels in the storage ponds.

Monitoring Requirements

Monitoring requirements shall be in accordance with the discharge permit. Effluent sampling requirements required by the permit will be performed at the STMWWTP prior to discharge to the effluent storage reservoir, the CDB ponds, or the irrigation site. Monitoring requirements at the irrigation site are covered in Parts I.A.11-13 of the permit and are restated below.

- "11. The permittee shall establish groundwater monitoring wells at the land application site and other sites as required by the Division. The number and location must be submitted for review and approval 90 days after permit issuance or completion of the approved site, whichever occurs first.
 - a. A minimum of four (4) samples must be taken from each monitoring well prior to commencement of the discharge to establish background levels.
 - b. The monitoring wells must be monitored monthly with a discrete sample for Total Phosphorous, Nitrates and Chlorides, and submitted in accordance with Item I.C.2 of this permit.
12. Staff gauges shall be installed in all effluent storage facilities 90 days after permit issuance or after completion of construction, whichever occurs first. A weekly measurement of freeboard depths shall be taken and submitted in accordance with Part I.C.2 of the permit.
13. Any effluent reuse shall be reported to the Division on the Discharge Monitoring Report Form in accordance with Part I.C.2 of the permit. This report shall contain the name of the effluent user, the quality of the wastewater delivered, the date(s) it was taken, the measured gallons used, and all other monitoring required by the approved effluent management plan. The permittee is responsible for



instructing the users of the limited application hazards involved when using this effluent. The effluent management plan must be submitted with the Operation and Maintenance Manual for review and approval. Modifications and/or additions to the facilities must be incorporated into this manual within 90 days of the modification or change. Any deviation from the approved plan will be considered a violation of this permit."

Public Notification

The County notified the public of its intent to irrigate with wastewater effluent at the CDB site during the processing of its County special use permit which was approved on March 24, 1987. In addition, as indicated on the plot plan, signs are posted along Mira Loma Road adjacent to the irrigate site warning the public that effluent is being used for irrigation.

Record Keeping

SPB will develop all records relating to monitoring of effluent reuse at the CDB irrigation site in accordance with the discharge permit. Copies will be submitted to the Washoe County Utility Division for filing. Monthly, SPB will complete a Discharge Monitoring Report Form and submit it to the County. The County will review the form and submit it to NDEP by the 28th of each month in accordance with the requirements of the discharge permit.

AGREEMENT 1

**WASHOE COUNTY APPLICATION SITE
LEASE AGREEMENT**

DISCHARGE SITE LEASE

THIS LEASE is made this 18th day of May, 1987, by and between TICOR TITLE INSURANCE COMPANY, a California corporation (hereinafter "Lessor"), and WASHOE COUNTY, NEVADA, a political subdivision of the State of Nevada (hereinafter the "County").

RECITALS

A. WHEREAS, Lessor hold title, pursuant to a Holding Agreement, to that certain parcel of real property located within Washoe County, Nevada, and more fully described in Exhibit "A" attached hereto and incorporated herein by reference (hereinafter "Discharge Site"); and

B. WHEREAS, County has acquired and taken possession of and is operating a wastewater treatment facility on land in the vicinity of the Discharge Site; and

C. WHEREAS, County intends to operate said wastewater treatment facility for an undetermined period of time and to use it and to expand it to certain adjacent land and further intends to establish a new wastewater treatment facility nearby and to utilize the Discharge Site for the discharge of the treated wastewater from both facilities; and

D. WHEREAS, under the terms and conditions set forth in the following lease, the parties desire to enter

into the relationship of landlord and tenant with respect to the Discharge Site.

AGREEMENTS

NOW, THEREFORE, the parties agree as follows:

1. The Discharge Site.

The Discharge Site consists of approximately 245.51 acres in Washoe County, Nevada, and is more fully described in Exhibit "A" attached hereto and incorporated herein by reference.

2. Term.

Unless earlier terminated in accordance with Section 9 hereof, this Lease and the rights of County and Lessor hereunder shall remain in effect so long as County discharges treated wastewater from the C.D.B. Sewer Treatment Facility ("C.D.B. Facility") acquired by County concurrently herewith or from the proposed Southeast Truckee Meadows Subregional Treatment Facility ("Proposed Facility") to be constructed by County, but in all events shall terminate on February 28, 2005.

3. Rent.

The County shall pay to the Lessor the sum of ONE HUNDRED DOLLARS (\$100.00) on September 1 (or if such day is a legal holiday in Reno, Nevada, then on the next succeeding business day) each year during the term of this Lease.

4. Taxes.

Lessor shall pay all real property taxes levied and assessed upon the Discharge Site based on its agricultural use. Any real property and personal property taxes resulting from the County's use of the property as a discharge site and any special assessments levied on the real property shall be paid by County.

5. Use of the Discharge Site.

During the term of this Lease, the County shall use the Discharge Site solely for the purpose of discharging treated wastewater. County shall be allowed to construct and maintain all facilities needed to utilize the Discharge Site as provided herein; provided, however, any such facilities and the maintenance thereof shall not interfere unduly with the agricultural use of the Discharge Site. Lessor retains the right to all other uses of the Discharge Site and the proceeds from all such other uses. Lessor shall have the right to change the use of the Discharge Site from the current agricultural use in accordance with the further terms hereof. Lessor agrees that Lessor or its tenants, successors or assigns shall cooperate reasonably with the County to assist the County to make discharges with reasonable frequency and shall not grow any crops that are not compatible with the County's Discharge Permit. The County shall discharge treated wastewater on the Discharge

Site in accordance with and in compliance with all applicable laws, permits, rules, regulations and requirements of all local, state and federal governmental agencies so as to allow the continued use of the Discharge Site for agricultural purposes.

6. Indemnity.

The County shall indemnify and hold harmless the Lessor against and from all claims, demands, expenses or other liabilities arising from the use by the County of the Discharge Site. If any claim is asserted against the Lessor in respect thereof, the Lessor shall promptly notify the County of the assertion of such claim and permit the County to defend such claim, in its own name or in the name of the Lessor, as may be appropriate in the judgment of the County, and the County shall be solely liable for the costs of such defense, including attorneys' fees, and shall have the sole right to control the defense of the claim. The County shall have no obligation to indemnify the Lessor against any claim which, as a result of the failure of the Lessor to give the County such notice, has become absolute and not subject to defense or which, as a result of the lapse of time between the assertion of such claim against the Lessor and the communication of notice of such claim to the County, becomes impossible to defend due to the loss or destruction of

evidence in the ordinary course of the operation of the County's affairs during such period.

7. Notices.

Any notice provided for herein or which any party desires to give in connection with this Agreement or the tenancy contemplated by this Agreement shall be mailed, addressed as follows:

To the County: Washoe County, Nevada
P. O. Box 11130
Reno, Nevada 89520
Attention: Chief Sanitary
Engineer

With a copy to: The District Attorney
Washoe County, Nevada
P. O. Box 11130
Reno, Nevada 89520

To the Lessor: Ticor Title Insurance Company
c/o Mr. Louis Damonte
13000 Sage Hill Road
Reno, Nevada 89511

With a copy to: Leo P. Bergin, Esq.
McDonald, Carano, Wilson,
Bergin, Frankovich & Hicks
P. O. Box 2670
Reno, Nevada 89505

Mailed notices shall be deemed received on the third business day following the date shown on the postmark on the United States Postal Service's receipt for the same if such notice is delivered, properly addressed, with first class and certified or registered mail charges prepaid to the United States Postal Service.

8. Treatment of Effluent, Change of Use and Relocation of Discharge Site.

A. The Discharge Site is presently in agricultural use and the County agrees that any effluent discharged or applied to the Discharge Site shall be treated to a sufficient quality and chemical composition so that no detriment should occur to the agricultural crops presently growing on the Discharge Site.

B. Lessor or its successor and assigns shall have the right at any time to propose a change in use, including a change in the type of crop grown, of the Discharge Site. If the proposed change in use requires an amendment to the existing Discharge Permit issued by the Nevada Department of Environmental Protection, County agrees to cooperate with Lessor and diligently to exercise its best efforts to obtain an amended Discharge Permit allowing the continued discharge of treated wastewater on the Discharge Site notwithstanding the alternative use, provided that any change of crops shall be only to a crop or crops which provide appropriate nutrient removal efficiencies on the Discharge Site, the Alternate Site or an expanded Discharge Site. Upon issuance of the amended Discharge Permit, the Lessor may change its use of the Discharge Site. County acknowledges that such an amendment to the Discharge Permit may require a higher and more expensive level of treatment,

and County agrees, at its own cost, to implement and achieve such higher treatment level, if achievement of that treatment level is within the design capacity of the Proposed Facility.

C. Lessor or its successors and assigns shall have the right at any time, at its sole option, to have the Disposal Site relocated to a suitable alternate land application site ("Alternate Discharge Site"). County shall cooperate with the Lessor to permit it to designate the Alternate Discharge Site on which County may discharge treated wastewater so long as the Lessor, without additional cost to County, (i) provides the Alternative Discharge Site to County, (ii) provides easements or other interests in land to County sufficient to provide a legally available location for necessary facilities to transport treated wastewater from the then existing wastewater treatment facility to the Alternate Discharge Site, and (iii) constructs and installs such facilities within such lands or interests in lands, together with such pumping stations and related equipment as may be necessary or appropriate to so transport treated wastewater, all in accordance with the County's specifications and its applicable ordinances. Upon compliance with the foregoing, the County shall release the Discharge Site to Lessor and the Alternate Discharge Site

thereafter shall be treated for all purposes as the Discharge Site hereunder.

D. If the Alternate Discharge Site is intended for use as a golf course, the County agrees, at its own expense, to apply for a Discharge Permit which will allow County to discharge treated wastewater on the Alternate Discharge Site for use to irrigate a golf course, and County shall diligently exercise its best efforts to secure such a Discharge Permit. County acknowledges that such a Discharge Permit will require a higher and more expensive level of treatment of the wastewater prior to discharge, and County agrees, at its own cost, to implement and achieve such higher treatment level, so long as such level is within the design capacity of the Proposed Facility. The County represents that the County's design specifications for the Proposed Facility are such that use of treated wastewater to irrigate a golf course is within the design capacity of the Proposed Facility, based on present regulations of the Nevada Department of Environmental Protection and the federal Environmental Protection Agency.

9. Lessor's Right to Effluent.

A. For the period described at Subsection D below, Lessor shall have the right to use all treated wastewater produced by the County at the C.D.B. Facility or the Proposed Facility up to 750,000 gallons per day and County

agrees to provide to Lessor all treated wastewater from County's operation of the C.D.B. Facility or the Proposed Facility, up to 750,000 gallons per day, all of which shall be discharged on the Discharge Site or the Alternate Discharge Site.

B. Notwithstanding the fact that County is or may become the owner of secondary water rights to all treated wastewater discharged from the Proposed Facility, Lessor and County agree that, if during the period described at Subsection D below County requires an expanded or additional discharge sites for the disposal of treated wastewater in quantities exceeding 750,000 gallons per day, resulting from the construction or expansion of the Proposed Facility, Lessor shall cooperate with the County to expand the Discharge Site by adding additional lands thereto in reasonable proximity to the Discharge Site (or such Alternate Discharge Site as then may be in use) sufficient to accept the additional treated wastewater. Such additional lands as may be so added shall become part of the Discharge Site (or such Alternate Discharge Site as then may be in use) and may be referred to as the "Expanded Discharge Site." The Expanded Discharge Site shall thereafter be governed by this Agreement, including the rental payment provision, except to the extent this Agreement is specifically modified at the time. Lessor shall be under no duty

to provide additional lands as an Expanded Discharge Site and the County shall not be restricted from exercising its right of eminent domain to secure additional lands for such use from Lessor or from others.

C. The County shall not impose any charge or fee upon Lessor for the wastewater furnished to Lessor in accordance with Subsections A or B above during the period specified at Subsection D.

D. The period during which the Lessor has the exclusive right to receive and use, without charge, the treated wastewater generated by the County's C.D.B. Facility and its Proposed Facility up to 750,000 gallons per day (in accordance with Subsection A above) and the option to accept, also without charge, all additional flows of treated wastewater generated by such facilities or an expansion thereof (in accordance with Subsections A and B above) shall commence on the date hereof (or such earlier date as the County took possession of the C.D.B. Facility) and shall terminate, unless extended as provided below, on the later to occur of (i) February 28, 1995 or (ii) one year following the date the County gives notice to Lessor (in accordance with Section 8 hereof) that the County has received a bona fide offer from a third party to accept and pay a fee for the use of all or a portion of the treated wastewater then generated by the County. The County shall specify in its

notice to Lessor (a) the portion, if less than all, of the treated wastewater generated by the County which such person is willing to accept and (b) the fee or charge and all terms regarding its payment which such person is willing to pay. Within 90 days following the date Lessor is deemed to receive the County's notice in accordance with Section 8 hereof, Lessor shall notify the County if Lessor desires to extend the period of its right to receive the portion of the treated wastewater specified in the County's notice, which extension shall be purchased by Lessor by entering into an amendment to this Agreement under the terms of which Lessor agrees to pay for such treated wastewater the fee specified by the County in the County's notice given to the Lessor, such fee to be payable for the period beginning one year after the date the County's notice is deemed given and ending one year after the County again delivers such a notice. If the Lessor fails to so notify the County, the County may enter into an agreement to provide treated wastewater to such other person beginning one year following the date the County's notice to Lessor was deemed given, but only on the terms and conditions and in the amount specified in such notice. The purpose of this Subsection D is to provide Lessor with the option to purchase treated wastewater from the County at the same price any other person is willing to pay therefor at such time as other persons seek

the use of such water, so long as at least ten years have elapsed following the date hereof; and to assure the County that it will receive the value of such treated wastewater either from Lessor or from such other person should such water have a value after such period has elapsed.

10. Miscellaneous.

A. This Lease shall be binding upon and shall inure to the benefit of the parties and their respective successors and assigns.

B. Unless the Lessor delivers to the County a Notice of Lease in form satisfactory to record the same on the land records of Washoe County, Nevada, in such fashion as to give notice of the existence and term of this Lease, the County shall have the right to record the full text of this Lease on such records.

C. This Lease represents the entire agreement of the parties with respect to the tenancy of County on the Discharge Site for the term or extended term specified herein and all discussions, prior writings, negotiations or other communications with respect thereto are merged herein. This Lease may be amended only by a writing properly authorized and executed by both parties.

D. This Lease shall be governed by Nevada law.

E. No waiver by either party of a breach by the other of its obligations or duties under this Lease or any of them shall be deemed a waiver of any subsequent breach by such party whether of the same or of a different duty or obligation, nor shall any forbearance by either party in seeking a remedy for any breach be deemed to be a waiver by the party so forbearing of its rights and remedies in respect to that or any other breach.

F. The captions or headings in this Lease are for the convenience of the parties in locating the provisions hereof and shall not control or affect in any way the meaning or construction of any provision hereof.

G. This Lease may be executed and delivered in several counterparts, each of which shall be deemed an original, but all of which, taken together, shall be a single agreement. In establishing the execution, delivery or terms of this Agreement, it shall be necessary to account only for such number of counterparts as have been, collectively, executed by each of the parties hereto.

H. Each schedule or exhibit appended to this Lease and referred to in the text hereof shall be deemed incorporated herein as if set forth in full text at each such reference.

I. In the event that there is any dispute regarding this Lease which results in the commencement of

legal proceedings, the prevailing party shall be entitled to receive all costs of such litigation, including reasonable attorneys' fees.

LESSOR:

TICOR TITLE INSURANCE
COMPANY

COUNTY:

WASHOE COUNTY, NEVADA

By Dennis George
Its ASST VICE PRESIDENT

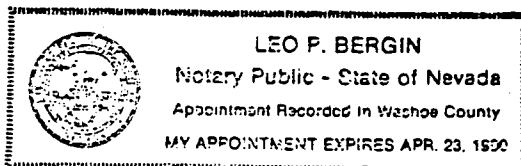
By [Signature]
Chairman, Board of
County Commissioners

ATTEST:

[Signature]
County Clerk

STATE OF NEVADA)
 : SS.
COUNTY OF WASHOE)

On this 15 day of May, 1987,
personally appeared before me, a Notary Public, Dennis
George, the ASST VICE PRESIDENT
of TICOR TITLE INSURANCE COMPANY, a California corporation,
who acknowledged that he executed the foregoing instrument.

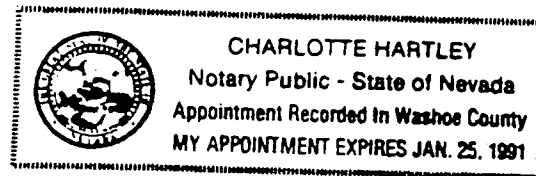


[Signature]
Notary Public

STATE OF NEVADA)
 : SS.
COUNTY OF WASHOE)

On this 15th day of April, 1987,
personally appeared before me, a Notary Public, Bob Williams,
the Chairman of the BOARD OF
COUNTY COMMISSIONERS of WASHOE COUNTY, NEVADA, a political
subdivision of the STATE OF NEVADA, who acknowledged that he
executed the foregoing instrument.

Charlotte Hartley
Notary Public



C2/05:nz

EXHIBIT "A"

A parcel described more particularly as follows:

Commencing at the Southeast corner of said Section 15; the point of beginning; thence Southerly along the section line common to Sections 22 and 23, 1097.52 feet more or less; thence South $79^{\circ}04'40''$ West 979.60 feet; thence South $61^{\circ}21'11''$ West 3980.50 feet; thence North $25^{\circ}23'20''$ West 684.52 feet; thence South $63^{\circ}39'30''$ West 560.38 feet to a point on the section line common to Sections 21 and 22; thence Northerly along the section line common to Sections 21 and 22, 2644.03 feet more or less to the section corner common to Sections 15, 16, 21 and 22; thence Easterly along the section line common to Sections 15 and 22 to the section corner common to Sections 14, 15, 22 and 23 and the point of beginning.

Together with the necessary 20.00 foot wide easements for the purpose of constructing force mains, irrigation pipes, berms, ditches, tail water collection and pump systems, and necessary appurtenances as shown on a set of plans entitled "Temporary Improvements for Wastewater Treatment Plan Expansion C.D.B. Services, Inc." prepared by SEA Inc., Engineers and Planners, dated May 1981.

AGREEMENT 2

CDB OPERATIONS AGREEMENT

11. SCOPE OF SERVICES

1 SPB represents to the County by the execution of the agreement
2 that it is qualified in all respects to perform the services that it herein
3 agrees to perform. SPB will utilize its knowledge and experience to maintain
4 and operate the County's Sewerage Facilities so that the effluent discharged
5 therefrom meets the requirements of all governmental regulatory agencies,
6 particularly including, but not limited to those under NPDES Permit No.
7 NY80007, within the limits of the operating capability of the Sewerage
8 System, provided that all times the plant influent does not contain
9 abnormal and biologically toxic substances that cannot be treated or removed
10 in the Sewerage System using the existing process and facilities and provided
11 that the Sewerage System is not rendered inoperable for any reason within
12 the control of SPB.
13

14 B. Operating processes agreed to be performed by SPB include, but
15 are not limited to, pumping, activated sludge (diffused air), and effluent
16 ponds. Maintenance activities agreed to be performed by SPB include, but
17 are not limited to, treatment plant maintenance, pump station maintenance,
18 effluent pond maintenance.

19 C. SPB will provide all necessary labor to perform the normal
20 operation and maintenance work tasks required to keep the sewer treatment
21 plant, lift station, and effluent disposal ponds in good operating condition.
22 This includes labor for repairs and parts replacement which can normally
23 be completed in the field with treatment plant operator skills. Special
24 technician or craftsment personnel required to complete other repairs will
25 be pre-authorized by the County. Costs of such pre-authorization
26 expenditures will be reimbursed by the County.

27 D. The County will furnish all existing laboratory glassware,
28 chemical and equipment for SPB's utilization at other County facilities.
29 All other supplies and tools will be maintained by SPB in good condition.

30 E. SPB will furnish the following major disciplines, supervision
31 and supplies:
32

1 Field Technician:

2	Certified Operator/Laborer (24 hours per month)	\$480.00
3	Travel - Vehicle Costs	\$ 80.00
4	Supervisory - Administration	
5	Sanitary Engineer (4 hours per month)	\$200.00
6	Compliance Testing (Includes Fecal Coli)	
7	(7.5 hours per month)	\$160.00
8	Lubricants, Oil Belts, HCI gas, gasoline	\$ 50.00
9	Monthly Contract Amount	\$970.00

10 F. The County will pay for all repairs and all parts necessary
11 for equipment repair or replacement during the term of service not provided
12 for in paragraph E above.

13 G. Inventory of equipment and documentation of routine maintenance
14 and operation will be maintained by SPB and be made available for inspection
15 to the County. SPB will submit upon request, documentation of the cost
16 effectiveness of "repair versus replace" decisions made.

17 H. Items defined as capital expenditures will not be included
18 within the scope of services and will be subject to approval and funding
19 by the County. Capital items will be defined as any new equipment and
20 facility items that significantly extend service life, that are considered
21 capital expenditure in accordance with standard accounting practices, that
22 are a non-routine type of expenditure on the annual basis and/or that are
23 pre-programmed for expenditure by the County. Normally, these capital
24 items cost more than \$200.00 each.

25 I. SPB agrees to perform other services as may be requested by
26 the County and for which appropriate compensation is agreed to by both
27 parties in advance.

28 III. CHANGE IN SERVICES

29 Any change in sewerage system operation, reporting requirements,
30 monitoring requirements, or in personnel qualifications required by any
31 governmental agency having jurisdiction to order such change may be
32 authorized by the County. In that event the parties shall mutually determine

1 the increase or decrease of costs of operations to the County as recited
2 under Article I of the Agreement.

3 IV. HOLD HARMLESS AGREEMENT

4 A. SPB heregy agrees to, and shall, hold County, its elective
5 and appointive boards, officers, agents and employees harmless from any
6 liability for damage or claims for damage for personal injury, including
7 death resulting therefrom, as well as from claims for property damage that
8 may arise from SPB's operations under this agreement, whether such operations
9 be by SPB or by any subcontractor or by any one or more persons directly
10 or indirectly employed by, or acting as agent for SPB, or any subcontractor
11 or subcontractors.

12 V. INSURANCE

13 A. SPB shall comply, during the life of this agreement, with
14 worker's compensation laws and regulations for all its employees employed
15 at the sewerage system.

16 B. The County shall maintain public liability and property
17 damage liability insurance in an amount not less than \$1,000,000.00.

18 C. The County shall maintain appropriate insurance covering
19 the physical facilities.

20 VI. RENEWAL

21 A. This agreement may be renewed for successive terms of one
22 year each as herein provided.

23 B. If SPB desires to renew this agreement, it shall give written
24 notice to the County one hundred eighty (180) days prior to the termination
25 date. If SPB's notice is conditional upon an increase in compensation,
26 it shall include a statement to that effect, together with the amount of
27 compensation in its notice, that shall also be accompanied by a written
28 justification of its requested increase, SPB shall furnish the County with
29 accounting records and other such additional information as the County may
30 request. The County shall notify SBP sixty (60) days prior to the termination
31 date of its determination to accept or reject said offer of renewal.

VII. PRICE ADJUSTMENT

A. Compensation adjustment shall be made and be effective as of the 1st of July of each year this agreement is in effect.

B. Compensation adjustments shall be made, increased or decreased, according to the following: U.S. Department of Labor, Bureau of Labor Statistics Indices, Consumer Price Index (CPI-U), and Wholesale Price Index for Industrial Chemicals (061).

The percentage increase or decrease in service compensation shall be the sum total of the weighted percentage changes in the indices using the following formula:

<u>WEIGHT</u>	<u>INDEX CHANGE</u>	<u>WEIGHTED % CHANGE</u>
0.5 x	(% Change in CPI-U)	= Wt % Change _____
0.2 x	(% Change in 061)	= Wt % Change _____
	Sum total % Change in Compensation	_____

The first increase or decrease in compensation shall be effective July 1, 1985, and shall be based on the weighted Bureau of Labor Statistics Indices as specified above between January 1, 1984 and December 31, 1984. Each subsequent increase or decrease in compensation shall be effective each July 1, and shall be based on the prior twelve (12) months changes in the indices. The percent change in compensation shall be multiplied by the previous months compensation as base to determine the amount of increase or decrease.

Any increase or decrease as calculated above may be waived if mutually agreeable.

VII. TERMINATION

A. This agreement may be terminated at any time by either party upon one hundred twenty (120) days written notice to the other party.

B. If this agreement is terminated by SPB or the County, SPB shall furnish the services necessary to continue normal operations for a period of sixty (60) days after the termination date. This sixty (60) day period will continue only, at the County's request, for the purpose of

1 continued supervision and of assisting in the placement and training
2 of water and sewerage system personnel to be furnished by the County or other
3 persons. In such event, the County shall pay to SPB, currently existing
4 compensation for such sixty (60) day period.

5 C. Upon termination by either the County or SPB, the County may
6 employ as County Employees all personnel in the employ of SPB for the
7 sewerage system.

8 IX. AMENDMENT

9 This agreement may be amended or modified only by written agreement
10 signed by both parties, and failure on the part of either party to enforce
11 any provision of the agreement shall not be construed as a waiver of the
12 right to compel enforcement of any provision.

13 X. ENTIRE AGREEMENT

14 This instrument contains the entire agreement between the parties
15 relating to the rights herein granted and the obligation herein granted and
16 the obligations herein assumed. Any oral representations or modifications
17 concerning this instrument shall be of no force or effect excepting a
18 subsequent modification in writing, signed by the party to be charged.

19 XI. PARTIAL INVALIDITY

20 If any term, provision, covenant, or condition of this agreement
21 is held by a court of competent jurisdiction to be invalid, void, or
22 unenforceable, the remainder of the provisions shall remain in full force
23 and effect and shall in no way be affected, impaired or invalidated.

24 If any legal action is necessary to enforce the terms of this
25 agreement, the prevailing party shall be entitled to reasonable attorney's
26 fees in addition to any other relief to which it may be entitled.

27 XIII. NOTICES

28 All notices shall be in writing and delivered in person or
29 transmitted by certified mail, return receipt, postage prepaid.

30 All notices required to be given to SPB shall be addressed as
31 follows:

32 SPB Utility Services, Inc.

1 1242 Glendale Avenue

2 Sparks, Nevada 89431

3 Notices required to be given to the County shall be addressed as
4 follows:

5 Washoe County Public Works Department

6 Utility Division

7 P.O. Box 11130

8 Reno, Nevada 89520

9 or such other addresses as may be specified by written notice by
10 either party to the other.

11 IN WITNESS WHEREOF, the parties hereto have caused their appropriate
12 governing bodies to execute this agreement.

13 WASHOE COUNTY, NEVADA

14
15 By Belie Williams
16 BELIE WILLIAMS, Chairman
Board of County Commissioners

17 ATTEST:

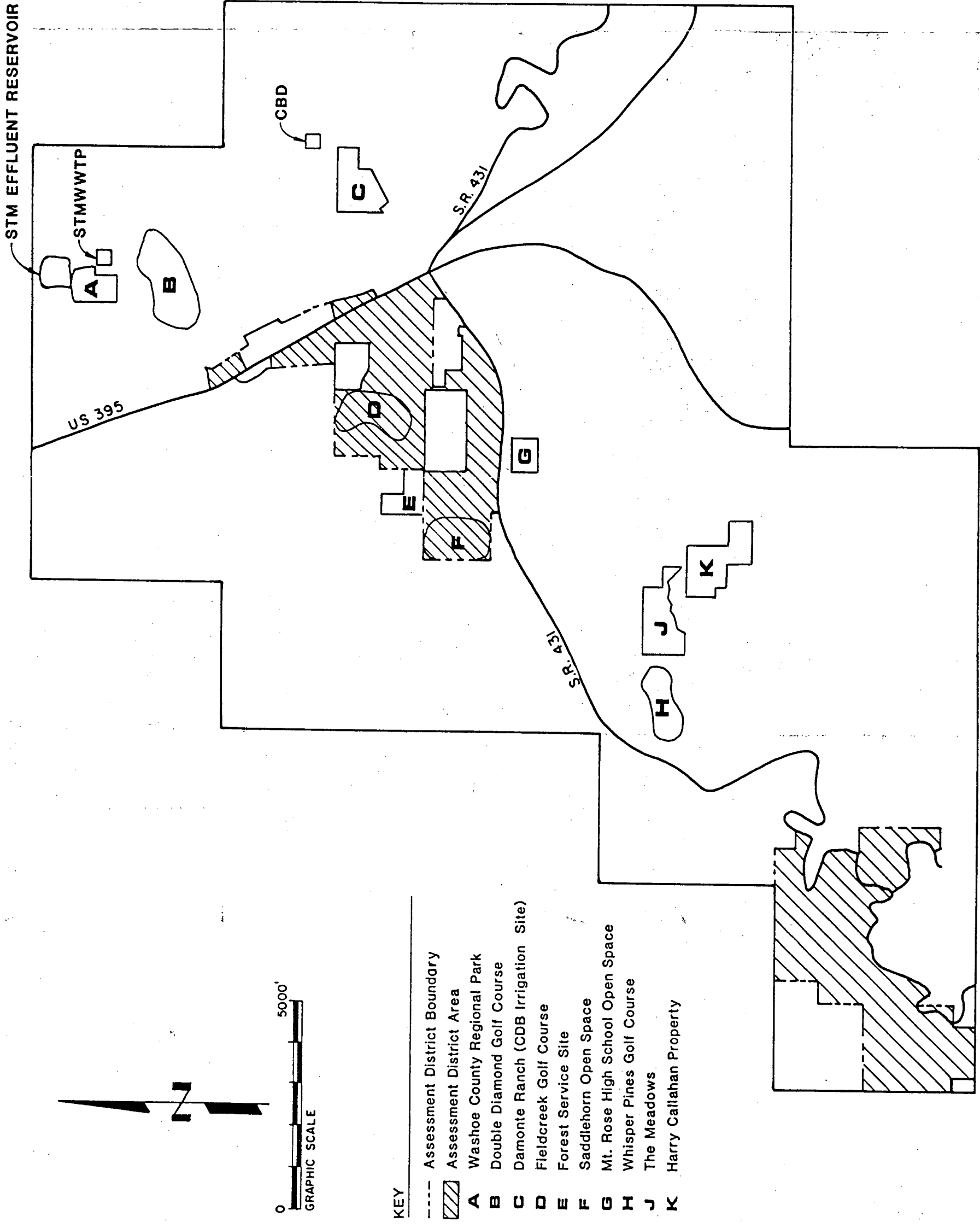
18
19 Judi Bailey
20 JUDI BAILEY
County Clerk

21
22 SPB UTILITY SERVICES, INC.

23
24 By George E. Shaw
25 GEORGE E. SHAW, PRESIDENT

26
27 ATTEST:

28 Linell C. Bailey
29 Secretary.
30 SPB Utility Services, Inc.



POTENTIAL REUSE SITES

4.0 Treatment Alternatives

Reuse guidelines established by the State of Nevada require that wastewater be treated to at least secondary standards as established by the EPA. These secondary standards typically refer to a treated effluent of 30 mg/L BOD and 30 mg/L TSS. The guidelines also require more stringent effluent limitations for reuse applications, depending on the reuse method and risk of human exposure (buffer zone distances), as discussed in Section 2. As the available buffer zone decreases, the treatment level increases. This section discusses recommended treatment alternatives for the various effluent limitations.

Existing Facilities

The South Truckee Meadows Wastewater Treatment Plant is designed to treat 0.75 mgd of wastewater to a secondary level, with anticipated effluent BOD and TSS characteristics of less than 30 mg/L for each constituent. The plant currently has all the facilities, including a disinfection system, required to provide effluent treated to the secondary level.

The disinfection system includes a chemical addition system and contact basin. The chemical feed system is designed to provide a peak chlorine feed rate of 300 ppd with an average feed rate of 63 ppd. The contact basin provides 75 minutes of detention time at a flow of 1.5 mgd and is oversized to provide fire flow storage for the plant.

The plant is designed to meet limitations for effluent reuse at the existing CDB land application site. However, once flow surpasses the CDB reuse capacity, other reuse sites will need to be considered, and additional treatment may be required.

Treatment Levels

As indicated earlier, required treatment levels are based on the degree of risk of public exposure at the reuse site, which depends on the buffer zone size. For this plan, levels of treatment and treatment processes required to achieve them are indicated in Table 4-1.



Table 4-1
Treatment Levels and Processes

	Treatment Level			
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
<u>Reuse Guideline</u>				
Buffer Zone	>800 ft	400-800 ft	100-400 ft	None
Fecal Coliform, (MPN/100ml)	NL	200	23	2.2
<u>Treatment Processes Required</u>				
Secondary Treatment	X	X	X	X
Flocculation			X	X
Clarification				X
Filtration			X	X
Disinfection		X	X	X

The following sections describe the treatment processes and facilities required for each 1.5 mgd increment of capacity at each treatment level.

Secondary Treatment (Level 1)

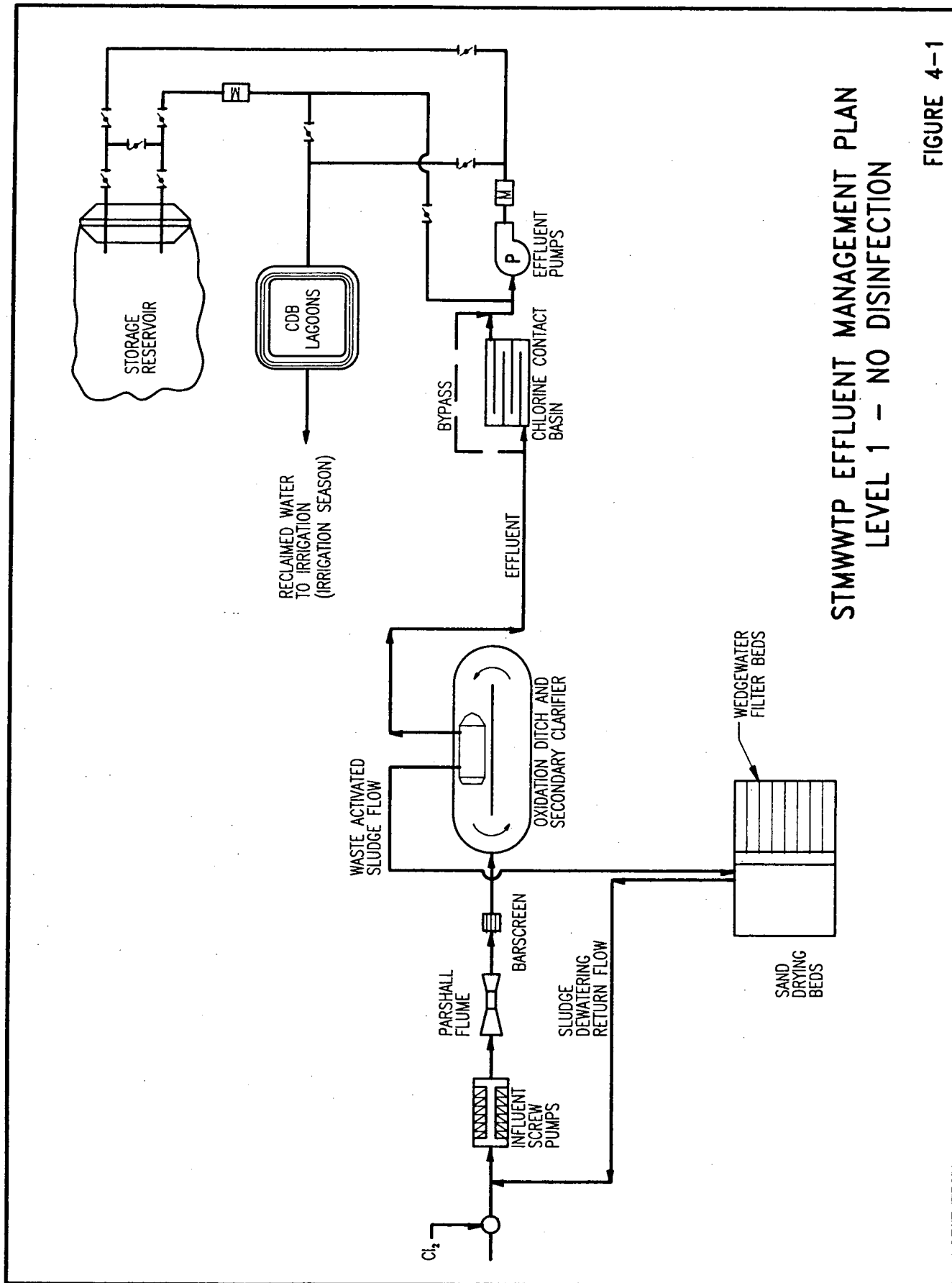
Secondary treatment is required where a buffer zone greater than 800 feet is provided for a spray irrigation system or where public access to a drip irrigation site is prevented.

Figure 4-1 shows a process schematic for this alternative. In theory, disinfection would not be needed. For the initial 1.5 mgd capacity, no additional treatment equipment would be required beyond that existing at the treatment plant.

Disinfection (Level 2)

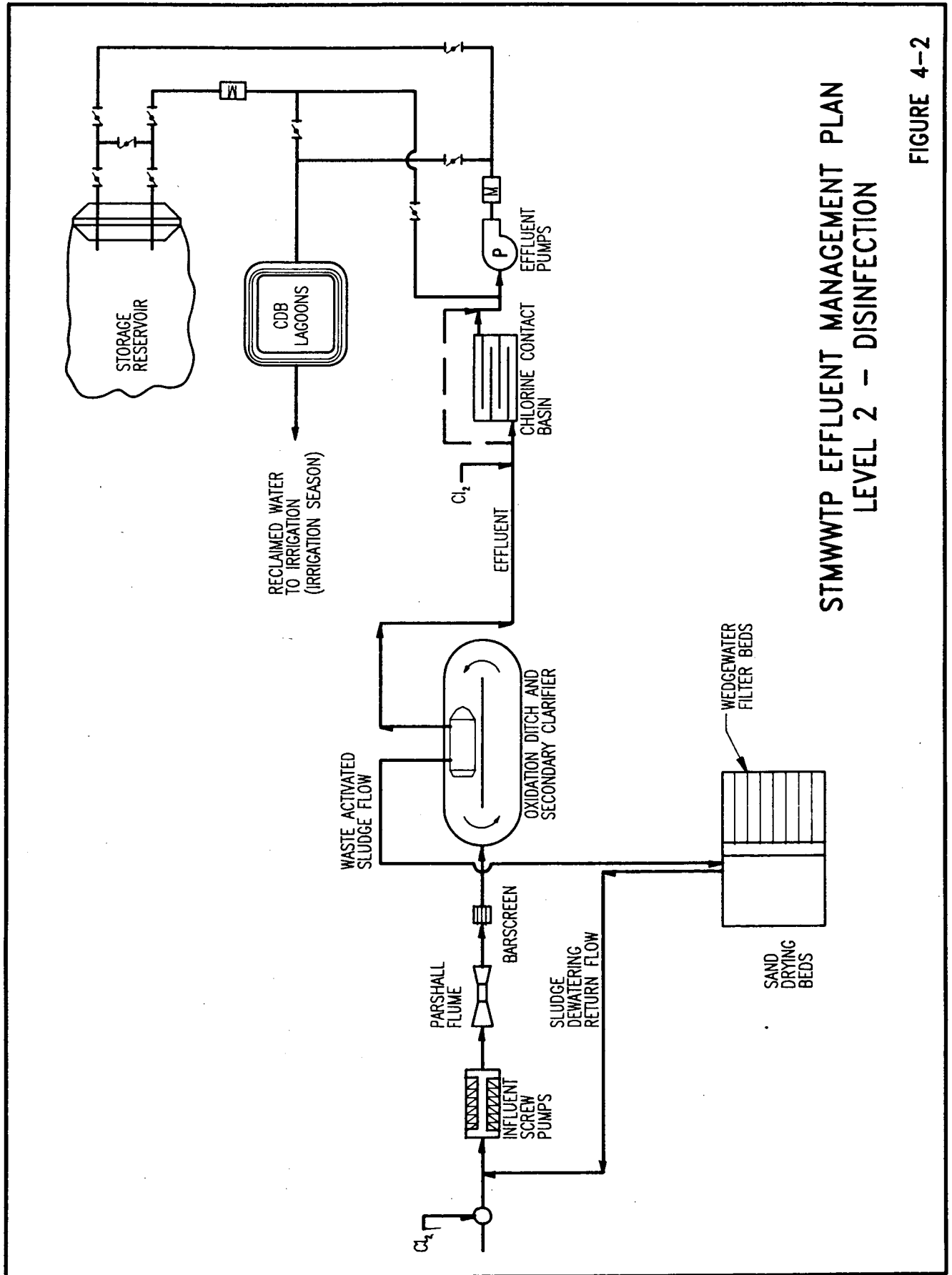
Disinfection is required for reuse alternatives requiring a 200 MPN/100 ml, 30-day geometric mean and 400 MPN/100 ml single maximum value. The existing disinfection system is capable of meeting this requirement for the 1.5 mgd plant capacity.

Wastewater currently discharged from the existing facilities could be used for applications requiring this level of treatment. No additional equipment is required beyond what currently exists at the treatment plant as shown on Figure 4-2. The disinfection system will need to be expanded as plant flows exceed 1.5 mgd.



STMWWTP EFFLUENT MANAGEMENT PLAN
LEVEL 1 - NO DISINFECTION

FIGURE 4-1



STMWWTP EFFLUENT MANAGEMENT PLAN
LEVEL 2 - DISINFECTION

Direct Filtration (Level 3)

To continually meet 30-day geometric average disinfection requirements of 23 MPN/100 ml, a process known as direct filtration should be used. Direct filtration uses chemical coagulation, flocculation and filtration as shown on Figure 4-3. Results of the Pomona Virus Study (Dryden et al 1979) found that direct filtration would produce the same quality of reuse water as tertiary treatment. Tertiary treatment would require the addition of a sedimentation step prior to filtration.

Coagulation facilities are likely to require the addition of alum and polymer. Typical feed rates for alum should range from 0 to 70 mg/L. Polymer feed rates should range from 0 to 10 mg/L. A combination system is recommended for this plan. The average alum dose is assumed to be 30 mg/L with a peak dose of 70 mg/L. The average polymer dose was assumed to be 3 mg/L with a peak dose of 10 mg/L. Jar testing will be needed to determine the actual chemical addition requirements prior to design of any filtration facilities.

There are several types of filtration equipment able to produce an effluent of the desired quality. To accommodate future installation of filtration equipment, 6 to 8 feet of hydraulic head has been provided between the boat clarifier and the chlorine contact basin. Therefore, an automatic backwash (ABW) filter unit requiring only 2 to 3 feet of head loss is recommended for the filtration process.

In the ABW filter design, the filter bed is divided into a number of compartments. An automatic mechanism is used to sequentially backwash and clean individual compartments while leaving the remaining compartments in service. Typical hydraulic loading rates are 2 gpm/sf at average conditions and 5 gpm/sf at peak conditions.

Based on these hydraulic requirements, one 16-foot wide x 40-foot long unit would be required for each 1.5 mgd of flow. During cold weather, the filters would need to be covered. Piping should be provided to bypass each filter unit for maintenance and during operational upsets.

Chlorine would continue to be used to disinfect the filtered effluent. The contact basin must be sized for one hour of detention at peak flow. This results in a four pass chlorine contact basin 250 feet long x 20 feet wide x 5 feet SWD. It is assumed that the chlorine dose would need to be increased to 10 mg/L to maintain the bacterial inactivation required. Bench scale testing will be required to refine the exact dose required.

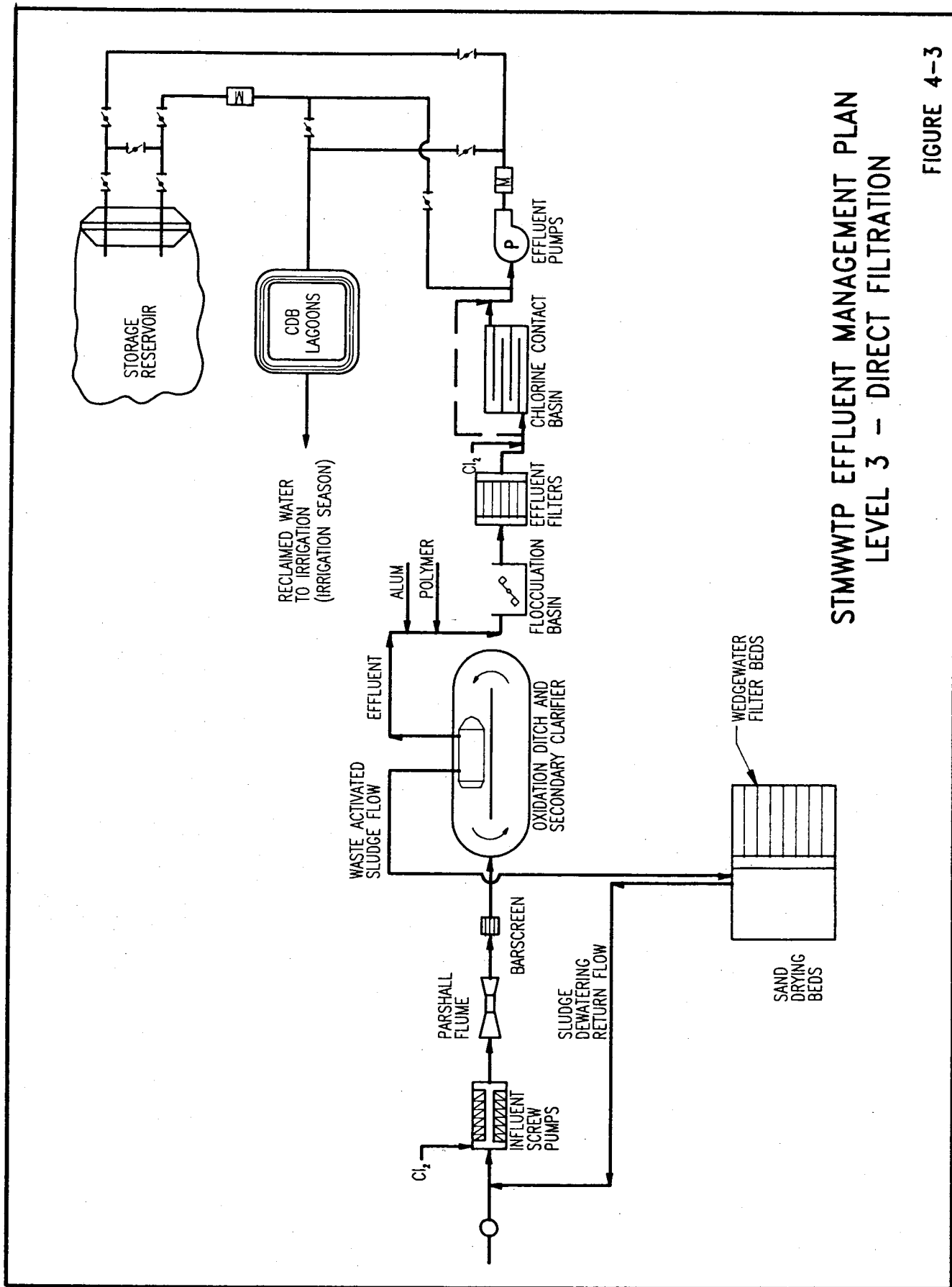


FIGURE 4-3

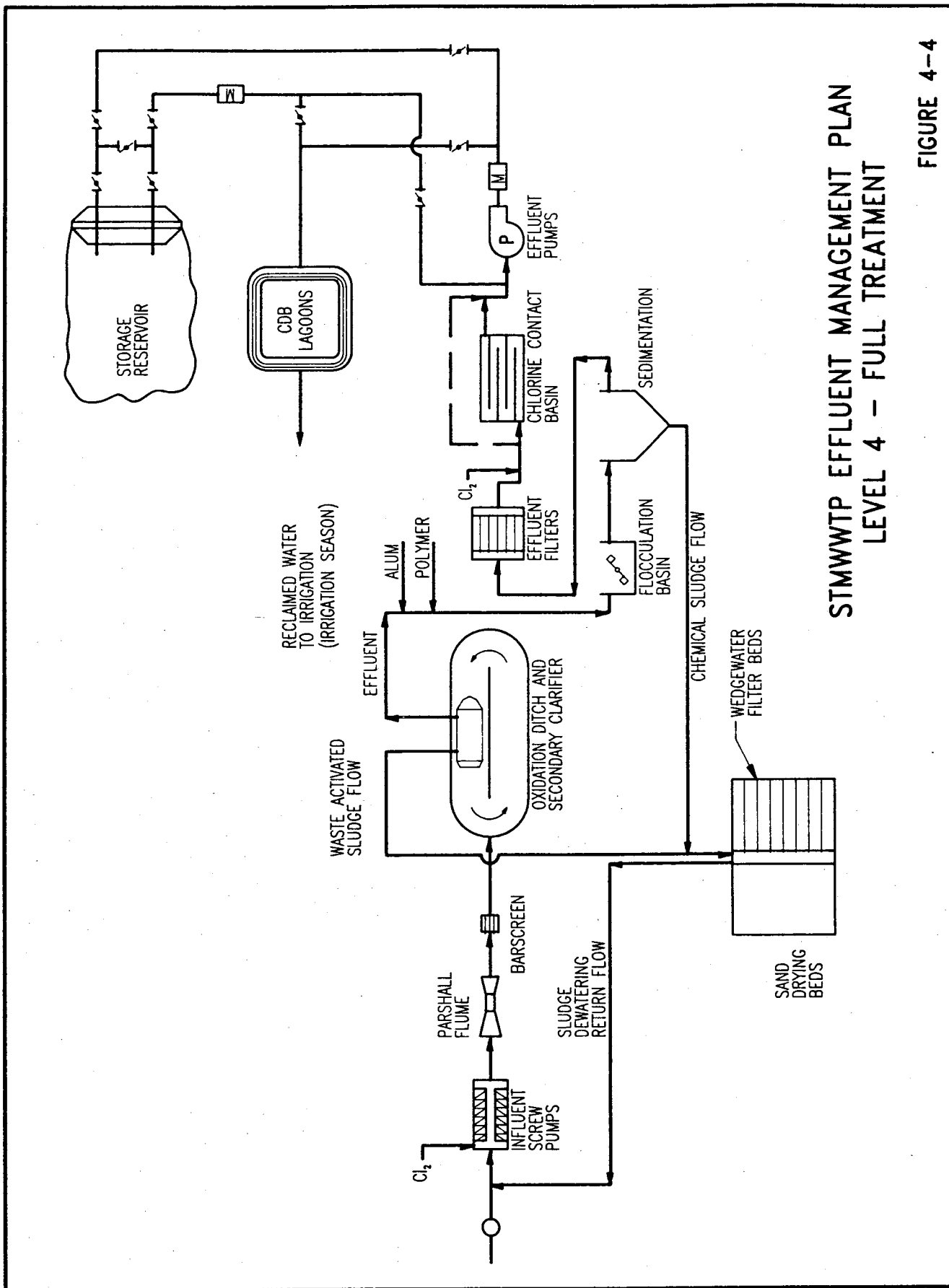


FIGURE 4-4

The County may consider using pipeline volume for additional detention time, however, this would require effluent sampling to be completed at some point downstream in the pipeline away from the treatment plant.

Tertiary Treatment (Level 4)

Level 4 treatment will require all of the processes discussed above, as well as clarification and two hours of chlorine contact time with 15 mg/L chlorine dosage. An 80-foot diameter clarifier would be required for each 1.5 mgd of capacity as indicated in Figure 4-4. The clarifier would have a side water depth of at least 14 feet and a flocculation well with four mixers.

Table 4-2 summarizes the facilities requirements for each level of treatment.



Table 4-2
Facilities Required for Each 1.5 MGD
of Capacity at Required Treatment Levels

<u>Facilities Required</u>	<u>Treatment Level</u>			
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
Rapid Mix Basin				
No. of basins			1	1
Dimensions, LxWxH, ft			6x6x6	6x6x6
Mixers, number			1	1
Horsepower, each			3	3
Flocculation Basin				
No. of basins			1	1
Dimensions, LxWxH, ft			11x11x11	11x11x11
Mixers, number			1	1
Horsepower, each			0.25	0.25
Alum (47%) feed, ppd				
Peak			3000	3000
Average			800	800
Polymer feed, ppd				
Peak			375	375
Average			40	40
Clarifier				
No. of basins				1
Dimensions, dia x SWD, ft				80 x 14
Floc well, dia x depth, ft				40 x 10
Mixers, number				4
Horsepower, each				0.5
Alum (47%) feed, ppd				
Peak				3000
Average				800

Table 4-2 (Continued)
Facilities Required for Each 1.5 MGD
of Capacity at Required Treatment Levels

<u>Facilities Required</u>	<u>Treatment Level</u>			
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
Clarifier (Continued)				
Polymer feed, ppd				
Peak				375
Average				40
ABW Filter				
No. of units			1	1
Dimensions, LxW, feet			40x16	40x16
Disinfection				
No. of contact basins		1	1	1
Dimensions, LxWxH, ft		160x16x5	250x20x5	500x20x5
Rapid mix chamber, LxWxH, ft		10x4x5	10x5x5	10x5x5
Mixer horsepower		3	3	3
Chlorine feed, ppd				
Peak		300	750	1500
Average		62	125	250

5.0 Initial Reuse Facilities

This section describes the storage and land application facilities which will be available for reuse of effluent from the initial 1.5 mgd phase of the South Truckee Meadows Wastewater Treatment Plant. These facilities include an effluent storage reservoir, presently under construction, and the CDB ponds and land application site.

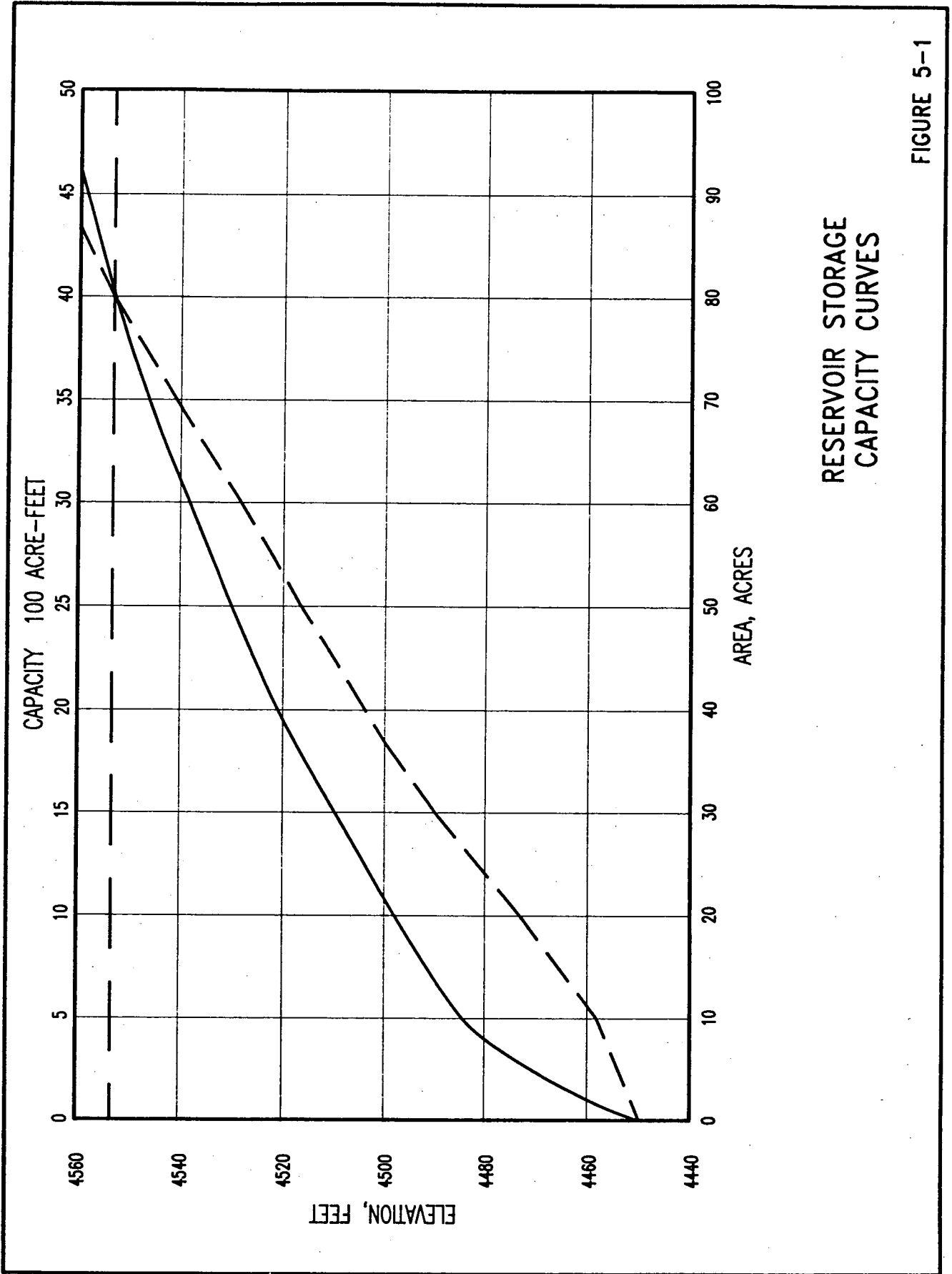
This section will present a water balance for the reservoir to determine the amount of effluent available for reuse at various capacity phases of the treatment plant. Also presented are the results of capacity analysis for the CDB land application site.

Storage Reservoir

The effluent storage reservoir is proposed for construction completion in 1992 and will be used to store effluent during the non-irrigation season. It will be located about 1/4 mile north of the treatment plant in the Huffaker Hills as indicated on Figure 1-2. The reservoir will have a maximum capacity of about 4000 acre-feet of water when filled to its high water level elevation of 4552.5, with a maximum water surface area equal to 80 acres. The depth-capacity curve is shown on Figure 5-1. Construction is projected to begin in early 1991 and will require about 13 months to complete.

Effluent will be pumped to the reservoir normally during the period from November to mid-April. The reservoir water level will be drawn down during the remainder of the year when irrigation occurs. Reclaimed effluent from the reservoir can be returned to the plant pump station, combined with plant effluent, and pumped to CDB for reuse. Efficient operation would have the reservoir reaching a minimum water level at the end of the irrigation season.

During the time water is stored in the reservoir, losses from seepage (percolation) and evaporation and additions from precipitation occur. Losses are affected by the amount of water in the reservoir at any given time. More effluent in the reservoir results in a greater water surface area exposed to seepage and evaporation losses.



RESERVOIR STORAGE
CAPACITY CURVES

FIGURE 5-1



Water Balance

To estimate the amount of effluent available, a reservoir water balance was completed for each plant capacity phase, including 0.75, 1.5, 3.0, 4.5 and 6.0 mgd. These water balances are shown in Tables 5-1 through 5-5 with a water balance summary shown in Table 5-6. The quantities of effluent available for reuse are values to be used by the County for planning purposes. Water balance analysis compares supplies to the reservoir with losses to determine the remaining water for reuse. Water supplies include plant effluent and natural precipitation, while losses include seepage and evaporation.

Precipitation data used in the analysis are average rainfall amounts recorded at the Reno-Cannon International Airport Weather Station. Evaporation rates were taken from previous water balance studies (WRD) completed for the CDB irrigation site. These values are indicated in Table 5-7.

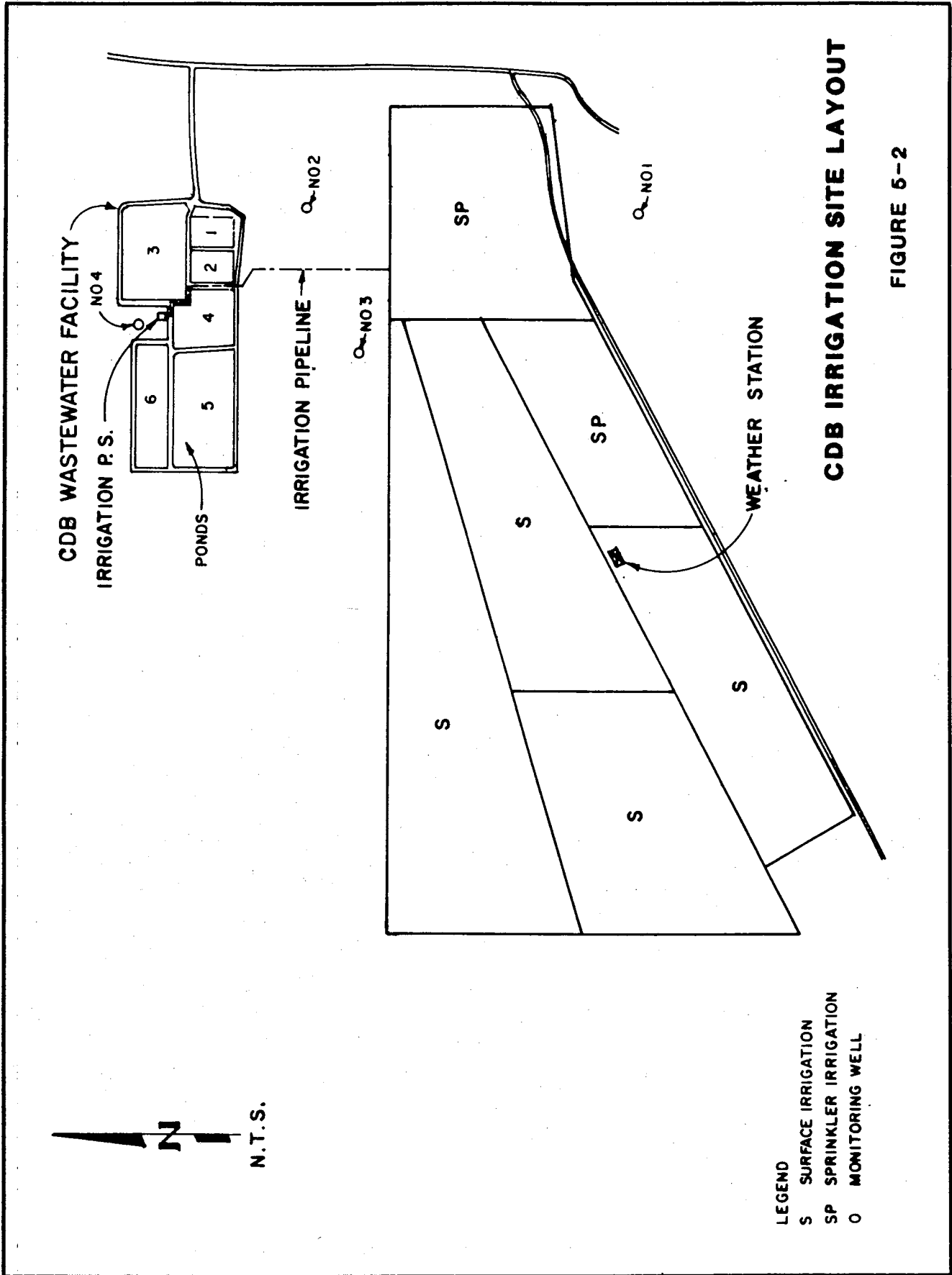
The seepage (percolation) rate from the reservoir will be limited by a clay liner to be provided in the reservoir. The liner is expected to limit seepage to 1×10^{-7} cm/sec, or 0.0034 inch/day.

CDB Treatment Facility and Land Application Site

The remainder of this section describes the existing CDB irrigation site and presents analysis to determine its reuse capacity. The CDB irrigation site is the County's current permitted discharge site for the South Truckee Meadows Wastewater Treatment Plant.

The CDB wastewater treatment facility is located at 12800 Mira Loma Road in the southeast portion of Truckee Meadows, east of Highway 341 (see Figure 1-2). The facility is owned by Washoe County and is operated under contract by SPD Utilities, Inc. It presently consists of two aerated lagoons and four effluent storage ponds and has a treatment capacity of 0.3 mgd. The plant is currently treating about 0.15 mgd of wastewater. Adjacent to CDB the county leases about 245 acres on the Damonte Ranch for agricultural reuse of treated wastewater. The water is applied using both surface and spray irrigation.

A site arrangement is shown on Figure 5-2.



CDB IRRIGATION SITE LAYOUT

FIGURE 5-2



TABLE 5-1
RESERVOIR WATER BALANCE @ 0.75 MGD
PLANT CAPACITY

ASSUMPTIONS

SEEPAGE RATES - BASED ON HARDING LAWSON ASSOCIATES ESTIMATES
EVAPORATION DATA - BASED ON CDB WEATHER STATION DATA
EFFLUENT FLOW - 0.75 MGD
RESERVOIR CAPACITY - 4000 AF
MAX RESERVOIR SURFACE AREA - 80 ACRES
MINIMUM RESERVOIR VOLUME - 100 AF

WATER SUPPLY					WATER DEMAND													
MONTH	EFFLUENT MONTHLY FLOW TO PRECIP. RESERVOIR AMOUNTS		TOTAL WATER SUPPLIED	SURFACE AREA		AVERAGE SURFACE AREA		RESERVOIR SEEPAGE RATE		MONTHLY EVAP. RATE		RESERVOIR LOSS		SEEPAGE & EVAP. DEMAND		EFFLUENT AVAILABLE FOR RESERVOIR REUSE		VOLUME AF
	AF	AF		A	A	AF/A	AF/A	AF/A	AF/A	AF	AF	AF	AF	AF	MGD			
NOV	69.06	4.00	73.06	16.00	21.50	21.50	0.01	0.18	0.22	3.87	4.09	68.98	0.75				168.98	
DEC	71.36	8.07	79.43	20.00	21.50	21.50	0.01	0.11	0.22	2.37	2.58	76.85	0.81				245.83	
JAN	71.36	8.27	79.63	23.00	21.50	21.50	0.01	0.12	0.22	2.58	2.80	76.84	0.81				322.66	
FEB	64.46	6.33	70.79	26.00	21.50	21.50	0.01	0.17	0.22	3.66	3.87	66.92	0.78				389.58	
MAR	71.36	4.93	76.29	28.00	21.50	21.50	0.01	0.39	0.22	8.39	8.60	67.69	0.71				457.27	
APR	69.06	3.07	72.13	29.00	21.50	21.50	0.01	0.54	0.22	11.61	11.83	60.31	0.66				517.58	
MAY	71.36	4.93	76.29		21.50	21.50	0.01	0.52	0.22	11.18	11.40	64.90	0.68					
JUN	69.06	2.27	71.33		21.50	21.50	0.01	0.76	0.22	16.34	16.56	54.78	0.60					
JUL	71.36	2.00	73.36		21.50	21.50	0.01	0.71	0.22	15.27	15.48	57.88	0.61					
AUG	71.36	1.80	73.16		21.50	21.50	0.01	0.63	0.22	13.55	13.76	59.40	0.62					
SEP	69.06	2.00	71.06		21.50	21.50	0.01	0.44	0.22	9.46	9.68	61.39	0.67					
OCT	71.36	2.27	73.63		21.50	21.50	0.01	0.27	0.22	5.81	6.02	67.61	0.71					
TOTALS	840.23	49.94	890.17				0.12	4.84	2.58	104.06	106.64	783.53						
EFFLUENT AVAILABLE FOR REUSE AT 0.75 MGD = 783 AF																		
STORAGE REQUIRED = 518 AF																		



TABLE 5-2
RESERVOIR WATER BALANCE @ 1.5 MGD
PLANT CAPACITY

ASSUMPTIONS

SEEPAGE RATES - BASED ON HARDING LAWSON ASSOCIATES ESTIMATES
EVAPORATION DATA - BASED ON CDB WEATHER STATION DATA
RESERVOIR CAPACITY - 4000 AF
MAX RESERVOIR SURFACE AREA - 80 ACRES
MINIMUM STORAGE VOLUME - 100 AF
GROWING SEASON - APRIL 15 THROUGH OCTOBER 30

WATER SUPPLY										WATER DEMAND												
MONTH	EFFLUENT		MONTHLY FLOW TO PRECIP.	TOTAL		SURFACE		AVERAGE SURFACE AREA	MONTHLY		MONTHLY EVAP. RATE	MONTHLY		MONTHLY		TOTAL		EFFLUENT		EFFLUENT AVAIL FOR RESERVOIR		
	AF	MGD		AF	MGD	AF	MGD		AF	MGD		AF	MGD	AF	MGD	AF	MGD	AF	MGD		AF	MGD
NOV	138.12	4.00	4.00	142.12	19.00	27.00	0.01	0.18	0.23	4.86	5.09	137.03	1.49	237.03								
DEC	142.72	8.07	150.79	25.00	27.00	0.01	0.11	0.11	0.27	2.97	3.24	147.55	1.55	384.58								
JAN	142.72	8.27	150.99	29.00	27.00	0.01	0.12	0.12	0.27	3.24	3.51	147.48	1.55	532.07								
FEB	128.91	6.33	135.24	32.00	27.00	0.01	0.17	0.17	0.27	4.59	4.86	130.38	1.52	662.45								
MAR	142.72	4.93	147.65	34.00	27.00	0.01	0.39	0.39	0.27	10.53	10.80	136.85	1.44	799.30								
APR	138.12	3.07	141.19	35.00	27.00	0.01	0.54	0.54	0.27	14.58	14.85	126.34	1.37	862.47								
MAY	142.72	4.93	147.65		27.00	0.01	0.52	0.52	0.27	14.04	14.31	133.34	1.40									
JUN	138.12	2.27	140.39		27.00	0.01	0.76	0.76	0.27	20.52	20.79	119.60	1.30									
JUL	142.72	2.00	144.72		27.00	0.01	0.71	0.71	0.27	19.17	19.44	125.28	1.32									
AUG	142.72	1.80	144.52		27.00	0.01	0.63	0.63	0.27	17.01	17.28	127.24	1.34									
SEP	138.12	2.00	140.12		27.00	0.01	0.44	0.44	0.27	11.88	12.15	127.97	1.39									
OCT	142.72	2.27	144.99		27.00	0.01	0.27	0.27	0.27	7.29	7.56	137.43	1.44									
TOTALS	1680.46	49.94	1730.40				0.12	4.84	3.20	130.68	133.88	1596.52										
EFFLUENT AVAILABLE FOR REUSE AT 1.5 MGD - 1596 AF																						
STORAGE REQUIRED = 862 AF																						

EFFLUENT AVAILABLE FOR REUSE AT 1.5 MGD - 1596 AF
STORAGE REQUIRED = 862 AF



TABLE 5-3
RESERVOIR WATER BALANCE @ 3.0 MGD
PLANT CAPACITY

ASSUMPTIONS

SEEPAGE RATES - BASED ON HARDING LAWSON ASSOCIATES ESTIMATES
EVAPORATION DATA - BASED ON COB WEATHER STATION DATA
RESERVOIR CAPACITY - 4000 AF
MAX RESERVOIR SURFACE AREA - 80 ACRES
MINIMUM STORAGE VOLUME - 100 AF
GROWING SEASON - APRIL 15 THROUGH OCTOBER 30

WATER SUPPLY					WATER DEMAND													
MONTH	EFFLUENT MONTHLY FLOW TO PRECIP.		TOTAL WATER RESERVOIR AMOUNTS SUPPLIED		SURFACE AREA END MONTH		AVERAGE SURFACE AREA	MONTHLY SEEPAGE RATE		MONTHLY EVAP. RATE		MONTHLY LOSS		MONTHLY SEEP & EVAP AVAILABLE FOR RESERVOIR		EFFLUENT REUSE		VOLUME AF
	AF	AF	AF	AF	A	A	AF/A	AF/A	AF/A	AF/A	AF	AF	AF	AF	AF	MGD		
NOV	276.21	4.00	280.21	23.00	31.50	0.01	0.18	0.32	5.67	0.32	5.67	5.99	274.23	2.98	374.23			
DEC	285.42	8.07	293.49	31.00	31.50	0.01	0.11	0.32	3.47	0.32	3.47	3.78	289.71	3.05	663.93			
JAN	285.42	8.27	293.69	36.00	31.50	0.01	0.12	0.32	3.78	0.32	3.78	4.10	289.59	3.04	953.52			
FEB	257.80	6.33	264.13	40.00	31.50	0.01	0.17	0.32	5.36	0.32	5.36	5.67	258.46	3.01	1211.98			
MAR	285.42	4.93	290.35	44.00	31.50	0.01	0.39	0.32	12.29	0.32	12.29	12.60	277.75	2.92	1489.73			
APR	276.21	3.07	279.28	45.00	31.50	0.01	0.54	0.32	17.01	0.32	17.01	17.33	261.96	2.85	1620.70			
MAY	285.42	4.93	290.35		31.50	0.01	0.52	0.32	16.38	0.32	16.38	16.70	273.65	2.88				
JUN	276.21	2.27	278.48		31.50	0.01	0.76	0.32	23.94	0.32	23.94	24.26	254.23	2.76				
JUL	285.42	2.00	287.42		31.50	0.01	0.71	0.32	22.37	0.32	22.37	22.68	264.74	2.78				
AUG	285.42	1.80	287.22		31.50	0.01	0.63	0.32	19.85	0.32	19.85	20.16	267.06	2.81				
SEP	276.21	2.00	278.21		31.50	0.01	0.44	0.32	13.86	0.32	13.86	14.18	264.04	2.87				
OCT	285.42	2.27	287.69		31.50	0.01	0.27	0.32	8.51	0.32	8.51	8.82	278.87	2.93				
TOTALS	3360.56	49.94	3410.50			0.12	4.84	3.78	152.46			156.24	3254.26					

EFFLUENT AVAILABLE FOR REUSE AT 3.0 MGD - 3254 AF

STORAGE REQUIRED - 1621 AF

EFFLUENT AVAILABLE FOR REUSE AT 3.0 MGD - 3254 AF
STORAGE REQUIRED - 1621 AF



TABLE 5-4
RESERVOIR WATER BALANCE @ 4.5 MGD
PLANT CAPACITY

ASSUMPTIONS

SEEPAGE RATES - BASED ON HARDING LAWSON ASSOCIATES ESTIMATES
EVAPORATION DATA - BASED ON CDB WEATHER STATION DATA
RESERVOIR CAPACITY - 4000 AF
MAX RESERVOIR SURFACE AREA - 80 ACRES
MINIMUM STORAGE VOLUME - 100 AF
GROWING SEASON - APRIL 15 THROUGH OCTOBER 30

WATER SUPPLY					WATER DEMAND													
MONTH	EFFLUENT MONTHLY FLOW TO PRECIP. RESERVOIR AMOUNTS SUPPLIED		TOTAL WATER	SURFACE AREA		AVERAGE SURFACE AREA	MONTHLY SEEPAGE RATE		MONTHLY EVAP. RATE	MONTHLY SEEPAGE LOSS		MONTHLY EVAP. DEMAND		TOTAL EFFLUENT REUSE		AVAIL FOR RESERVOIR VOLUME		
	AF	AF		AF	A		AF/A	AF/A		AF	AF	AF	AF	AF	AF		MGD	AF
NOV	414.33	4.00	418.33	29.00	39.00	0.01	0.18	0.39	7.02	7.41	410.92	4.46	510.92					
DEC	428.14	8.07	436.21	36.00	39.00	0.01	0.11	0.39	4.29	4.68	431.53	4.54	942.45					
JAN	428.14	8.27	436.41	43.00	39.00	0.01	0.12	0.39	4.68	5.07	431.34	4.53	1373.79					
FEB	386.71	6.33	393.04	49.00	39.00	0.01	0.17	0.39	6.63	7.02	386.02	4.49	1759.81					
MAR	428.14	4.93	433.07	56.00	39.00	0.01	0.39	0.39	15.21	15.60	417.47	4.39	2177.28					
APR	414.33	3.07	417.40	58.00	39.00	0.01	0.54	0.39	21.06	21.45	395.95	4.30	2375.26					
MAY	428.14	4.93	433.07		39.00	0.01	0.52	0.39	20.28	20.67	412.40	4.33						
JUN	414.33	2.27	416.60		39.00	0.01	0.76	0.39	29.64	30.03	386.57	4.20						
JUL	428.14	2.00	430.14		39.00	0.01	0.71	0.39	27.69	28.08	402.06	4.23						
AUG	428.14	1.80	429.94		39.00	0.01	0.63	0.39	24.57	24.96	404.98	4.26						
SEP	414.33	2.00	416.33		39.00	0.01	0.44	0.39	17.16	17.55	398.78	4.33						
OCT	428.14	2.27	430.41		39.00	0.01	0.27	0.39	10.53	10.92	419.49	4.41						
TOTALS	5041.02	49.94	5090.96			0.12	4.84	4.68	188.76	193.44	4897.52							

EFFLUENT AVAILABLE FOR REUSE AT 4.5 MGD = 4897 AF
STORAGE REQUIRED = 2375 AF



TABLE 5-5
RESERVOIR WATER BALANCE @ 6.0 MGD
PLANT CAPACITY

ASSUMPTIONS

SEEPAGE RATES - BASED ON HARDING LAWSON ASSOICATES ESTIMATES
EVAPORATION DATA - BASED ON CDB WEATHER STATION DATA
RESERVOIR CAPACITY - 4000 AF
MAX RESERVOIR SURFACE AREA - 80 ACRES
MINIMUM STORAGE VOLUME - 100 AF
GROWING SEASON - APRIL 15 THROUGH OCTOBER 30

WATER SUPPLY				WATER DEMAND									
MONTH	EFFLUENT AF	MONTHLY PRECIP. AF	TOTAL WATER SUPPLIED AF	SURFACE AREA A	AVERAGE SURFACE AREA A	MONTHLY SEEPAGE RATE AF/A	MONTHLY EVAP. RATE AF/A	MONTHLY LOSS AF	SEEPAGE EVAP. AF	MONTHLY SEEP & EVAP DEMAND AF	EFFLUENT REUSE AF	EFFLUENT REUSE MGD	EFFLUENT VOLUME AF
NOV	552.45	4.00	556.45	32.00	45.00	0.01	0.18	0.45	8.10	8.55	547.90	5.95	647.90
DEC	570.87	8.07	578.94	40.00	45.00	0.01	0.11	0.45	4.95	5.40	573.54	6.03	1221.44
JAN	570.87	8.27	579.14	49.00	45.00	0.01	0.12	0.45	5.40	5.85	573.29	6.03	1794.72
FEB	515.62	6.33	521.95	57.00	45.00	0.01	0.17	0.45	7.65	8.10	513.85	5.84	2308.57
MAR	570.87	4.93	575.80	65.00	45.00	0.01	0.39	0.45	17.55	18.00	557.80	5.86	2866.37
APR	552.45	3.07	555.52	68.00	45.00	0.01	0.54	0.45	24.30	24.75	530.77	5.76	3131.75
MAY	570.87	4.93	575.80	58.00	45.00	0.01	0.52	0.45	23.40	23.85	551.95	5.80	
JUN	552.45	2.27	554.72	52.00	45.00	0.01	0.76	0.45	34.20	34.65	520.07	5.65	
JUL	570.87	2.00	572.87	44.00	45.00	0.01	0.71	0.45	31.95	32.40	540.47	5.68	
AUG	570.87	1.80	572.67	37.00	45.00	0.01	0.63	0.45	28.35	28.80	543.87	5.72	
SEP	552.45	2.00	554.45	29.00	45.00	0.01	0.44	0.45	19.80	20.25	534.20	5.80	
OCT	570.87	2.27	573.14	12.00	45.00	0.01	0.27	0.45	12.15	12.60	560.54	5.89	
TOTALS	6721.48	49.94	6771.42			0.12	4.84	5.40	217.80	223.20	6548.22		
EFFLUENT AVAILABLE FOR REUSE AT 6.0 MGD = 6548 AF													
STORAGE REQUIRED = 3132 AF													



Table 5-6
Reservoir Water Balance Summary

<u>Design Plant Flow</u>		<u>Effluent Available for Reuse</u>		<u>Storage Required</u>	
(mgd)	(acre-feet)	(acre-feet)	(%)	(acre-feet)	(% used)
0.75	840	784	93	510	13
1.5	1,680	1,596	95	862	22
3.0	3,360	3,254	97	1,621	41
4.5	5,041	5,041	97	2,375	60
6.0	6,721	6,548	97	3,132	78

The county plans to divert raw wastewater flows from CDB to the new South Truckee Meadows Wastewater Treatment Plant, and then use the CDB facility strictly for storage and land application of effluent from the new plant. A 24-inch force main has been completed to convey effluent from STMWWTP to CDB.

The following paragraphs discuss the physical characteristics of the site with the objective of establishing the site's reuse capacity.

Previous Studies

During the period 1986 to 1989, a series of annual studies investigating the performance of the CDB land application system was completed by Water Research and Development, Inc. (WRD). The purpose of these studies was to collect climatological data and plant growth data in order to develop management measures for and determine the capacity of the system. Data developed in those studies has been incorporated into this report.

Climate

Important climatic factors to consider for land application of municipal wastewater are temperature, precipitation, evaporation, evapotranspiration, and wind

and velocity direction. A knowledge of these factors is important to the hydraulic and nutrient loading analysis required to determine the site capacity. Two sources of climatic data were available: weather stations at the Reno Cannon International Airport and at the CDB site itself. Table 5-7 summarizes the area's pertinent climatic data.

As indicated, the temperature varies significantly from season to season as well as from hour to hour every day. Freezing temperatures occurring during the winter months limit the growing season to five to seven months, usually April through October.

The CDB area has a dry desert-like climate with annual rainfall of about 7.5 inches. The rainfall amounts received at the CDB weather station in 1987 and 1988 were 6.82 inches and 5.59 inches, respectively, which is less than normal for the area.

Evaporation and evapotranspiration rates are needed to determine the hydraulic loading rates for the land application site. Evaporation is the transfer of water from liquid to vapor state. Transpiration is the process by which plants remove moisture from the soil and release it to the air as vapor. The combined process is called evapotranspiration which generally consumes more than half of all precipitation falling on land.

Evapotranspiration rates differ not only between area and season, but also between plant types. As mentioned before, the primary crops at the CDB land application site recently were alfalfa and oats. The evapotranspiration (ET) rates in Table 5-7 are the average values for two studies completed for the CDB irrigation system during 1987 and 1988. The evapotranspiration rates were determined using the Corrected Penman method.

Wind is an important factor to consider when spray irrigation of treated effluent is being considered. Spray irrigation must be terminated when wind speeds are high enough to blow aerosols off the site. Average wind speeds were taken at the CDB weather station and are shown in Table 5-7. These average monthly totals were calculated using 24-hour wind totals.

Table 5-7
Meteorological Data for the CDB Site

<u>Month</u>	Temp. ^a <u>Range</u> °F	Avg ^b <u>Precip.</u> inches	10-yr ^b <u>Precip.</u> inches	Avg ^a <u>Evap.</u> inches	Avg ^a <u>ET</u> inches	Wind <u>Vel.</u> mph
Jan	-8 to 2	1.24	1.72	1.42	0.13	5
Feb	7 to 68	0.95	1.58	2.08	0.23	5
Mar	6 to 76	0.74	1.31	4.63	0.86	6
Apr	11 to 82	0.46	1.35	6.47	2.69	5
May	18 to 85	0.74	0.21	6.29	7.04	5
Jun	23 to 97	0.34	0.53	9.15	6.82	5
Jul	27 to 97	0.30	0.04	8.49	8.44	4
Aug	31 to 105	0.27	0.09	7.61	8.75	3
Sep	22 to 96	0.30	2.31	5.30	5.26	4
Oct	21 to 96	0.34	1.65	3.20	3.34	3
Nov	7 to 90	0.60	1.71	2.11	1.43	4
Dec	<u>-12 to 70</u>	<u>1.21</u>	<u>1.04</u>	<u>1.31</u>	<u>0.50</u>	6
Totals	-12 to 105	7.49	13.54	58.06	45.49	

^aDenotes data taken in 1987 and 1988 from the CDB weather station.

^bData from the Reno Cannon International Airport weather station.

Groundwater

The depth to the groundwater table and groundwater quality are two important factors relative to irrigation site capacity. Shallow groundwater can interfere with crop growth and deter percolation of effluent. Generally a depth to groundwater of at least 5 feet is preferred. Lesser depths require subsurface drainage unless the shallow groundwater occurs only in the winter and no crops susceptible to poor drainage are grown.

Previous studies of the CDB application site show the groundwater table depth has been found to vary from 20 feet in southern portions to 4 feet at the northern end. Further north in the vicinity of the CDB holding ponds the water table has been observed at or near the ground surface.

Soils

In a 1985 irrigation report on the CDB land application site, soils at the site were found to be primarily Springmeyer stoney loam (#590; 0-2 percent slope), with lesser amounts of the Orr sandy loam (#623; 0-2 percent slope) and the Godecke loamy sand (#420) (USDA Soil Conservation Service, 1978). The Springmeyer soils consist of very deep, well drained soils on terraces formed in alluvium derived from mixed rock. Typically, the surface layer is grayish brown stony loam about 13 inches thick. The subsoil is a brown gravelly sandy clay loam to about 27 inches. To a depth of 60 inches exists a light yellowish brown very cobbly sandy clay loam. Permeability of this soil is moderately slow and where the water table is not present effective rooting depth is 60 inches or more.

The Orr series consists of very deep, well drained soils on terraces and alluvial fans. These soils formed in alluvium are derived from mixed rock sources. The surface layer consists of a brown stony sandy loam that reaches about 10 inches in depth. This layer is underlain by a pale brown heavy sandy loam to a depth of about 40 inches. The layer below that runs to 60 inches below the surface is a very pale brown gravelly sandy loam. Permeability through this soil is slow and a seasonally high water table in late winter and spring is common.

Crop

To maximize the reuse of effluent using crop irrigation, the crop selection is essential. Criteria which should be considered in selecting a crop for land application include:

- Water requirement and tolerance.
- Nutrient requirement and tolerance.
- Nutrient utilization and renovation efficiency.
- Sensitivity to potentially toxic elements and salts.
- Insect and disease problem.
- Season of growth and dormancy requirement.
- Natural range.
- Ecosystem stability.
- Demand or market for the product.

Of primary concern in land application is the removal of soluble nitrogen and phosphorous. Nitrogen is removed by crop uptake and denitrification in the soil. Phosphorous is removed by chemical precipitation and adsorption, although plants do take up some amounts. Crop uptake values vary widely among plant types.

Typical literature values for nitrogen and phosphorous removal for alfalfa are in the range of 155-450 and 15-35 pounds per acre per year respectively. A commonly used rate for nitrogen removal is 220 pounds per acre per year. The variance in uptake values for nitrogen results because, as a legume, alfalfa can get much of its nitrogen from the air. However, there is evidence that alfalfa utilizes nitrogen applied in wastewater when it is available. How much of the nitrogen in wastewater the alfalfa uses in comparison to nitrogen in the air is the cause for the range of uptake values. Typical literature uptake rates for nitrogen and phosphorous for oat hay are 53-150 and 25 pounds per acre per year respectively.

The 1987 and 1988 WRD reports indicated crop nitrogen uptake rates of 160 to 180 pounds per acre for alfalfa and 50 pounds per acre for oats.

Topography

The topography of the CDB site is gently sloping with slopes less than 5 percent. Therefore, most types of spray or surface irrigation are suitable for the site.

Irrigation System

The irrigation system currently being used consists of two 1,320 lineal feet of Thunderbird wheel line sprinklers that presently irrigate 32 acres. The remaining fields are flood irrigated by 180-foot corrugations on 24-inch centers. The Thunderbird wheel line sprinklers are equipped with Nelson flow control nozzles that will deliver 5 gpm over a pressure range of 30 psi to 80 psi. The flexible nozzle

design allows the system to function at a constant rate with a varying number of sprinkler heads. A normal watering set will last 12 hours and be repeated every 12 to 20 days. The flood irrigation equipment uses 6-hour sets on about 20-day rotations. Some clogging was experienced in the wheel line sprinklers after they were first installed but the problem was remedied by installing larger nozzles.

Storage

The CDB facility was constructed in the early 1970s by a group of private developers to serve new homes in the area. The original facility consisted of two aerated lagoons and two unlined storage/facultative treatment lagoons for a total volume of 43.4 acre-feet. In March, 1988, an expansion of the CDB facility was completed in order to accommodate an average daily treatment capacity of 300,000 gallons. The expansion added two ponds to increase storage capacity to 137 acre feet (with 3 feet of pond freeboard). The surface area and volume breakdowns for each pond are listed in Table 5-8.

Table 5-8
CDB Pond Capacity

<u>Pond No.</u>	<u>3 Feet of Freeboard</u>		<u>No Freeboard</u>	
	<u>S.A.</u> acres	<u>Vol.</u> acre-feet	<u>S.A.</u> acres	<u>Vol.</u> acre-feet
1	1.3	8.6	1.4	11.7
2	1.3	8.6	1.4	11.7
3	5.4	42.6	5.6	58.4
4	4.2	13.0	4.3	19.5
5	7.3	42.7	7.6	64.5
6	<u>4.2</u>	<u>21.2</u>	<u>4.4</u>	<u>33.3</u>
Totals	24	137	25	199

Capacity Analysis

The amount of effluent which can be reused at CDB depends mainly on the hydraulic, nitrogen, and phosphorous loading capacities of the land application site. The CDB site can be classified as a slow rate (SR) land treatment system as defined in Water Pollution Control Federation Manual of Practice No. FD-16 entitled Natural

Systems for Wastewater Treatment. This publication was published in 1990 and is a widely accepted standard for evaluation of land application systems. The design procedures in MOP FD-16 were used to evaluate the CDB site reuse capacity.

Hydraulic Loading. The "slow rate" method assumes that the hydraulic loading of the site must exceed the hydraulic demand by 15 percent to satisfy leaching requirements (L.R.) and reduce excessive deep percolation into shallow groundwater. In addition to this it is assumed that the irrigation efficiency is 85 percent. Therefore, the gross application of wastewater for a given time period is:

$$\text{Gross Application} = (\text{Evapotranspiration}/0.85 - \text{Precipitation}) \times (1 + 0.15)$$

Using the evapotranspiration rates and the 10-year precipitation data (suggested as the design year) found in Table 5-7, a water balance was completed as indicated in Table 5-9.

According to the slow rate method the total water applied to the site should be about 64 inches (13.54 + 50.17) per year. From a hydraulic loading standpoint the wastewater applied to the site should be about 4.2 acre feet per acre.

Nitrogen Loading. A total nitrogen balance is almost as important as a water balance, because nitrate ions are mobile in the soil and can affect the quality of underlying groundwater. Excessive nitrogen application could be a limiting factor to hydraulic loading rates. The removal of nitrogen in most land application systems comes from crop uptake, denitrification, and leaching. The annual nitrogen balance may be determined from the following relationship:

$$\begin{array}{lcl} \text{Loading} & = & \text{Crop} + \text{Denitrification} + 2.7 (\text{Percolating})(\text{Max Nitrogen Conc.}) \text{ or} \\ \text{Potential} & \text{Uptake} & \text{Water} \quad \quad \quad \text{in Percolate} \end{array}$$

$$L \text{ (\#/acre/year)} = U \text{ (\#/acre/year)} + D \text{ (\#/acre/year)} + 2.7W \text{ (ft/yr)} C \text{ (mg/L)}$$

Table 5-9
CDB Land Application Site
Water Balance

<u>Month</u>	<u>C-Penman Evapo- transpiration (in.)</u>	<u>Precipitation (in.)</u>	<u>Wastewater Applied (in.)</u>
Jan	0.13	1.72	0.00
Feb	0.23	1.58	0.00
Mar	0.86	1.31	0.00
Apr	2.61	1.35	2.09 1.98
May	7.04	0.21	9.28 ✓
Jun	6.82	0.53	8.62 ✓
Jul	8.44	0.04	11.37 ✓
Aug	8.75	0.09	11.73 ✓
Sep	5.26	2.31	4.46 ✓
Oct	3.34	1.65	2.62 ✓
Nov	1.43	1.71	0.00
Dec	<u>0.50</u>	<u>1.04</u>	<u>0.00</u>
Totals	45.49 42.34	13.54 6.18	50.17 50.06

Based on the following assumptions the nitrogen loading potential is calculated as follows:

- A crop uptake value for alfalfa of 160#/acre is used. This value was used in the 1987 CDB report and is conservative for design.
- A typical range for nitrogen denitrification is between 15 and 25 percent of the total nitrogen in the effluent. A value of 15 percent is assumed.
- The amount of percolating water is determined by subtracting the evapotranspiration/year from the total water applied (precipitation + wastewater). Taking data from Table 5-9, the amount of percolating water is 1.47 feet/year.
- The EPA standard for nitrogen concentrations in drinking water is 10 mg/L and will be used for the nitrogen concentration in the percolating water.

Using these values, the loading potential is equal to 220 pounds/acre/year.

The loading potential reveals that the CDB land application site can remove 220 pounds of nitrogen per acre per year when the primary crop grown is alfalfa. The estimated nitrogen loading can be calculated from the following equation:

$$\text{Nitrogen Loading} = 2.7(\text{Effluent N Concentration})(\text{Liquid Loading})$$

The total nitrogen concentration in the treated effluent for the South Truckee Meadows Plant is expected to be a maximum of 10 mg/L. Based on this, and an annual liquid loading rate of 4.2 feet/year, nitrogen loading is calculated as follows:

$$\text{Nitrogen Loading} = 113 \text{ \#/acre/year}$$

The nitrogen applied to the fields per year is considerably less than the nitrogen removal capacity of alfalfa. Therefore, hydraulic loading capacity is the controlling loading factor.

Overall Capacity. Based on the information discussed above, hydraulic loading limits the reuse capacity of the CDB site to 1,029 acre feet per year (0.92 mgd), without considering the impacts of storage. To determine the capacity of the system as a whole, a combined water balance was completed for the reservoir, holding ponds, and reuse site as indicated in Table 5-10. As shown in the water balance, the capacity of the entire reuse system, including the effluent storage reservoir and the CDB reuse site, is about 1.1 mgd.

TABLE 5-10

WATER BALANCE @ CDB
AGRONOMIC CAPACITY

ASSUMPTIONS

EFFLUENT RESERVOIR SEEPAGE RATES - BASED ON HARDING LAWSON ASSOCIATES ESTIMATES
EVAPORATION DATA - BASED ON CDB WEATHER STATION DATA
CDB AGRONOMIC CAPACITY - 245 ACRES
CDB STORAGE ANNUAL SEEPAGE RATE - 1.6 FT/YR(SE&A, 1981)
MAX CDB STORAGE SURFACE AREA - 24 ACRES
CDB STORAGEAE CAPACITY - 137 AF
RESERVOIR CAPACITY - 4000 AF
MAX RESERVOIR SURFACE AREA - 80 ACRES
MINIMUM RESERVOIR STORAGE VOLUME - 100 AF
ASSUME CDB STORAGE PONDS ARE KEPT FULL YEAR ROUND

WATER SUPPLY

WATER DEMAND

MONTH	EFFLUENT MONTHLY		TOTAL		SURFACE AVERAGE		MONTHLY SEEPAGE		MONTHLY EVAP.		MONTHLY SEEPAGE		MONTHLY EVAP.		CDB CROP		MONTHLY SEEPAGE & DEMAND AT		TOTAL		NET		RESERVOIR	
	AF	AF	AF	AF	A	A	AF/A	AF/A	AF/A	AF/A	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF
OCT	105.52	2.27	107.79	14.00	14.00	14.00	0.01	0.27	0.14	0.14	3.78	9.60	53.90	67.42	40.37	140.37								
NOV	102.12	4.00	106.12	19.00	16.50	16.50	0.01	0.18	0.17	2.97	7.44	0.00	10.58	95.55	235.92									
DEC	105.52	8.07	113.59	23.00	21.00	21.00	0.01	0.11	0.21	2.31	5.76	0.00	8.28	105.31	341.23									
JAN	105.52	8.27	113.79	27.00	25.00	25.00	0.01	0.12	0.25	3.00	6.00	0.00	9.25	104.54	445.78									
FEB	95.31	6.33	101.64	29.00	28.00	28.00	0.01	0.17	0.28	4.76	7.20	0.00	12.24	89.40	535.18									
MAR	105.52	4.93	110.45	30.00	29.50	29.50	0.01	0.39	0.30	11.51	12.48	0.00	24.28	86.17	621.35									
APR	102.12	3.07	105.19	31.00	30.50	30.50	0.01	0.54	0.31	16.47	16.08	41.65	74.51	30.69	652.04									
MAY	105.52	4.93	110.45	28.00	29.50	29.50	0.01	0.52	0.30	15.34	15.60	188.65	219.89	-109.43	542.61									
JUN	102.12	2.27	104.39	25.00	26.50	26.50	0.01	0.76	0.27	20.14	21.36	176.40	218.17	-113.78	428.83									
JUL	105.52	2.00	107.52	20.00	22.50	22.50	0.01	0.71	0.23	15.98	20.16	232.75	269.11	-161.59	267.25									
AUG	105.52	1.80	107.32	12.00	16.00	16.00	0.01	0.63	0.16	10.08	18.24	240.10	268.58	-161.26	105.99									
SEP	102.11	2.00	104.11	12.00	12.00	12.00	0.01	0.45	0.12	5.41	13.92	90.65	110.10	-5.99	100.00									
TOTALS	1242.45	49.94	1292.39				0.12	4.85	2.71	111.74	153.84	1024.10	1292.39	0.00										

EFFLUENT FLOW AT AGRONOMIC CAPACITY - 1.11 MGD
EFFLUENT RESERVOIR CAPACITY REQUIRED - 652 AF



6.0 Future Reuse Opportunities

As discussed in the previous section the CDB land application site will, on the average, reuse 1.1 mgd of effluent. Beyond that flow level, other reuse sites must be available. This section describes known potential reuse sites and their capacities.

A number of options may be considered for reuse, including land application for irrigation, rapid infiltration for groundwater recharge, wetlands enhancement, and industrial reuse. This report is not intended to be an exhaustive analysis of all potential alternatives; its purpose is to describe some reuse options which appear most available, based on communication with potential users and environmental acceptability.

General Considerations For Reuse Options

Effluent reuse is normally the preferred method of treated wastewater disposal. There are several benefits that can be achieved through the reuse of treated wastewater. One benefit is that effluent can partially satisfy demand for fresh water, which is beneficial in areas of limited potable water sources. Another benefit is that, with crop irrigation, the treated wastewater can be used as a supplement to fertilizer, which can contribute to reduced farming costs. A third benefit of reuse is potential income to Washoe County from the sale of effluent. Revenue received from the sale of effluent may be used to offset the costs of treatment and conveyance.

Future Reuse Opportunities

In recent years the County has contacted various parties to assess interest in effluent reuse. Potential users include private property owners and government agencies with property in or near SAD #9. Generally, greatest interest has been expressed for irrigation of golf courses and open areas. Potential reuse sites are shown on Figure 6-1 and are described below.



Golf Course Irrigation

Golf course irrigation represents the largest potential reuse opportunity in the South Truckee Meadows area at this time. There are a number of planned golf courses in the area, some of which are in advanced design and approval stages. Three courses identified as likely reuse sites include the Double Diamond Ranch, Field Creek, and Whispering Pines golf courses.

Double Diamond Ranch. Double Diamond Ranch is located about 1/2 mile south of the STMWWTP just east of Highway 395. The proposed subdivision will have around 4,900 single family lots and 1,750 multi-family units. As designed, the development surrounds an 18 hole golf course covering 213 acres, of which 180 acres will be irrigated. This reuse option has the advantage of close proximity to the South Truckee Meadows treatment plant.

Field Creek Ranch. Field Creek Ranch is another subdivision with housing units and a golf course and is located just south of Zolezzi Lane and east of Highway 395 about 3 or 4 miles southwest of the STMWWTP. The proposed golf course consists of about 110 acres of irrigable turf. Plans to date have included irrigation with Steamboat Creek ditch water. However, irrigation with effluent appears to be a viable alternative.

Whispering Pines. Whispering Pines Golf Course will be located on the Callahan Ranch just east of Highway 431, and west of the Callahan Ranch Road about 8 miles southwest of the STMWWTP. The course will be situated in the middle of a subdivision and will have 160 acres of watered turf.

Crop Irrigation

Other than the CDB land application site, presently there is one other potential crop irrigation site. This site is an 80 acre area of property owned by Mr. Alex Walker located just north of the Whispering Pines Golf Course.

Open and Wetlands Area Irrigation

Several additional opportunities are available for irrigation of open space and wetlands areas for enhancement of habitat and groundwater recharge. Areas which are likely to be available are described below.

Washoe County Regional Park. The Washoe County Regional Park will be located north of the treatment plant as indicated on Figure 6-1. The area consists of two parcels which are owned by Washoe County and the Bureau of Land Management. The Washoe County area includes about 33 acres uphill from the effluent reservoir. The BLM parcel to the west includes 82 acres of open space. Effluent may be used in these areas for landscape and open space irrigation.

U.S. Forest Service Site. The Forest Service property is located just west of Field Creek subdivision and encompasses 120 acres of open space.

Saddlehorn Subdivision. The Saddlehorn subdivision will have 94 acres of open space adjacent to the west, which may be available for open space irrigation.

The Meadows. The Meadows is located on the Callahan Ranch east of the proposed Whispering Pines Golf Course off the Callahan Ranch Road. This area includes 100 acres of wetlands which may be enhanced by the application of effluent.

Harry Callahan, Sr. Property. This area is located on the Callahan Ranch southeast of the Meadows. It includes approximately 125 acres of wetlands which may be enhanced by application of effluent.

Mt. Rose High School. The proposed Mt. Rose High School will be located south of Highway 431 just below Shadowridge subdivision. The property consists of 64 acres, of which about 15 acres will be open space which may be irrigated.

Landscape Irrigation

Several parties have shown interest in using effluent for irrigation of landscaping within developments. Of particular interest is the potential for irrigating landscaping along US Highway 395 from the Huffaker Hills to the Mt. Rose Highway.



Table 6-1
Potential Future Reuse Sites and Capacity

<u>Site</u>	<u>Type</u>	<u>Area</u> acres	<u>Capacity</u> ac ft/yr
County Regional Park	Landscape irrigation	115	481
Double Diamond Ranch	Golf course	181	766
Field Creek Ranch	Golf course irrigation	110	460
Forest Service	Open area irrigation	120	502
Saddlehorn	Open area irrigation	94	393
Whispering Pines	Golf course irrigation	160	669
The Meadows	Wetlands for GW recharge	100	418
Harry Callahan	Wetlands for GW recharge	125	523
Alex Walker Property	Crop irrigation	80	334
Mt. Rose High School	Open space irrigation	15	63
Highway 395	Landscape irrigation	<u>20</u>	<u>60</u>
Total Reuse Capacity		1,120	4,669

Conceivably, a 20-foot strip of landscaping on each side of the highway could be irrigated using a drip-type system. The total acreage irrigated would be about 20 acres.

Site Reuse Capacities

Using the loading methodology discussed in Section 5, the reuse capacity of the aforementioned sites was estimated as indicated in Table 6-1, with the exception of the Highway 395 site. Landscape architects in the area indicate that an application rate of 3 acre-feet per acre per year is appropriate for landscape areas.



Combined with the 1,293 acre feet reuse capacity at CDB, the total reuse capacity of existing and potential sites is 5,962 acre-feet. Results in Section 5, Table 5-6 indicated 6,548 acre-feet of effluent available at the ultimate plant capacity of 6.0 mgd. Making a straight line comparison, development of all of the above sites, including CDB, will provide sufficient reuse capacity for about 5.3 mgd of treated flow.

7.0 Preliminary Conveyance Facilities

Over time as the connected population in SAD 9 increases, the South Truckee Meadows Wastewater Treatment Plant will be expanded to meet increased service needs. This section presents preliminary dates for expansion of the plant assuming various growth levels. Also presented herein are preliminary conveyance facilities required to deliver effluent to the future reuse sites identified in Section 6. Cost opinions for these facilities are also included.

Expansion Schedule

An expansion schedule is summarized in Table 7-1. The dates indicated are based on three growth rates which county staff selected for analysis. The 1992 flow to the treatment plant was assumed to be 0.15 mgd, which represents the raw wastewater flow diverted from the CDB treatment facility to the new plant. Flow projections were made based on growth rates of 100, 200, and 400 equivalent resident unit (ERU) connections added each year, with each ERU representing 325 gallons per day. As indicated, at the largest growth rate the expanded CDB land application system must be in operation in 1992, and additional storage provided by 1993.

NDEP requires plans for each expansion to be approved when flows reach 85% of the current discharge flow limit. This guideline is the basis for the "Start of Construction" flow shown in Table 7-1; when plant capacity reaches these flow levels the County should be starting construction of the next expansion. These projections should be reevaluated as actual growth data becomes available.

Conveyance Facilities

Table 7-1 indicates that additional reuse sites beyond CDB will be required sometime between 1999 to 2021. As indicated in Section 6, the County has identified a number of future reuse sites. For planning purposes, preliminary conveyance facilities to deliver effluent to all the sites have been developed and costed as discussed below.

Preliminary pipeline alignments were identified using available USGS maps. Generally the alignments are assumed to follow existing public rights of way and, where not available, private property and section boundary lines.



Table 7-1
Schedule of Expansion for STM Wastewater

Start of Constr Flow (mgd) ¹	Design Flow (mgd)	Expansion Necessary	Year ² Growth Rates ³		
			100 ERU/ Yr	200 ERU/ Yr	400 ERU/ Yr
0.17	0.2	Expand CDB Irrigation Facilities to 1.1 Maximum Reuse Capacity	1993	1992	1992
0.26	0.3	Expand Storage to 0.75 mgd with STM Effluent Reservoir	1996	1994	1993
0.64	0.75	Sludge Handling Improvements	2010	2001	1996
0.64	0.75	Expand Reservoir Capacity to 6.0 mgd	2010	2001	1996
0.94	1.1	Expand Effluent Reuse System Beyond CDB Land Application Site	2021	2006	1999
1.28	1.5	2d Phase Expansion to 3.0 mgd	2033	2012	2002
2.55	3.0	3d Phase Expansion to 4.5 mgd	2079	2035	2014
3.83	4.5	4d Phase Expansion to 6.0 mgd	2126	2059	2025
	6.0	System Capacity	2172	2082	2037

¹"Start of Construction" flow is equal to 85 percent of design flow. At this flow, all final plans and specifications for improvements must be approved (NDEP requirement).

²This is the year the facilities should be operational.

³One ERU equals 325 gallons/day.



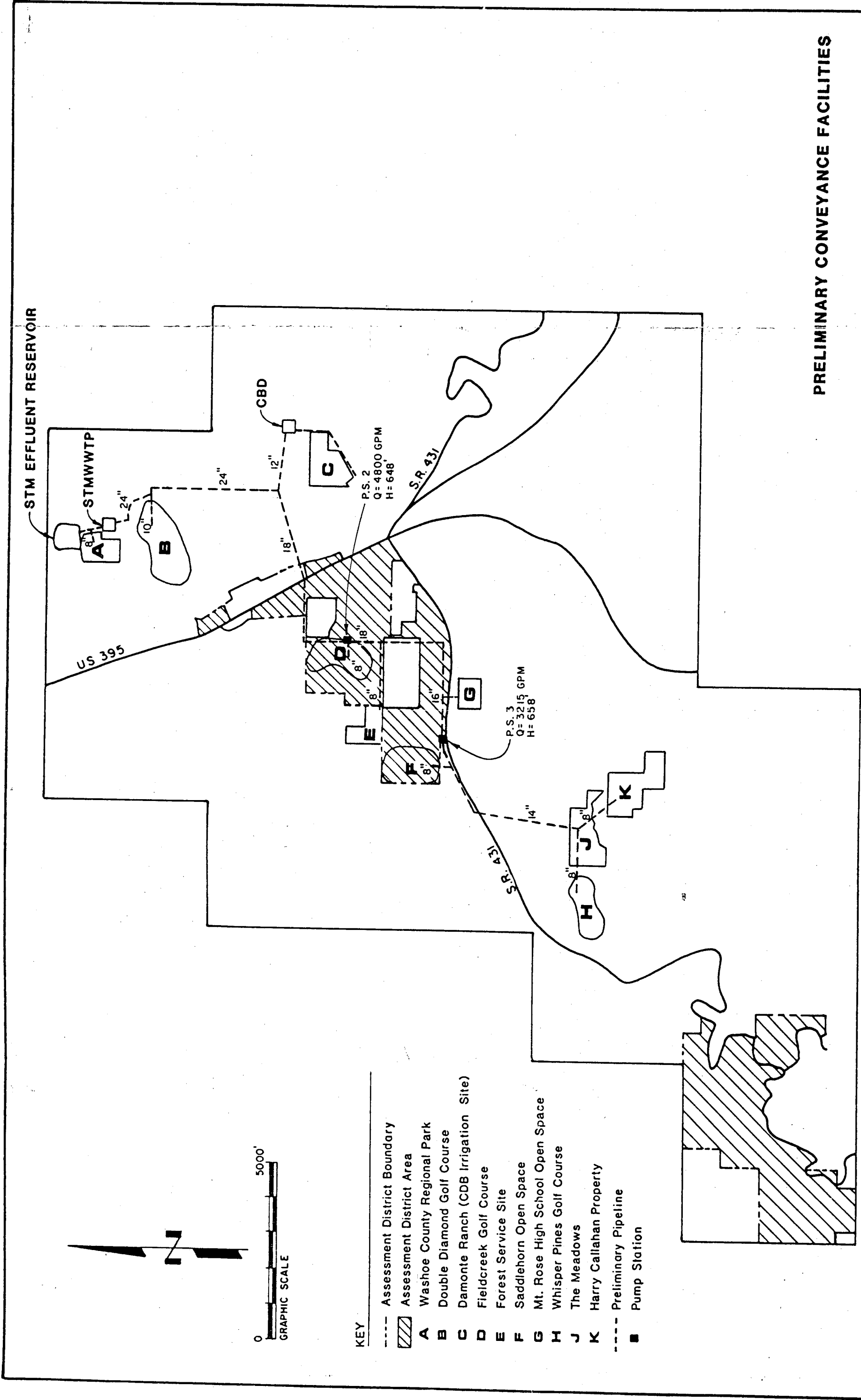
After alignment selection, pipe sizes were developed. Size selection was based on a flow of about 6 feet per second at the peak month (August) average daily flow for each site. Tables 7-2 and 7-3 show pipe design flows and sizes for mainlines and laterals respectively.

Pump stations will be required to lift the effluent from the treatment plant to the reuse sites. The approximate elevation of each preliminary pump station site is indicated in Table 7-4. For reference, the elevation at the treatment plant is 4435. Pump stations will be designed to pump the design flows with one pump in standby. As shown on Figure 7-1, for this report we have assumed two pump stations will be provided in addition to the existing one at the treatment plant. The stations are located at vertical intervals equal to about one-third of the total static head from the plant to the highest reuse site. Design heads are based on the static head plus pipe losses, based on the Hazen-Williams equation with a coefficient, C, equal to 120. Vertical column pumps will be provided.

Preliminary Conveyance Facilities Cost Opinion

Total costs were developed for the conveyance facilities as indicated in Tables 7-5 and 7-6. Based on recent bid experience, pipeline costs were assumed to average \$4 per inch diameter per linear foot of pipe. The pump station costs were projected from costs developed recently for similar applications. The 25 percent contingency is typical for planning level costs and is intended to provide for such costs as easement acquisition, power transmission, and unanticipated costs. It is important to note that the 24-inch pipeline shown on Figure 7-1 and the 12-inch lateral to CDB have been completed and are not included in the cost opinion. More detailed costs should be developed during the design memorandum phase of implementation.





PRELIMINARY CONVEYANCE FACILITIES

Table 7-2
Conveyance System Mainline Sizes

<u>Reuse Site</u>	<u>Peak Flow</u> (cfs)	<u>Pipe Size</u> (inches)
STMWWTP to Double Diamond Golf Course	17.0	24*
Double Diamond Golf Course to CDB Lateral	14.7	24*
CDB Junction to Fieldcreek Golf Course	10.8	18
Fieldcreek Golf Course to Forest Service Open Area	9.4	18
Forest Service Site to Mt. Rose High School	7.4	16
Mt. Rose High School to Saddlehorn	7.2	16
Saddlehorn to The Meadows	5.7	14

*Existing.



Table 7-3
Conveyance System Lateral Sizes

<u>Reuse Site</u>	<u>Peak Flow cfs</u>	<u>Pipe* Size inches</u>
Washoe County Regional Park	1.9	8
Double Diamond Golf Course	2.3	10
Fieldcreek Golf Course	1.4	8
Forest Service Open Area	1.9	8
Saddlehorn Open Area	0.3	8
Mt. Rose High School	1.5	8
Whispering Pines Golf Course	2.0	8
The Meadows	1.6	8
Harry Callahan Property	2.0	8

*Minimum lateral size equal to 8 inches.



Table 7-4
Site Elevations

<u>Reuse Site</u>	<u>Approximate Elevation</u> ft
STMWWTP	4,440
Washoe County Regional Park	4,850
Double Diamond Golf Course	4,445
CDB	4,472
Fieldcreek Golf Course	4,800
Forest Service	5,100
Saddlehorn	5,375
Whispering Pines Golf Course	5,800
The Meadows	5,450
Harry Callahan Property	5,300

Table 7-5
Preliminary Opinion of Pipeline Costs

<u>Pipe Size</u> inches	<u>Lineal Feet</u>	<u>Cost per ft</u> \$	<u>Total Cost</u> \$M
18	21,500	72	1.55
16	6,500	64	0.42
14	12,500	56	0.70
10	2,000	40	0.08
8	<u>12,000</u>	32	<u>0.38</u>
	54,500		3.13



Table 7-6
Conveyance Facilities Cost Summary

<u>Present Worth Costs</u>	<u>Cost</u> \$M
Capital Costs	
Pipeline	3.13
Pump Stations	<u>1.15</u>
Subtotal	4.29
Contingency at 25%	<u>1.08</u>
Subtotal	5.37
Engineering and Administration at 15%	<u>0.81</u>
Subtotal	6.18
Annual Costs (20 years @ 9 percent)	<u>2.40</u>
TOTAL PRESENT WORTH COST	<u>8.58</u>

APPENDIX A
DISCHARGE PERMIT

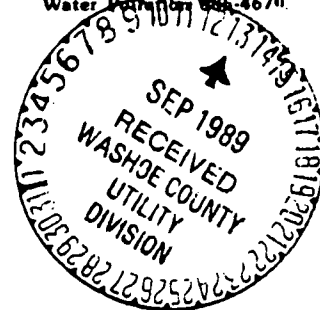
STATE OF NEVADA



DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL PROTECTION

201 South Fall Street
Carson City, Nevada 89710

September 8, 1989



Mr. John Collins
Department of Public Works
Sanitation District
Post Office Box 11130
Reno, NV 89520

Dear Mr. Collins:

In accordance with provisions of the Federal Water Pollution Control Act (33 U.S.C. 1251, et. seq.) and the Nevada Water Pollution Control Law Chapter 445, of the Nevada Revised Statutes, the Department of Conservation and Natural Resources, Division of Environmental Protection has reviewed the following application for a permit to discharge:

Discharger
Washoe County
Department of Public Works
Sanitation District

Permit Number
NEV40024

This office published a public notice of our proposed action in the Reno-Gazette Journal. The notice was also sent to interested persons on our mailing list.

After consideration of all comments received during the 30 day comment period, the Division of Environmental Protection is issuing the enclosed discharge permit to Washoe County Department of Public Works, Sanitation District. This action does not constitute a significant change from the tentative determinations set forth in the public notice.

The permit shall take effect on September 8, 1989. If you have any questions on this matter, feel free to contact me at 885-4670.

Sincerely,

A handwritten signature in cursive script that reads "Albert F. Porta".

Albert F. Porta
Permits Officer
Water Quality Section

AP/srb:14
Enclosure
cc: Art Molin
Bill Isaef

Permit No. NEV40024

AUTHORIZATION TO DISCHARGE

In compliance with the provisions of the Federal Water Pollution Control Act as amended, (33 U.S.C. 1251 et. seg; the "Act"), and the Nevada Revised Statutes,

Washoe County
Department of Public Works
South Truckee Meadows Facility
P.O. Box 11130
Reno, NV 89520

is authorized to discharge from a facility located at

8500 Mira Loma Road
Coordinates: Latitude 39° 27' 30" N
Longitude 119° 44' 30" W

to receiving waters named

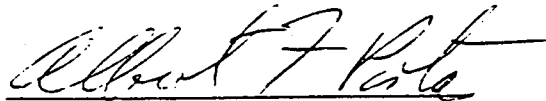
groundwaters of the State of Nevada
via spray irrigation

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

This permit shall become effective on 8 September 1989

This permit and the authorization to discharge shall expire at midnight,
8 September 1994.

Signed this 8th day of September, 1989.



Albert F. Porta
Permits Officer

cpt:12

A. EFFLUENT LIMITATIONS, MONITORING REQUIREMENTS AND CONDITIONS

1. During the period beginning on the effective date of this permit, and lasting until the permit expires, the the permittee is authorized to discharge treated effluent from the treatment facility to the reservoir, CDB storage ponds and irrigation site.

Samples taken in compliance with the monitoring requirements specified below shall be taken at the following locations(s): Influent, prior to treatment and effluent after treatment but prior to discharge to the reservoir CDB storage ponds or irrigation site.

The discharge shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATIONS			MONITORING REQUIREMENTS	
	30-day Average mg/l Kg/day lbs./day	mg/l	Daily Max. Kg/day lbs./day	Measurement Frequency	Sample Type
Flow (influent)*	1.5 MGD			Continuous	Continuous
Flow (effluent)*	1.5 MGD			Continuous	Continuous
BOD (5-day, 20°)**	30	170	375	Once/week	Composite
Suspended Solids**	30	170	375	Once/week	Composite
Total Phosphorus (as P)	--	---	---	Once/month	Composite
Total Dissolved Solids	--	---	---	Quarterly	Composite
Total Chlorine Residual***	200/100 ml	400/100 ml		Once/month	Discrete
Fecal Coliform Bacteria***	--	---	---	Once/month	Discrete
Ammonia Nitrogen (NH ₃ -N)	--	---	---	Once/month	Composite
Nitrates (NO ₃)	--	---	---	Once/month	Composite
Dissolved Oxygen	Not less than 6 Standard Units nor greater than 9 Standard Units			Once/month	Discrete
pH				Once/month	Discrete
Arsenic	--	---	---	Quarterly	Composite
Boron	--	---	---	Quarterly	Composite

* The flow shall be limited to 0.2 mgd, the existing approved disposal capacity of the irrigation site adjacent to the CDB ponds until plans and specifications for additional disposal capacity are approved and constructed; the flow shall be limited to 0.3 mgd, the existing storage capacity of the CDB holding ponds, until plans and specifications for additional storage capacity are approved and constructed. The CDB holding ponds must be renovated for storage of effluent from the South Truckee Meadows plant before the 0.3 mgd flow is permitted; the flow shall be limited to 0.75 mgd until additional sludge stabilization facilities, sludge dewatering facilities, blower capacity (to meet standby requirements), and effluent disposal/storage capacity correspond to a flow of 1.5 mgd.

** Influent and effluent shall be sampled.

*** The 200/100 ml limit is a 30 day median until draft effluent reuse regulations are finalized which will contain the future requirement.

2. The treatment works shall not cause objectionable odors in the collection system, treatment facility, reservoir, CDB storage ponds or irrigation site.
3. There shall be no discharge of substances that would cause a violation of water quality standards of the State of Nevada.
4. All solid waste shall be disposed pursuant to approval of the Division.
5. There shall be no discharge from the collection, treatment and disposal facilities except as authorized by this permit.
6. The treatment facility shall be fenced (6 ft. chain-link) and posted.
7. The collection, treatment and disposal facilities shall be constructed in conformance with plans approved by the Division. Any change to the approved plans must be sent immediately to the Division for approval.
- * 8. The facility shall be operated by a certified Nevada Class III operator in accordance with the Operations and Maintenance Manual which must be submitted 90 days after permit issuance for review and approval by this Division.
9. The land application site shall be fenced (4 strand barbed wire) and posted.
10. There shall be no runoff from the irrigation site and no standing water for prolonged periods.
11. The permittee shall establish groundwater monitoring wells at the land application site and other sites as required by the Division. The number and location must be submitted for review and approval 90 days after permit issuance or completion of the approved site, whichever occurs first.
 - a. A minimum of four (4) samples must be taken from each monitoring well prior to commencement of the discharge to establish background levels.
 - b. The monitoring wells must be monitored monthly with a discrete sample for Total Phosphorus, Nitrates and Chlorides, and submitted in accordance with Item I.C.2 of this permit.
12. Staff gauges shall be installed in all effluent storage facilities 90 days after permit issuance or after completion of construction, whichever occurs first. A weekly measurement of freeboard depths shall be taken and submitted in accordance with Part I.C.2 of the permit.

13. Any effluent reuse shall be reported to the Division on the Discharge Monitoring Report Form in accordance with Part I.C.2 of the permit. This report shall contain the name of the effluent user, the quality of the wastewater delivered, the date(s) it was taken, the measured gallonage used, and all other monitoring required by the approved effluent management plan. The permittee is responsible for instructing the users of the limited application and hazards involved when using this effluent. The effluent management plan must be submitted with the Operation and Maintenance Manual for review and approval. Modifications and/or additions to facilities must be incorporated into this manual within 90 days of the modification or change. Any deviation from the approved plan will be considered a violation of this permit.
14. A report on the operation of the sludge dewatering facilities shall be submitted on a quarterly basis. The report shall include the total volumes of sludge wasted, concentration of wasted sludge from the secondary system, volumes directed to each specific drying bed, how many drying beds were in service and how many times they were cleaned and reused, rotation of the beds in service, time for dewatering to take place, and the percent solids attained. The concentration of wasted sludge and percent solids of sludge attained after dewatering shall be tested once every two (2) weeks.

Part I (continued)

B. SCHEDULE OF COMPLIANCE

1. The permittee shall achieve compliance with the effluent limitations upon issuance of the permit.
2. No later than 14 calendar days following a date identified in the above schedule of compliance, the permittee shall submit either a report of progress or, in the case of specific actions being required by identified dates, a written notice of compliance or noncompliance. In the latter case, the notice shall include the cause of noncompliance, any remedial actions taken, and the probability of meeting the next scheduled requirement.
3. The Director, may upon request of the permittee and after public notice, revise or modify a schedule of compliance in an issued permit if he determines good and valid cause (strike, flood, materials shortage or other event over which the permittee has little or no control) exists for such revision.

C. MONITORING AND REPORTING

1. Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge.
2. Reporting

Monitoring results obtained during the previous three (3) months shall be summarized for each month and reported on a Discharge Monitoring Report Form postmarked no later than the 28th day of the month following the completed reporting period. The first report is due on *28 July 1990* Duplicated signed copies of these, and all other reports required herein, shall be submitted to the State and the Regional Administrator at the following addresses:

Division of Environmental Protection
Water Pollution Control
201 South Fall Street, Room 221
Capitol Complex
Carson City, NV 89710

Part I.C. (continued)

3. Definitions

- a. The "30-day average discharge" means the total discharge during a month divided by the number of days in the period that the facility was discharging. Where less than daily sampling is required by this permit, the 30-day average discharge shall be determined by the summation of all the measured discharges divided by the number of days during the period when the measurements were made.

If fewer than four measurements are made during a month, then compliance or noncompliance with the 30-day average discharge limitations shall not be determined.

- b. The "daily maximum" discharge means the total discharge during any calendar day.

- c. The "30-day average concentration", other than for fecal coliform bacteria, means the arithmetic mean of measurements made during a month. The "30-day average concentration" for fecal coliform bacteria means the geometric mean of measurements made during a month. The geometric mean is the n th root of the product of n numbers.

If fewer than four measurements are made during a month, the compliance or noncompliance with the 30-day average concentration limitation shall not be determined.

- d. The "daily maximum" concentration means the measurement made on any single discrete sample or composite sample.

- e. A "discrete" sample means any individual sample collected in less than 15 minutes.

- f. A "composite" sample means, for flow rate measurements, the arithmetic mean of no fewer than four (4) individual measurements taken at equal time intervals for eight (8) hours, or for the duration of discharge, whichever is shorter. A "composite" sample means, for other than flow rate measurements, a combination of no fewer than four (4) individual samples obtained at equal time intervals for either (8) hours, or for the duration of discharge, whichever is shorter. The volume of each individual sample shall be proportional to the discharge flow rate at the time of sampling.

4. Test Procedures

Test procedures for the analysis of pollutants shall conform to regulations (40 CFR, Part 136) published pursuant to Section 304(h) of the Act, under which such procedures may be required unless other procedures are approved by the Division.

Part I.C. (continued)

5. Recording of Results

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information:

- a. the exact place, date, and time of sampling;
- b. the dates the analyses were performed;
- c. the person(s) who performed the analyses;
- d. the analytical techniques or methods used; and
- e. the results of all required analyses.

6. Additional Monitoring by Permittee

If the permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit, using approved analytical methods as specified above, the results of such monitoring shall be included in the calculation and reporting of the values required in the Discharge Monitoring Report Form. Such increased frequency shall also be indicated.

7. Records Retention

All records and information resulting from the monitoring activities required by this permit, including all records of analyses performed and calibration and maintenance of instrumentation and recordings from continuous monitoring instrumentation, shall be retained for a minimum of three (3) years, or longer if required by the Director.

8. Modification of Monitoring Frequency and Sample Type

After considering monitoring data, stream flow, discharge flow and receiving water conditions, the Division of Environmental Protection may, for just cause, modify the monitoring frequency and/or sample type by issuing an order to the permittee.

9. Permit Modification and Reissuance

This permit may be modified, or alternatively, revoked and reissued, to comply with any applicable effluent limitation issued pursuant to the order of the United States District Court for the District of Columbia issued on June 8, 1976, in Natural Resources Defense Council, Inc. et al. v Russell E. Train, 8 ERC 2120 (D.D.C. 1976), if the effluent limitations so issued:

- a. is different in conditions or more stringent than any effluent limitations in the permit; or
- b. controls any pollutant not limited in the permit.

PART II

A. MANAGEMENT REQUIREMENTS

1. Change in Discharge

All discharges authorized herein shall be consistent with the terms and conditions of this permit. The discharge of any pollutant identified in this permit more frequently than or at a level in excess of that authorized shall constitute a violation of the permit. Any anticipated facility expansions, or treatment modifications which will result in new, different, or increased discharges of pollutants must be reported by submission of a new application or, if such changes will not violate the effluent limitations specified in this permit, by notice to the permit issuing authority of such changes. Any changes to the permitted treatment facility must comply with Nevada Administrative Code (NAC) 445.179 to 445.181. Pursuant to NAC 445.174, the permit may be modified to specify and limit any pollutants not previously limited.

2. Facilities Operation

The permittee shall at all times maintain in good working order and operate as efficiently as possible all treatment or control facilities, collection systems or pump stations installed or used by the permittee to achieve compliance with the terms and conditions of this permit.

3. Adverse Impact

The permittee shall take all reasonable steps to minimize any adverse impact to receiving waters resulting from noncompliance with any effluent limitations specified in this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge.

4. Noncompliance, Unauthorized Discharge, Bypassing and Upset

- a. Any diversion, bypass, spill, overflow or discharge of treated or untreated wastewater from facilities described in Part II.A.2 of this permit is prohibited except as authorized by this permit. In the event the permittee has knowledge that a diversion, bypass, spill, overflow or discharge not authorized by this permit is probable, the permittee shall notify the Division of Environmental Protection immediately.
- b. The permittee shall notify the Division of Environmental Protection within twenty-four (24) hours of any diversion, bypass, spill, upset, overflow or discharge of treated or untreated sewage other than that which is authorized by the permit. A written

Part II.A. (continued)

report shall be submitted to the Director within five (5) days of diversion, bypass, spill, overflow, upset or discharge, detailing the entire incident including:

- (1) time and date of discharge;
 - (2) exact location and estimated amount of discharge;
 - (3) flow path and any bodies of water which the discharge reached;
 - (4) the specific cause of the discharge; and
 - (5) the preventive and/or corrective actions taken.
- c. The following shall be included as information which must be reported orally within 24 hours: any unanticipated bypass which exceeds any effluent limitation in the permit; any upset which exceeds any effluent limitation in the permit; and violation of a limitation for any toxic pollutant or any pollutant identified as the method to control a toxic pollutant.
- d. The permittee shall report all instances of noncompliance not reported under Part II.A.4.b. at the time monitoring reports are submitted. The reports shall contain the information listed in Part II.A.4.b.
- e. An "upset means an exceptional incident in which there is unintentional and temporary noncompliance with the 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.
- f. In selecting the appropriate enforcement option, the Division of Environmental Protection shall consider whether or not the non-compliance was the result of an upset.
- g. The burden of proof is on the permittee to establish that an upset occurred.

In order to establish that an upset occurred, the permittee must provide, in addition to the information required under paragraph II.A.4.b. above, properly signed contemporaneous logs or other documentary evidence that:

- (1) The facility was at the time being properly operated as required in paragraph II.A.2 above; and
- (2) All reasonable steps were taken to minimize adverse impacts as required by paragraph II.A.3 above.

Part II.A. (continued)

5. Removed Substances

Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of waste waters shall be disposed of in a manner such as to prevent any pollution from such materials from entering any navigable waters.

6. Safeguards to Electric Power Failure

In order to maintain compliance with the effluent limitations and prohibitions of this permit the permittee shall either:

- a. provide at the time of discharge an alternative power source sufficient to operate the wastewater control facilities;

or, if such alternative power is not in existence,
- b. halt or reduce all discharges upon the reduction, loss, or failure of the primary source of power to the waste water control facilities.

B. RESPONSIBILITIES

1. Right of Entry

The permittee shall allow the Director and/or his authorized representatives, upon the presentation of credentials:

- a. to enter upon the permittee's premises where an effluent source is located or in which any records are required to be kept under the terms and conditions of this permit; and
- b. at reasonable times, to have access to and copy any records required to be kept under the terms and conditions of this permit; to inspect any monitoring equipment or monitoring method required in this permit; and to perform any necessary sampling to determine compliance with this permit or to sample any discharge.

2. Transfer of Ownership or Control

In the event of any change in control or ownership of facilities from which the authorized discharge emanate, the permittee shall notify the succeeding owner or controller of the existence of this permit, by letter, a copy of which shall be forwarded to the Director. All transfer of permits shall be approved by the Division of Environmental Protection.

Part II.B. (continued)

3. Availability of Reports

Except for data determined to be confidential under NRS 445.311, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the office of the State. As required by the Act, effluent data shall not be considered confidential. Knowingly making any false statement on any such report may result in the imposition of criminal penalties as provided for in NRS 445.337.

4. Furnishing False Information and Tampering with Monitoring Devices

Any person who knowingly makes any false statement, representation, or certification in any application, record, report, plan or other document filed or required to be maintained by the provisions of NRS 445.131 to 445.354, inclusive, or by any permit, rule, regulation or order issued pursuant thereto, or who falsifies, tampers with or knowingly renders inaccurate any monitoring device or method required to be maintained under the provisions of NRS 445.131 to 445.354, inclusive, or by any permit, rule, regulation or order issued pursuant thereto, is guilty of a gross misdemeanor and shall be punished by a fine of not more than \$10,000 or by imprisonment in the county jail for not more than 1 year, or by both fine and imprisonment. This penalty is in addition to any other penalties, civil or criminal, provided pursuant to NRS 445.131 to 445.354, inclusive.

5. Penalty for Violation of Permit Conditions

Nevada Revised Statutes (NRS) 445.317 provides that any person who violates a permit condition is subject to administrative and judicial sanctions as outlined in NRS 445.324 through 445.334.

6. Permit Modification, Suspension or Revocation

After notice and opportunity for a hearing, this permit may be modified, suspended, or revoked in whole or in part during its term for cause including, but not limited to, the following:

- a. violation of any terms or conditions of this permit;
- b. obtaining this permit by misrepresentation or failure to disclose fully all relevant facts; or
- c. a change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

Part II.B. (continued)

7. Toxic Pollutants

Notwithstanding Part II.B.6 above, if a toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established under Section 307(a) of the Act for a toxic pollutant which is present in the discharge and such standard in prohibition is more stringent than any limitation for such pollutant in this permit, this permit shall be revised or modified in accordance with the toxic effluent standard or prohibition and the permittee so notified.

8. 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 established pursuant to any applicable Federal, State or local laws, regulations, or ordinances.

9. Property Rights

The issuance of this permit does not convey any property rights, in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations.

10. Severability

The provisions of this permit are severable, and if any provision of this permit, or the application of any provisions 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.

PART III

A. OTHER REQUIREMENTS

1. Reapplication

If the permittee desires to continue to discharge, he shall reapply not later than 180 days before this permit expires on the application forms then in use.

2. Signatory Requirements

a. Applications. All permit applications shall be signed as follows:

- (1) For a corporation: by a responsible corporate officer. For the purposes 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 employing more than 250 persons or having gross annual sales or expenditures exceeding \$25 million (in second-quarter 1980 dollars), if 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 proprietor, respectively; or
- (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. Reports. All reports required by permits and and other information requested by the Director shall be signed by a person described in paragraph a. of this section, 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 in paragraph a. of this section;

Part III.A.2.b. (continued)

- (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. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.); and
- (3) The written authorization is submitted to the Division.
- c. Changes to authorization. If an authorization under paragraph b. of this section is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph b. of this section must be submitted to the Division prior to or together with any reports, information, or applications to be signed by an authorized representative.
- d. Certification. Any person signing a document under paragraphs a. or b. of 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."

3. Holding Pond Conditions

If any wastewater from the permittee's facility is placed in ponds, such ponds shall be located and constructed so as to:

- a. contain with no discharge the once-in-one-hundred year storm at said location;
- b. withstand with no discharge the once-in-one-hundred year flood of said location; and
- c. prevent escape of wastewater by leakage other than as authorized by this permit.

Part III.A. (continued)

4. Flow Rate Notification

The permittee shall notify the Director, by letter, not later than ninety (90) days after the 30-day average daily influent flow rate first equals or exceeds 85% of the design treatment capacity of the permittee's facility given in Part I.A. above. The letter shall include:

- a. The 30-day average daily influent flow rate;
- b. The maximum 24 hour flow rate during the 30 day period reported above and the date the maximum flow occurred;
- c. The permittee's estimate of when the 30-day average influent flow rate will equal or exceed the design treatment capacity of the permittee's facility;
- d. A status report on the treatment works which will outline but not be limited to past performance, remaining capacity of the limiting treatment and disposal units or sites, past operational problems and improvements instituted, modifications to the treatment works which are needed to attain the permitted flow rate due to changing site specific conditions or design criteria; and
- e. The permittee's schedule of compliance to provide additional treatment capacity before the 30-day average daily influent flow rate equals the present design treatment capacity of the permittee's facility.

The permittee shall implement and comply with the provisions of the schedule of compliance after approval by the Director, including in said implementation and compliance, any additions or modifications which the Director may make in approving the schedule of compliance.

APPENDIX B
EFFLUENT REUSE GUIDELINES

Nevada Division of Environmental Protection
Guidelines for Wastewater Treatment Plant Effluent Reuse

FINAL DRAFT - April 11, 1990

- I. The State of Nevada will not allow any reuse of wastewater treatment plant effluent which has not attained at least a secondary level of treatment. Additional Wastewater Treatment such as screen filtration, or Advanced Wastewater Treatment such as chemical addition, coagulation and dual media filtration may be required to attain the more stringent levels of disinfection presented herein depending on the type of secondary treatment provided. The Division will issue discharge permits to all persons, public or private entities who operate treatment works associated with the transfer and reuse of effluent.

No construction of any reuse treatment works shall begin until plans and specifications are approved by the Division and a discharge permit obtained. Plans and Specifications must be prepared and stamped by a registered professional engineer who has attained experience in the environmental field. Required reporting information needed for evaluating the approval or disapproval of the selected site will include but not be limited to depth and quality of groundwater, soils characterization and their compatibility with effluent application, flood hazards, distances to residential areas, surface waters and water supply wells, areas of public access and climatic conditions.

- II. The State of Nevada Division of Environmental Protection will not allow at this time irrigation of food crops for human consumption with wastewater treatment plant effluent except for surface irrigation of trees that bear fruits or nuts.
- III. An Effluent Management Plan must be submitted to the Division for review and approval before any reuse is initiated. This plan shall include but not be limited to notification of the public; flow measuring; effluent storage; distribution and application rates; (application areas depicted on a plot plan), irrigation scheduling; methods of controlling discharge volumes at the supply and reuse site; effluent and groundwater sampling locations and frequency; emergency procedures; precautionary measures to be taken to minimize aerosol drift at spray irrigation sites during times of excessive winds; runoff control; prevention of standing effluent; soils information; water rights; contracts or agreements; and nuisance problems.
- IV. The Division will also consider the remoteness of the reuse site as well as the availability of public access at the time of application when imposing a set of requirements for a specific site in a discharge permit. It may be possible that special provisions will have to be made at sites already constructed.

- V. The facility discharge permit will require sampling of specific constituents and specify the frequency of that sampling based on site specific conditions at the plant and reuse site.
- VI. The fecal coliform concentrations listed for each buffer zone represent minimum disinfection levels for those buffer zone distances. Buffer zone distances at all levels of minimum disinfection can be increased.
- VII. Spray and surface irrigation of pasture, forage, fiber, seed crops and greenbelt in prevented access reuse areas.

A. Spray Irrigation

Disinfection Requirements:

- 1.) No disinfection is required if a buffer zone of 800 feet is provided.

2.)	<u>200</u> c.f.u. or (colony forming units) Fecal Coliform 100 ml M.P.N. (Most probable number)	Geometric Mean In Any 30 Day Period
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<u>400</u> c.f.u. or (colony forming units) Fecal Coliform 100 ml M.P.N. (Most probable number)	Single Maximum Value
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- A buffer zone of 400 feet is required at this level of disinfection.

3.)	<u>23</u> c.f.u. of M.P.N. Fecal Coliform 100 ml	Geometric Mean In Any 30 Day Period
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<u>240</u> c.f.u. or M.P.N. Fecal Coliform 100 ml	Single Maximum Value
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Secondary, Recommended Limit:

5 N.T.U. (Nephelometric Turbidity Units) Turbidity	Single Maximum Value
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- A buffer zone of 100 feet is required at this level of disinfection.

4.)	<u>2.2</u> c.f.u. or M.P.N. 100 ml	Fecal Coliform	Geometric Mean in Any 30 Day Period
	<u>23</u> c.f.u. or M.P.N. 100 ml	Fecal Coliform	Single Maximum Value

Secondary, Recommended Limit:

3 N.T.U. (Nephelometric Turbidity Units) Turbidity	Single Maximum Value
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- No buffer zone is required at this level of effluent disinfection.

B. Surface Irrigation

Disinfection Requirements:

- 1.) No disinfection is required
- 2.) No buffer zone is required

C. General Requirements for both Spray and Surface Irrigation under Section VII.

- 1.) Public access to the irrigation site(s) must be prevented.
- 2.) Physical barriers must be installed and posted in a manner acceptable to the Division.
- 3.) Spray irrigation shall be designed and managed so as to minimize drift of aerosols beyond posted buffer zones or borders of the irrigation site.
- 4.) No runoff or standing effluent is allowed from or on a spray application site(s). The application period on a designated flood irrigation zone shall be no longer than necessary to saturate the root zone as related to onsite soils and distribution system uses. Runoff from a designated flood irrigation zone will be prevented or collected and controlled in a manner acceptable to the Division.
- 5.) Samples are to be taken at any point in the treatment works after final treatment prior to the application point.

VIII. Landscape Spray Irrigation at Golf Courses, Cemeteries and similar Greenbelts which are considered controlled access reuse areas.

A. Disinfection Requirements:

1.) $\frac{23}{100}$ c.f.u. or M.P.N. ml	Fecal Coliform	Geometric Mean In Any 30 Day Period
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$\frac{240}{100}$ c.f.u. or M.P.N. ml	Fecal Coliform	Single Maximum Value
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Secondary, Recommended Limit:

5 N.T.U. (Nephelometric Turbidity Units) Turbidity	Single Maximum Value
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- A buffer zone of 100 feet is required at this level of effluent disinfection.

2.) $\frac{2.2}{100}$ c.f.u. or M.P.N. ml	Fecal Coliform	Geometric Means In Any 30 Day Period
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$\frac{23}{100}$ c.f.u. or M.P.N. ml	Fecal Coliform	Single Maximum Value
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Secondary, Recommended Limit:

3 N.T.U. (Nephelometric Turbidity Units) Turbidity	Single Maximum Value
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- No buffer zone is required at this level of effluent disinfection.

3.)	$\frac{2.2}{100}$ c.f.u. or M.P.N. ml	Total Coliform	Geometric Mean In Any 30 Day Period
	$\frac{23}{100}$ c.f.u. or M.P.N. ml	Total Coliform	Single Maximum Value

Secondary, Recommended Limit:

2 N.T.U. (Nephelometric Turbidity Units) Turbidity	Single Maximum Value
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- No buffer zone is required at this level of effluent disinfection.
- B. General Requirements for Landscape Spray Irrigation under Section VIII.
 - 1a. All routine irrigation at the VIII - A.1. levels of disinfection shall be completed at night when public is not present on the site(s).
 - 1b. Public shall not be allowed access onto specific areas of the irrigation site within 1 hour after irrigation has been completed or until grasses are dry when utilizing a VIII - A.1. level of disinfection.
 - 1c. Routine golf course irrigation can be initiated before play is finished for the day when utilizing a VIII - A.2. level of disinfection. Players must have completed play and be removed from any influences from all sprinkler heads in a specific area before irrigation is initiated at the VIII - A.2. and VIII - A.3. level of disinfection.
 - 1d. Routine irrigation for all levels of effluent disinfection shall be implemented in accordance with a schedule outlined in the approved Effluent Management Plan. Specific areas within the site which are first accessed by the public will be irrigated during the initial stages of the schedule.
 - 2. The public shall be notified of the effluent reuse by cautions printed on scorecards, posting of water hazards, buffer zone borders, edges of the site or any other methods acceptable to the Division. The times of routine effluent irrigation are to be indicated to the public.

3. Water hazards at golf courses of effluent impoundments which receive a IX - A.1. or IX - A.2. quality effluent will be posted with an additional warning to avoid contact with treated wastewater. Water hazards and impoundments can be utilized as effluent holding reservoirs.
- 4a. No daytime effluent irrigation or application of grasses and greens will be allowed with a VIII - A.1. level of disinfection.
- 4b. All areas of equipment maintenance, breakage repair and irrigation testing shall be isolated from public access and adequately posted as required by the Division.
- 4c. When utilizing an effluent with a VIII - A.2. level of disinfection additional public notification shall be provided or installed during day time irrigation or application of effluent on controlled specific areas of the site when maintenance of equipment, greens or grasses is necessary and remain in place until grasses are dry. Notification methods and specific areas will be defined by the user and approved by the Division. The additional notification shall be directly related to this necessary activity and areas which are affected. This irrigation or application is to take place during periods of peak sunshine whenever possible.
5. The spray irrigation system shall be designed and managed so as to minimize the drift of aerosols beyond the edge of the buffer zones, and posted borders or physical barriers of the irrigation site.
6. No runoff or standing effluent is allowed from or on the irrigation sites other than what is contained in adequately posted water hazards and storage basins.
7. Samples are to be taken at any point in the treatment works after final treatment prior to the application point.
8. Physical barriers shall be installed when dwelling units are adjacent to the irrigation site when utilizing a VIII - A.2. level of disinfection.
9. All drinking water fountains located within the irrigation site shall be covered during all times of effluent irrigation.
10. No restrictions on public access will apply after irrigation has been completed and during times of daytime effluent irrigation or application necessary for maintenance of equipment grasses and greens if a IX - A.4. level of effluent disinfection is attained. The public will still need to be notified of the effluent reuse in method(s) acceptable to the Division and be protected against being directly sprayed by a discharge from a sprinkler head.

IX. Landscape Spray Irrigation at highway islands, medians, shoulders, as well as, lawns, greenbelt areas, parks and playgrounds which are considered unrestricted public access areas.

A. Disinfection Requirements:

1.)	$\frac{2.2}{100 \text{ ml}}$ c.f.u. or M.P.N.	Fecal Coliform	Geometric Mean In Any 30 Day Period
	$\frac{23}{100 \text{ ml}}$ c.f.u. or M.P.N.	Fecal Coliform	Single Maximum Value

Secondary, Recommended Limit:

3 N.T.U. (Nephelometric Turbidity Units) Turbidity	Single Maximum Value
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2.)	$\frac{2.2}{100 \text{ ml}}$ c.f.u. or M.P.N.	Total Coliform	Geometric Mean In Any 30 Day Period
	$\frac{23}{100 \text{ ml}}$ c.f.u. or M.P.N.	Total Coliform	Single Maximum Value

Secondary, Recommended Limit:

2 N.T.U. (Nephelometric Turbidity Units) Turbidity	Single Maximum Value
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B. General Requirements for Landscape Irrigation under Section X.

1. A buffer zone is not required at these levels of effluent disinfection. The spray irrigators will be adjusted to discharge near the ground surface and away from areas of normal and frequent public access and also at restricted angles so as to minimize aerosols.

2. The spray irrigation system shall be designed and managed so as to minimize the drift of aerosols beyond the edge of the buffer zones, and posted borders or physical barriers of the irrigation site.
3. No standing effluent or runoff is allowed on or from the site.
4. Routine irrigation for the X - A.1. level of effluent disinfection shall be implemented in accordance with a schedule outlined in the approved Effluent Management Plan. Irrigation of specific areas within the site first accessed by the public will be completed in the first stages of the schedule.
5. Areas shall be posted notifying the public of the effluent reuse to the satisfaction of the Division. Routine times of irrigation are to be indicated to the public.
6. No routine irrigation is to take place when the public is allowed or present on greenbelt irrigation sites.
- 7a. Provisions can be made in the Effluent Management Plan for irrigation, or application of controlled portions of the site during the daytime periods when maintenance of equipment, ground or grasses is necessary if adequate precautions, acceptable to the Division are approved to protect the public.
- 7b. Additional public notification shall be provided or installed when utilizing an effluent disinfected to the IX - A.1. level during any daytime irrigation or application of effluent on controlled specific areas of the site when maintenance of equipment, greens and grasses is necessary and remain in place until grasses are dry. Notification methods and specific areas will be defined by the user and approved by the Division in the Effluent Management Plan. The additional notification shall be directly related to this necessary activity and areas which are affected. This irrigation or application is to take place during periods of peak sunshine, whenever possible.
8. Samples are to be taken at any point in the treatment works after final treatment prior to the application point.
9. Physical barriers shall be installed as required by the Division, depending on adjacent developments.
10. No restrictions on public access will apply after routine irrigation has been completed and during times of day time effluent irrigation or application necessary for maintenance of equipment and grasses if a IX - A.2. level of disinfection is attained.

X. Landscape Subsurface Drip and Surface Irrigation in Unrestricted Public Access Areas.

A. Disinfection Requirements:

<u>200</u> c.f.u. or M.P.N. 100 ml	Fecal Coliform	Geometric Means In Any 30 Day Period
<u>400</u> c.f.u. or M.P.N. 100 ml	Fecal Coliform	Single Maximum Value

B. General Requirements for drip irrigation under Section X:

1. No buffer zone is required.
2. Irrigated areas must be posted notifying the public of the effluent reuse to the satisfaction of the Division. Routine times or irrigation are to be indicated to the public.
3. No standing effluent, surfacing effluent or effluent runoff is allowed on or off the designated irrigation sites.
4. No disinfection will be required if public access is prevented.
5. Samples are to be taken at any point in the treatment works after final treatment prior to application.

XI. Controlled Recreational Impoundments and Controlled Landscape Impoundments.

A. Disinfection Requirements:

1.) <u>23</u> c.f.u. or M.P.N. 100 ml	Fecal Coliform	Geometric Mean In Any 30 Day Period
<u>240</u> c.f.u. or M.P.N. 100 ml	Fecal Coliform	Single Maximum Value

Secondary, Recommended Limit:

5 N.T.U. (Nephelometric Turbidity Units) Turbidity	Single Maximum Value
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2.)	<u>2.2</u> c.f.u. of M.P.N. 100 ml	Fecal Coliform	Single Maximum Value
	<u>23</u> c.f.u. or M.P.N. 100 ml	Fecal Coliform	Single Maximum Value

Secondary, Recommended Limit:

3 N.T.U. (Nephelometric Turbidity Units) Turbidity	Single Maximum Value
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- B. General Requirements for Controlled Recreational Impoundments and Controlled Landscape Impoundments under Section XI:
- 1a. A minimum XI - A.1. level of disinfection shall be maintained in a Controlled Landscape Impoundment.
 - 1b. A minimum XI - A.2. level of disinfection shall be maintained in a Controlled Recreational Impoundment.
 - 2a. The effluent pond or lake shall be posted to the satisfaction of the Division notifying the public of the effluent reuse and any limiting practices.
 - 2b. No fishing, boating, swimming, wading or aerosol generating fixtures such as decorative aerators, waterfalls or water fountains, will be allowed in Controlled Landscape Impoundments with an XI - A.1. level of disinfection.
 - 2c. No swimming or wading will be allowed in a Controlled Recreational Impoundment.
 3. Provisions shall be to discharge excess storm flows from the impoundment to a surface water in a manner acceptable to the Division.
 4. Samples are to be taken at any point in the treatment works after final treatment prior to discharge into impoundments.

XII. Unrestricted Recreational Impoundments.

A. Disinfection Requirements:

$\frac{2.2 \text{ c.f.u. of M.P.N.}}{100 \text{ ml}}$

Total Coliform

Geometric
Mean In
Any 30 Day
Period

$\frac{23 \text{ c.f.u. of M.P.N.}}{100 \text{ ml}}$

Total Coliform

Single
Maximum
Value

Secondary, Recommended Limit:

2 N.T.U. (Nephelometric Turbidity Units) Turbidity

Single
Maximum
Value

B. General Requirements for Unrestricted Recreational Impoundments:

1. Provisions shall be to discharge excessive storm flows from the impoundment to a surface water in a manner acceptable to the Division.
2. Samples are to be taken at any point in the treatment works after final treatment prior to discharge into the impoundments.

XIII. Effluent Storage Reservoirs.

1. The Division will allow the construction of these holding impoundments for effluent which is to be reused. Site conditions must be conducive to such a project. Special requirements for construction such as lining, surface area, amount of storage required and groundwater monitoring will be determined during design review.
2. Effluent storage reservoirs will not be considered part of the treatment process. Wastewater treatment plants will be required to produce at a minimum, a secondary quality effluent before flow which is to be reused is directed into an effluent storage reservoir, located either on or off the plant site.
3. Provisions could possibly be made in the design of a lagoon wastewater treatment plant to utilize an impoundment as a reservoir and treatment unit if additional treatment is needed to attain a secondary effluent and the proper conditions are present at the plant site.

4. All mechanical plants will be required to attain a minimum secondary quality effluent or a higher quality effluent as outlined in the related design criteria of their treatment units, before discharging any effluent storage reservoir.
5. Storage reservoirs are designed to hold effluent for application during desired time periods when the effluent can be properly reused.
- 6a. Effluent contained within reservoirs shall consistently meet or exceed the disinfection level and quality of its intended use if no additional treatment is provided.
- 6b. Reuse limits will be placed on wastewater treatment plant effluent quality. Monitoring of effluent which is about to be withdrawn from a storage reservoir for spray irrigation will be required in the discharge permit to document the deviation from the required reuse limits.
7. Golf course, recreational or landscape impoundments must receive effluent of at least a secondary quality to prevent odor generation and rapid solids accumulation. The minimum secondary treatment is to be completed at the plant site. Additional disinfection or tertiary treatment of effluent at golf course, recreational or landscape impoundments and storage reservoirs will be allowed if a higher quality effluent is required for the site specific reuse. The installation of additional treatment units will require more effluent monitoring to assure that the higher quality effluent is being produced before being directed into the reservoir(s).
8. Storage reservoirs shall be posted and/or fenced to the satisfaction of this Division depending on their use and location.

XIV. Industrial or Commercial Reuse Generating No Aerosols.

Typical examples include but are not limited to closed cooling systems, sand and gravel operations construction uses, compaction and nonpotable process water additions.

A. Minimum Disinfection Requirements:

<u>200</u> c.f.u. or M.P.N. 100 ml	Fecal Coliform	Geometric Mean In Any 30 Day Period
<u>400</u> c.f.u. or M.P.N. 100 ml	Fecal Coliform	Single Maximum Value

B. General Requirements for Industrial and Commercial Reuse:

1. Notification to the public and employed personnel at the reuse site who come in contact with the treatment plant effluent will be provided and included in the Effluent Management Plan for review and approval.
2. The Division reserves the right to impose more stringent limits on any treatment plant effluent reuse which may impose a higher risk to the public on a case by case basis.
3. Samples of the effluent should be taken at the discharge point of the treatment plant or delivery point at the reuse site.

XV. Industrial and Commercial Reuse Generating Aerosols.

Typical examples include but are not limited to dust control, equipment washdown, cooling towers and tools on devices using spray nozzles.

A. Minimum Disinfection Requirements:

<u>200</u> c.f.u. of M.P.N. 100 ml	Fecal Coliform	Geometric Mean In Any 30 Day Period
<u>400</u> c.f.u. or M.P.N. 100 ml	Fecal Coliform	Single Maximum Value

B. General Requirements for Construction Reuse:

1. Notification to the public and employed personnel at the reuse site who may come in contact with treatment plant effluent will be provided and included in the Effluent Management Plan for review and approval.
- 2a. The Division reserves the right to impose more stringent limits on treatment plant effluent reused at a construction site which is subject to frequent public access such as well traveled highway renovations.
- 2b. Reuse sites which generate aerosols and are adjacent to areas of unrestricted or controlled access shall conform with the disinfection levels and buffer zones outlined in Part VII - A.
3. Samples of effluent shall be taken at the discharge point of the treatment plant or before reuse is initiated at the construction site.

DEFINITIONS:

1. Aerosols - Any material, solid or liquid, of a size that remains in the air for an appreciable length of time before settling. Typical size range from .01 to .20 um.
2. BOD₅ (inhibited) - Biochemical oxygen demand which represents the strength of a waste in terms of its organic content. It is an amount of oxygen that is required for the oxidation of carbonaceous matter present in a water.
3. Buffer Zone - The distance from the normal wet-line edge of the irrigation, under no wind conditions, to the property line, posted barrier at the reuse site, or any point open to public access.
4. Controlled Access Area - A reuse site where public access is regulated by the nature of the activity or by means other than physical barriers.
5. Controlled Landscape Impoundment - A body of treatment plant effluent or effluent diluted with another water source which is used to enhance the attractiveness of an area.
6. Controlled Recreational Impoundment - A body of treatment plant effluent or effluent diluted with another water source in which recreation is limited to non-full body contact activities such as fishing and boating.
7. Drip Irrigation - Application of effluent through nozzles below the ground surface.
8. Disinfection - Any physical or chemical method that reduces the number of organisms in a given location. Specifically, reducing the number of pathogenic organisms in the effluent flow stream.
9. Effluent - Water resulting from the treatment of sewage at a wastewater treatment plant.
10. Fecal Coliform - Bacteria that have demonstrated a high probability of having come from human fecal material and has been used as an indicator for pathogenic organisms in effluent because of their resistance to disinfection.
11. Geometric Mean - The " n^{th} " root of the product of N numbers (i.e., the geometric mean of 2, 4, 8, 3 is $\sqrt[4]{2 \cdot 4 \cdot 8 \cdot 3} = 3.72$).
12. Greenbelt Area - A site which has been designated as a park, or grass plat in or near residential areas.
13. Landscape Surface Irrigation - Application of effluent through nozzles at the ground surface which do not produce streams, mists or aerosols.

14. Median - The middle value in a distribution in which an equal number of values lie above and below that value.
15. Prevented Access Area - A reuse site where public access is prohibited by physical, posted barriers, such as fences or walls, which are acceptable to the Division for the specific site.
16. Process Water - A liquid which becomes part of a finished product or is essential in the production of another.
17. Restricted Recreation Impoundment - A body of effluent or diluted effluent in which recreation is limited to non-full body contact activities.
18. Reuse - Any beneficial utilization of effluent from a wastewater treatment plant.
19. Secondary Level of Treatment - Biologically oxidized sewage which has a BOD₅ (inhibited) concentration of 30 mg/l or lower.
20. Spray Irrigation - The application of effluent by utilizing a gravity distributed system.
21. Surface Irrigation - The application of effluent by utilizing a gravity distributed system.
22. Treatment or Waste Treatment - (As defined in N.A.C. 445.109) "Treatment or Waste Treatment" means the stabilization or alteration of the quality of wastewater waters by physical, biological or chemical means or a combination thereof, for the purpose of reducing or eliminating adverse effects on water quality, such that the tendency of the wastes to cause any degradation in water quality or other environmental conditions is reduced or eliminated.
23. Treatment Works - (As defined in NRS. 445.186) "Treatment Works" means:
 1. Any devices and systems used in the storage, treatment, recycling and reclamation of municipal sewage or industrial wastes of a liquid nature, including intercepting sewers, outfall sewers, sewage collection systems, pumping power and other equipment, and their appurtenances;
 2. Extensions, improvements, remodeling, additions, and alterations of any device or system mentioned in subsection 1;
 3. Units essential to provide a reliable recycled supply such as standing treatment units and clean well facilities;

4. Any works, including site acquisition of the land that will be an integral part of the treatment process or is used for ultimate disposal or residues resulting from such treatment; and
 5. Any other method or systems for preventing, abating, reducing, storing, treatment, separating or disposing of municipal waste, including storm water runoff, industrial waste or waste in combined storm water and sanitary sewer systems.
24. Unrestricted Access Area - A reuse site where public access is not regulated in any way and is open at all time.
25. Unrestricted Recreational Impoundment - A body of treatment plant effluent or effluent diluted with another water source in which there are no limits on body contact activities.

Signed _____ Date _____
Julian P. Bielawski, P.E.
Environmental Engineer

Signed _____ Date _____
Richard E. Reavis, P.E.
Environmental Engineer

Signed _____ Date _____

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