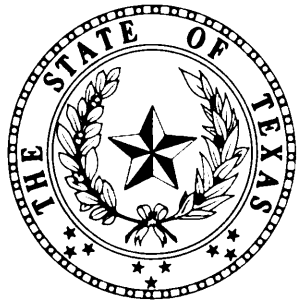
PLAN SUMMARY REPORT
for the
RIO GRANDE BASIN
WATER QUALITY MANAGEMENT PLAN



Prepared by

WEST TEXAS COUNCIL OF GOVERNMENTS

for

TEXAS DEPARTMENT OF WATER RESOURCES

July, 1978

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as LP-166

PLAN SUMMARY REPORT

FOR THE

RIO GRANDE BASIN

WATER QUALITY MANAGEMENT PLAN

Developed to Satisfy
Section 208 Requirements
of the
Federal Water Pollution Control Act
Amendments of 1972

Pursuant to
Title 40 CFR 130 and 131 and
The State of Texas Continuing Planning Process

PREPARED BY

WEST TEXAS COUNCIL OF GOVERNMENTS

AND THE

TEXAS DEPARTMENT OF WATER RESOURCES

The preparation of this report was financed through planning grants from the State of Texas and the U.S. Environmental Protection Agency through the Texas Department of Water Resources.

JULY, 1978

FISCAL YEAR 1980 REVISIONS
TO THE
STATE OF TEXAS WATER QUALITY MANAGEMENT PLANS

INTRODUCTION

Initial water quality management plans were developed in accordance with the requirements of Section 208 of the Federal Clean Water Act, Public Law 95-217, during the period of 1975-1979. Upon completion of significant plan documents, certification was made by the Governor of Texas that the completed document was prepared in accordance with the Act and applicable federal regulations and that the plan document was adopted as the State Water Quality Management Plan for the affected area. Subsequent to that initial certification, more accurate information has been developed regarding municipal facility needs, facility design information, and facility population projections.

The primary sources of the more recent data are the revised statewide population projections (by county and designated area) contained in the document "POPULATION PROJECTIONS FOR TEXAS" (certified by the Governor) and facility-specific information developed as part of the application and/or facility planning phases of the Section 201 (PL 95-217) Construction Grants Program. The information developed within the Section 201 program has been evaluated by the Texas Department of Water Resources in cooperation with the local 208 planning agency for the affected area and the results of those evaluations are summarized in this document.

The information presented in this document is intended only to revise the facility planning information for the areas listed in the following tables. Other areas for which information is presented in the initial water quality management plans are not affected by this document.

FACILITY INFORMATION

The following tables are organized by 208 planning areas, both state and designated. Within each table, facility planning information is provided in five categories:

1. AREA - City or special district for which proposed needs are identified. The physical planning boundaries for the area are established in the management agency designation for that area certified by the Governor.

2. MANAGEMENT AGENCY - The entity proposed for designation as the management agency for the collection, treatment or both for the area in accordance with Section 208(c) of the Clean Water Act. Many of the entities listed have already been designated by the Governor for the purposes shown.

3. POPULATION - Base and projected population for the area. The population projections presented herein are consistent with the statewide population projections in "POPULATION PROJECTIONS FOR TEXAS"

and the requirements of paragraph 8a of Appendix A to Title 40 Code of Federal Regulations Part 35, Subpart E (Construction Grants).

4. TREATMENT/COLLECTION NEEDS - The columns shown under the TREATMENT NEEDS heading indicate a probable need for new facilities (N), expanded facilities (E) in terms of treatment capacity (volume), and/or upgraded facilities (U), which may be required due to more stringent effluent limits or needed plant rehabilitation. The columns under the COLLECTION NEEDS heading indicate a probable need for a new collection system (N), expansion of an existing system (E), and/or rehabilitation (R) of an existing system.

5. COMMENTS - Any special conditions relative to an area's needs are indicated in this column.

UTILIZATION OF FACILITY INFORMATION

The facility information in this document is intended to be utilized in the preparation of facilities plans and the subsequent design and construction of needed facilities, primarily in the Section 201 Construction Grants Program. Design capacities of units of the treatment and collection systems shall be based upon the population projections contained in this document plus any additional needed capacity established for commercial/industrial influents and documented infiltration/inflow volumes (treatment or rehabilitation).

The probable needs shown under the TREATMENT NEEDS and/or COLLECTION NEEDS headings are preliminary findings; specific needs for an area shall be as established in the completed and certified detailed engineering studies conducted during Step 1 (facilities planning) of the Section 201 Construction Grants Program.

EFFLUENT LIMITS

Specific effluent quality for any wastewater discharges resulting from any of the facilities recommended in this document shall be in accordance with Chapter XVIII, Effluent Standards, of the Permanent Rules of the Texas Department of Water Resources in effect at the time of permit issuance for the specific facility.

RIO GRANDE BASIN

AREA	MANAGEMENT AGENCY (Collection/Treatment)	POPULATION				TREATMENT NEEDS			COLLECTION NEEDS			COMMENTS
		BASE (Year)	5 YEAR (Year)	10 YEAR (Year)	20 YEAR (Year)	N	E	U	N	E	R	
Alpine	City of Alpine (C/T)	5,971 (1970)	6,400 (1980)	6,800 (1990)	6,900 (2000)			X			X	
Anthony, Texas (joint system)	City of Anthony (C/T)	2,200 (1975)	2,700 (1980)	3,300 (1990)	4,350 (2000)		X			X		Cost effective analysis to be determined in facility plan
Anthony, New Mexico	(Management Agency to be designated by State of New Mexico)		2,400 (1980)									Projections under review by New Mexico
Vinton, Texas	City of Vinton (C/T)		340 (1980)									Projections under review
Dell City	City of Dell City (C/T)	523 (1980)		664 (1990)	843 (2000)		X			X		
Eagle Pass	City of Eagle Pass (C/T)	15,364 (1970)	22,319 (1980)	28,311 (1988)	34,678 (1998)		X			X		
El Paso	City of El Paso and El Paso Public Service Board (C/T)	441,300 (1980)	540,000 (1990)	625,900 (2000)	710,100 (2010)	X	X	X	X	X	X	Total population. Options to be determined by cost-effective analysis in facility plan

AREA	MANAGEMENT AGENCY (Collection/Treatment)	POPULATION				TREATMENT NEEDS			COLLECTION NEEDS			COMMENTS
		BASE (Year)	5 YEAR (Year)	10 YEAR (Year)	20 YEAR (Year)	N	E	U	N	E	R	
El Paso Co. WCID #4 District Boundaries	El Paso Co. WCID #4 (C/T)	3,630 (1975)	4,378 (1983)	5,147 (1990)	6,487 (2000)		X	X		X		
Fort Hancock WCID #1	Fort Hancock WCID #1 (C/T)	504 (1980)		550 (1995)	560 (2000)		X			X		
Kermit	City of Kermit (C/T)	8,115 (1978)	8,199 (1980)	8,822 (1990)	9,403 (2000)		X			X		
Laredo	City of Laredo (C/T)	101,300 (1979)	111,100 (1985)	118,100 (1990)	140,700 (2005)		X			X		
Resident Population		82,600 (1979)	90,300 (1985)	96,000 (1990)	114,400 (2005)							
Transient Population		18,700 (1979)	20,800 (1985)	22,100 (1990)	26,300 (2005)							
Monahans	City of Monahans (C/T)	8,619 (1975)	8,907 (1980)	9,894 (1990)	10,408 (1995)			X				
Pecos	City of Pecos (C/T)	13,300 (1980)	13,550 (1985)		13,850 (1995)	X			X			
Sonora	City of Sonora (C/T)	5,500 (1980)		7,100 (1990)	8,700 (2000)		X			X		

EXCERPT FROM

FISCAL YEAR 1980 REVISIONS

TO THE

STATE OF TEXAS WATER QUALITY MANAGEMENT PLANS

RIO GRANDE BASIN

Developed in accordance with Section 208
of the Federal Clean Water Act of 1977 and
Title 40 Code of Federal Regulations
Part 35, Subpart G

Compiled by

TEXAS DEPARTMENT OF WATER RESOURCES

July 1980

PREFACE

In order to estimate costs and other characteristics of sewage collection and treatment systems, it is necessary to make estimates of future service areas, treatment plant locations, lift station locations, and trunk line layouts. These locations and configurations are estimated for preliminary planning purposes and should be considered as approximate rather than specific. Accordingly, the locations and configurations presented within this report are not specific requirements of the plan. The exact location and sizing of sewer collection/treatment system elements will be determined for a given service area when a detailed engineering study is done either as part of the 201 Facility Plan or as part of a preliminary engineering study undertaken independently of the grant program. Appropriate changes in the recommendations of this report will be made at that time as necessary, to reflect actual conditions for the area.

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CHAPTER A

INTRODUCTION

Section 208 of the Clean Water Act of 1977 (Public Law 95-217) requires areawide wastewater treatment management planning be performed throughout the nation. The planning described in this Section of the Act consists of two types:

1. In areas with complex water quality problems the Governor designates (a) the boundaries of each such area, and (b) a local planning agency which is responsible for preparing a wastewater treatment management plan for that area.

2. The State is responsible for preparing a water quality management plan for the remainder of the State not designated by the Governor.

The policies and procedures established by the Environmental Protection Agency, for the accomplishment of Section 208 planning by both the State and designated areawide planning agencies, are set forth in Title 40, Code of Federal Regulations, Parts 130 and 131.

Within Texas, eight areas have been designated by the Governor as being complex water quality problem areas: Killeen-Temple, Southeast Texas, Corpus Christi, Dallas-Fort Worth, Houston, Lower Rio Grande Valley, San Antonio, and Texarkana. In order to prepare a water quality management plan for the remainder of the state, the state has been divided into fifteen planning areas. The boundaries of these fifteen areas essentially follow the hydrologic boundaries of the major river basins.

The water quality management plan being prepared for each of these state planning areas consists of two primary documents:

1. Volume I. Basic Data Report includes information on existing wastewater treatment facilities; existing water quality; existing land use patterns; existing population; and projections of economic growth, population, and probable land use patterns.

2. Volume II. Plan Summary Report presents the recommended plan for water quality management and the legal, financial, and institutional requirements of that plan. It also includes a description of feasible alternatives, an environmental assessment, and a summary of public participation activities conducted in the development of the plan.

The following document is the final report (Volume II. Plan Summary Report) for the Rio Grande River Basin, exclusive of the Lower Rio Grande Valley Designated Areawide Planning Area. It was developed through the joint efforts of the West Texas Council of Governments and Bernard Johnson, Inc., for the Texas Department of Water Resources, in conformance with the State of Texas Continuing Planning Process, as amended April, 1976 and the appropriate federal regulations. All plan content elements as specified in Title 40, Code of Federal Regulations, Part 131 are set forth in either Volume I. Basic Data Report or Volume II. Plan Summary Report.

CHAPTER B

PROBLEM DEFINITION

Volume I identifies two categories of problems which are to be addressed in Volume II. The first category includes water quality problems which can be identified from an analysis of in-stream water quality data. The second category of problems includes those which are due to needs for various types of wastewater system facilities in a given community. The following problem definition chapter summarizes the specific in-stream water quality problems and facility needs which are addressed in this volume.

1. WATER QUALITY PROBLEM AREAS

The purpose of Chapter F, "Water Quality Assessment", in Volume I was to analyze existing data and make comparisons of existing water quality levels to the water quality standards in order to identify water quality problem areas. The majority of the data used to define water quality problems came from the following two sources:

1. Texas Department of Water Resources Surface Water Monitoring Network

2. United States Geological Survey Cooperative Program

The water quality problem areas are generally defined as segments within each basin that have shown violations of the Texas Water Quality Standards as established by the Texas Department of Water Resources.

Following is a summary of the problems identified in Chapter F and other in-stream water quality problems which have been identified subsequent to the preparation of Volume I. These additional problem areas have been identified as a result of public hearings, advisory committee meetings, and the review of Volume I by interested parties.

The following discussion will deal with the water quality problems found in the Rio Grande Basin for the period 1972 through 1977. Each segment exhibiting a water quality problem will be discussed in numerical order beginning with Segment 2301.

a. Segment 2301. Segment 2301 (Rio Grande Tidal) exhibited two water quality violations in 1973. Monitoring station 2301.01 recorded a dissolved oxygen (DO) violation of 4.5 mg/l on June 29, 1973 and a pH violation of 5.1 of February 7, 1973. The DO concentration fell below the dissolved oxygen standard of 5.0 mg/l and the pH value fell below the minimum pH standard of 7.0.

b. Segment 2302. That portion of the Rio Grande River from the International Bridge in Brownsville to Falcon Dam, Segment 2302, has exhibited similar water quality standards violations as Segment 2301. On the same dates that water quality standards violations were exhibited by Segment 2301, February 7, 1973 and June 29, 1973, Segment 2302 exhibited violations for the same water quality parameters. On February 7, 1973 a pH violation of 4.4 was recorded, and on June 29, 1973 a dissolved oxygen violation of 4.8 mg/l was recorded. These respective values violated the stream standards of 6.5 for pH and 5.0 mg/l for dissolved oxygen. In addition, monitoring station 2302.02 exhibited a temperature violation of 92°F (33.3°C) of July 22, 1975. This value exceeded the standard of 90°F (32.2°C).

c. Segment 2303. Falcon Lake exhibited one water quality violation and this occurred late in water year 1974. On September 6, 1974, monitoring station 2303.01 exhibited a dissolved oxygen concentration of 4.8 mg/l, which fell below the DO standard of 5.0 mg/l.

d. Segment 2304. Segment 2304, below the City of Laredo, exhibited fecal coliform levels substantially in excess of the standard, as monitored by stantions 2304.0050 and 2304.0075.

e. Segment 2305. Amistad Reservoir has exhibited good water quality except for surface water temperature violations. The temperature standard of 88°F (31.1°C) was exceeded on August 14, 1974 when a surface water temperature value of 94°F (34.4°C) was exhibited by monitoring station 2305.01. One year later on August 29, 1975 this same monitoring station exhibited a second surface water temperature violation of 91°F (32.8°C).

f. Segment 2306. That portion of the Rio Grande River from the headwaters of Amistad Reservoir to the confluence of the Rio Conchos near Presidio, (Segment 2306), has exhibited only one water quality violation. On October 21, 1971, a dissolved oxygen concentration of 2.5 mg/l was recorded at monitoring station 2306,01. This value falls below the stream standard for DO of 5.0 mg/l for Segment 2306

g. Segment 2307. Monitoring station 2307.01 has exhibited water quality problems which involve the chloride and total dissolved solids (TDS) parameters. For water year 1975, this station exhibited an annual average chloride concentration of 492 mg/l, which exceeded the standard of 300 mg/l. This station also exhibited a TDS annual concentration of 1,736 mg/l, exceeding the standard of 1,500 mg/l, in water year 1975.

h. Segment 2308. Segment 2308 of the Rio Grande is very short in length and extends from the Riverside Diversion Dam to the New Mexico-Texas state line. Monitoring station 2308.01, which is located 1.7 miles upstream from the American Dam, exhibited the only water quality violations for Segment 2308. On December 15, 1971 and again on February 25, 1972 this monitoring station exhibited a dissolved oxygen violation of 3.5 mg/l. This value violates the dissolved oxygen stream standard of 5.0 mg/l.

i. Segment 2310. Segment 2310 of the Pecos River has exhibited water quality problems associated with minerals and dissolved oxygen. The single TDWR monitoring station 2310.01, located near Shumla on the Pecos River exhibited a sulfate violation in 1975. The sulfate standard of 500 mg/l was exceeded with an annual average sulfate concentration of 592 mg/l. Four sulfate concentrations recorded that year ranged from 426 mg/l to 700 mg/l with three of the sulfate concentrations exceeding the standard. In 1972, two DO violations were exhibited by this TDWR station. On November 16, 1971 and again on June 14, 1972 a dissolved oxygen concentration of 4.5 mg/l was recorded. In each instance, the stream standard for dissolved oxygen of 5.0 mg/l was violated.

j. Segment 2311. The upper poriton of the Pecos River up to Red Bluff Dam, Segment 2311, has exhibited no water quality problems in 1974 and 1975. However, in 1973 and 1972 monitoring stations 2311.02 and 2311.03 exhibited dissolved oxygen concentrations below the 5.0 mg/l standard. Monitoring station 2311.02

exhibited a DO concentration of 4.5 mg/l on three occassions in 1972, and exhibited a 3.0 mg/l reading on September 18, 1973. Monitoring station 2311.03 has exhibited only one DO violation, and this occurred on November 22, 1971 when a DO concentration of 4.5 mg/l was recorded. The dissolved oxygen standard requires that the daily flow exceed the minimal seven-day flow to be expected in a two-year period. The daily flows recorded for the DO violations do not exceed the standard, and, thus, the dissolved oxygen concentrations can be used to indicate conditions in the Pecos River during extremely low flow conditions only.

A review of unpublished water quality data for water years 1976 and 1977 indicates that there are no new or different water quality problem areas in the Rio Grande Basin. This review indicates that chloride measurements continue to exceed the stream standard in Segments 2307 and 2309. Segments 2308 and 2311 show continued water quality problems in complying with the dissolved oxygen (DO) standard. The only other parameter that indicated possible water quality problems was pH. The review indicates that pH measurements continue to exceed the stream standards established for Segments 2306 and 2311.

2. FACILITY INFORMATION

The Rio Grande Basin is located in south and west Texas (see Figure II-B-1). The Basin is subdivided into drainage areas which are associated with stream segments delineated by the Texas Department of Water Resources. The drainage areas of the Rio Grande Basin are shown in Figure II-B-2.

Municipalities and industries of the study area are required to obtain permits, Waste Control Orders, from the Texas Department of Water Resources. These permits authorize and limit discharges and require periodic reports describing the quantity and quality of discharge.

A listing of the municipal dischargers in the Rio Grande Basin is presented in Table II-B-1. This description includes a listing of the permitted municipal dischargers, their permitted discharge levels (30-day average), their reported discharges, and their relative location within the Rio Grande Basin.

A description of the industrial dischargers in the Middle Rio Grande Basin is presented in Table II-B-2. This description includes a listing of permitted dischargers and their two-digit Standard Industrial Code (SIC) identification, permitted discharge levels (30-day average), and the reported discharge levels. Apparently only Reynolds Mining Company in Segment 2304 is in violation of it's permit.

Municipal Solid Waste sites are inventoried in Table II-B-3. This table organizes the municipal disposal sites alphabetically by county and lists the permit number, operator, longitude, latitude and class of the site. The sites are identified by permit number on Plate 7C in the map packet. Industrial Solid Waste sites are inventoried in Table II-B-4. This table organizes the industrial disposal sites alphabetically by county and records the permit number operator and class for each site. The sites are identified by permit number on Plate 7C in the map packet.

Feed lots are inventoried in Table II-B-5. This table organizes the feed lots by county and lists the permit number, stream segment location, and operator. These feed lots are identified by permit number on Plate 7C in the map packet.

FIGURE II-B-1

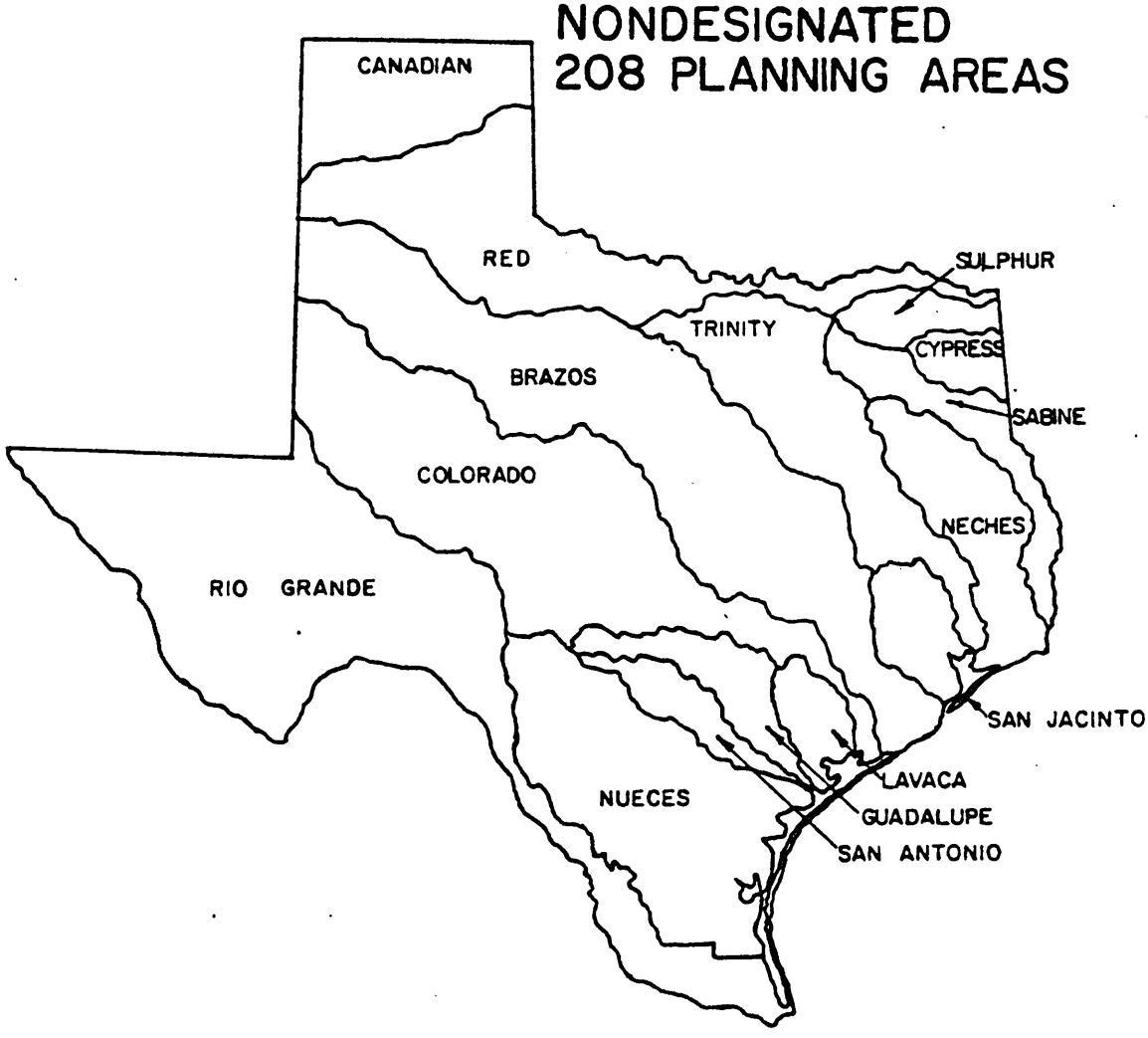
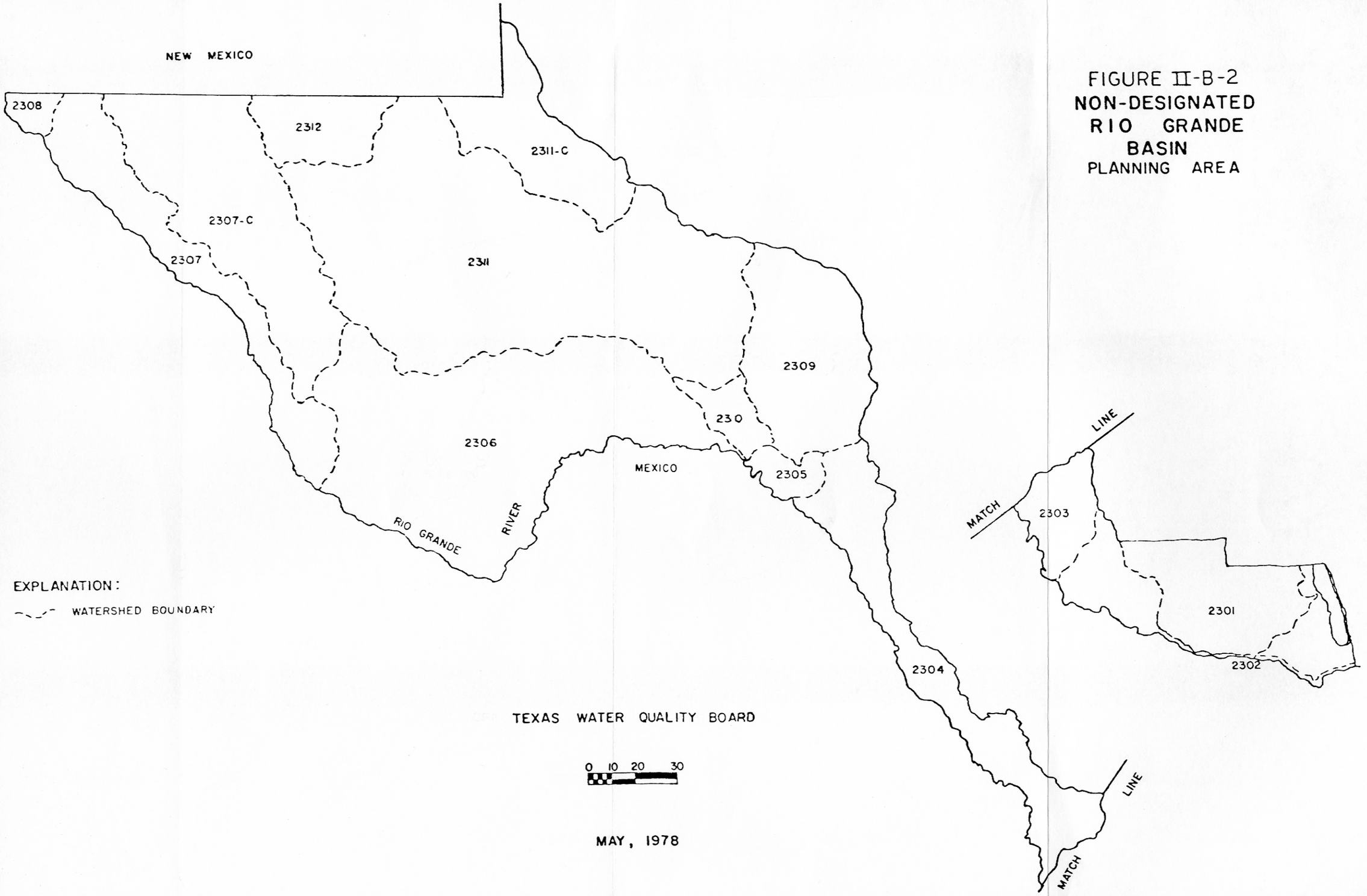

NONDESIGNATED
208 PLANNING AREAS
CANADIAN
RED
SULPHUR
TRINITY
CYPRESS
BRAZOS
SABINE
COLORADO
NECHES
RIO GRANDE
SAN JACINTO
LAVACA
NUECES
GUADALUPE
SAN ANTONIO

FIGURE II-B-2
NON-DESIGNATED RIO GRANDE BASIN
PLANNING AREA



TEXAS WATER QUALITY BOARD

MAY, 1978

TABLE II-B-1

MUNICIPAL WASTEWATER TREATMENT FACILITIES
IN THE RIO GRANDE STUDY AREA

Segment Number	Name	WTCOG Number	Treatment Scheme	Permit Requirements 30-Day Average Flow MGD	BOD mg/l	TSS mg/l	Self-Reported Effluent 30-Day Average Flow MGD	BOD mg/l	TSS mg/l
			MIDDLE RIO GRANDE						
2302	Roma	11212-01		0.250	30	30	Reported No Discharge		
2302	Roma	11212-02		----------Cancelled----------					
2302	Starr Co. WCID #2	10802-01	Aeration Basin	1.500	20	20	0.967	9	9
2302	Starr Co. WCID #2	10802-02		----------Cancelled----------					
2303	Zapata Co. Waterworks	10462-02	Oxidation Pond	0.800	10	15	0.138	26.5	29
2303	Zapata Co. San Ygnacio	10848-01		----------Cancelled----------					
2304	Brackettville	10194-01	Imhoff Tank, Drying Beds	0.300	20	20	0.142	10	12
2304	Del Mar Conser. Dist.	10337-01	Trickling Filter, Clarifier, Irrigation	0.240	30		Reported No Discharge		
2304	Del Rio Util. Comm.	10159-01	Imhoff Tank, Trickling Filter	4.000	20	20	1.317	21	15
2304	Del Rio Util. Comm.	10159-03	Aeration Basin	1.760	20	20	0.766	22	14
2304	Del Rio Util. Comm.	10159-05	Aeration Basin, Oxidation Pond	0.324	30	30	0.3	43	45
2304	Eagle Pass	10406-01	Activated Sludge	2.000	20	20	2.0	40-115	40-115
2304	Laredo	10681-01	Water Treatment Plant	4.110		20*	2.974		
2304	Laredo	10681-02		8.000	20	20	8.0	50-80	50-80
2304	Maverick Co.	11156-01	Imhoff Tank, Oxidation Pond	0.010	30	30	Reported No Discharge		
2309	Crockett Co. WCID #1	10059-01	Imhoff Tank, Oxidation Pond	0.040	30	30	Reported No Discharge		
2309	Crockett Co. WCID #1	10059-02		0.0105	----------No Discharge----------				
2309	Crockett Co. WCID #1	10059-03		----------No Discharge----------					
2309	Sonora			0.350	20	20	0.256	67.5	55.2
2311	Crane	10750-01	Imhoff Tank, Evaporation Pond	0.250	30	--------No Discharge-------			
2311	Ft. Stockton	10708-01	Aeration Basin, Oxidation Pond	----------No Discharge----------					
2311	Grandfalls	10764-01	Imhoff Tank, Oxidation Pond	0.140	30	30	Reported No Discharge		
2311	Iraan	10692-01		0.090	30	30	Reported No Discharge		
2311	Kermit	10200-01	Oxidation Ponds	1.000	30	30	Reported No Discharge		
2311	McCamey	10218-01	Land Application	----------No Discharge----------					
2311	Monahans	10224-01	Land Application	----------No Discharge----------					
2311	Pecos	10245-01	Oxidation Pond	----------No Discharge----------					
2311	Rankin	10601-01	Imhoff Tank, Oxidation Pond	----------No Discharge----------					
2311	Sheffield Water Supply Corp.	10916-01	Oxidation Pond, Land Application	----------No Discharge----------					
2311	West Texas Children's Home	11121-01	Imhoff Tank, Oxidation Pond	----------No Discharge----------					
2311	Wickett	10622-01	Oxidation Pond, Land Application	----------No Discharge----------					
2311	Wink	10318-01	Imhoff Tank, Oxidation Pond	----------No Discharge----------					

*Above TSS in river

TABLE II-B-1 (Continued)

Segment Number	Name	WTCOG Number	Treatment Scheme	Permit Requirements 30-Day Average Flow MGD	BOD mg/l	TSS mg/l	Self-Reported Effluent 30-Day Average Flow MGD	BOD mg/l	TSS mg/l
			UPPER RIO GRANDE						
2306	Marfa (#1 Main Plant)	10109-01	Imhoff-Sand Filter-Sand Application	----------No Discharge----------					
2306	Marfa (Ft. Russell Plant)	10109-02	Dourtman Tank-Holding Tank-Land Application	----------No Discharge----------					
2306	Alpine Sewage Treatment Plant	10117-01	Oxidation Ditch, Final Clarifier, Chlorination	0.640	20	20	0.179	40	50
2306	Marathon Water Supply & Sewer Service Corp.	10974-01	Oxidation Pond	0.028	20	25	--No Report Received--		
2307	El Paso Co. WCID #4 (Fabens, Texas)	10166-01	Trickling Filter	0.350	32	26		29	22
2307	Van Horn Sewage Treatment Plant	10721-01	Anaerobic & Aerobic Lagoon	0.150	35	80	--No Report Received--		
2307	El Paso Co. Water Authority (Subdivision-Surety Towers)	10795-01	Imhoff-Aerated Lagoon	0.890	30	30	-----No Discharge-----		
2307	Dell City Sewage Treatment Plant	10866-01	Oxidation Pond	0.030	20	--	-----No Discharge-----		
2307	Ft. Hancock WCID #1	11173-01	Anaerobic & Aerobic Lagoons	0.325	35	80	---Not Constructed----		
2307	El Paso (Socorro Plant)	10408-08	Oxidation Ponds	20.000	30	0	12	34	69
2307	Rosenborrough, Joseph	11665-01	Package Plant	----	30	30	---Permit Cancelled---		
2307	Union Oil Co. of California	11499-01	Oxidation Ponds	----	30	30	--No Report Received--		
2308	Gaslight Square Mobile Home Estate	11241-01	Package Plant	----	20	20	--No Report Received--		
2308	Rio Valley Joint Venture	11469-01	Package Plant	0.023	20	20	0.015	9	9
2308	Tennis West, Inc.	11605-01	Package Plant	0.100	20	20	0.002	2	13
2308	Anthony Sewage Treatment Plant	10120-01	Oxidation Ponds	0.500	30	30	-----No Discharge-----		
2308	El Paso WCID (Westway)	10167-01	Oxidation Ponds	----------No Discharge----------					
2308	El Paso (Delta Street Plant)	10408-04	High Rate Trickling Filter	25.000	35	35	17	40	35
2308	El Paso (Ascarate Plant)	10408-05	High Rate Trickling Filter	1.000	50	70	0.344	34	37
2308	El Paso (Ysleta Plant)	10408-06		----------Abandoned----------					
2308	El Paso (Northeast Plant)	10408-07	Oxidation Ponds	----------No Discharge----------					
2308	Canutillo ISD (Canutillo)	11561-01	Activated Sludge	0.50	20	20	----------		
2311	Ft. Davis Water Supply Corp.	10970-01	Oxidation Ditch	0.045	20	20	0.030	6	--
2311	University of Texas-McDonald Observatory (Upper Level Plant)	11370-01	Extended Aeration Package Plant	0.010	20	20	--No Report Received--		
2311	University of Texas-McDonald Observatory (Toyah Creek Plant)	11374-01	Extended Aeration Package Plant	0.005	20	20	--No Report Received--		

TABLE II-B-2

INDUSTRIAL DISCHARGERS WITHIN
THE RIO GRANDE STUDY AREA

Segment Number	Name	WTCOG Number	SIC Number	Permit Requirements 30-Day Average Flow MGD	BOD mg/l	TSS mg/l	Self-Reported Effluent 30-Day Average Flow BOD	BOD mg/l	TSS mg/l
		MIDDLE RIO GRANDE							
2302	Scroggins Brothers	01629-01		Cancelled					
2302	Starr Feedyards	01815-01	02	No Discharge					
2304	Alta Verde Industries, Inc.	01657-01	20	No Discharge					
2304	Capitol Aggregates Inc.	01363-01		Cancelled					
2304	Central Power and Light	01200-01	49	0.740		25	0.156		
2304	Laredo Packing Company	01577-01	20	No Discharge					
2304	Maverick Beef Producers, Inc.	01425-01	02	No Discharge					
2304	Reynolds Mining Corp.	00500-01	32	0.100		30	0.6*		30*
2304	Reynolds Mining Corp.	00500-02	32	No Discharge					
2304	T. S. Scibienski	01431-01	02	No Discharge					
2304	Texas Mining and Smelting	01264-01	33	0.008		No Discharge			
2311	Delaware Basin Aggregates, Inc.	01335-01		Cancelled					
2311	Duvall Corp.	01316-01		Cancelled					
2311	J & J Farms Inc.	01362-01	02	No Discharge					
2311	Kesey Bros. Feeders Inc.	01828-01	02	No Discharge					
2311	Pecos Feedyards, Inc.	01356-01	02	No Discharge					
2311	Phipps Sand and Gravel Company Inc.	01320-01		Cancelled					
2311	Portable Aggregates Incorporated	01321-01		Cancelled					
2311	Ranchers Feed Yards, Inc.	01614-01	02	No Discharge					
2311	Reeves County Feeders, Inc.	01615-01	02	No Discharge					
2311	Seven D Pens	01330-01	02	No Discharge					
2311	Texas Electric Service Co.	00556-01	49	0.325		No Discharge			
2311	Texas Electric Service Co.	00556-02	49	4.000		No Discharge			
2311	West Texas Electric Service Co.	00961-01	49	0.864					
2311	Worsham Flying Service, Inc.	01365-01		Cancelled					

*Average of 5 months reported Jan 78 thru June 78

TABLE II-B-2 (Continued)

Segment Number	Name	WTCOG Number	Treatment Scheme	Permit Requirements 30-Day Average Flow MGD	BOD mg/l	TSS mg/l	Self-Reported Effluent 30-Day Average Flow MGD	BOD mg/l	TSS mg/l
			UPPER RIO GRANDE						
2306	Kuykendall & Black Cattle Co.	01334-01	02	----------No Discharge----------					
2307	Paso Pork Producers	20038-01	02	---------Exempted from Reporting---------					
2307	Paso Pork Producers	20210-01	02	---------Exempted from Reporting---------					
2307	Crinco Investment, Inc.	11711-01	93	0.035	30	--	No Report Received		
2307	Union Oil Company of California	11499-01	93	---	30	30	No Report Received		
2307	Bill Ellis Feed Lot Inc.	01358-01	02	----------No Report Received----------					
2307	Clint Feed Yards	01347-01	02	----------No Report Received----------					
2307	Fabens Delinting Plant	00516-01	07	0.022	--	--	No Report Received		
2307	Lee Moor Farm	01349-01	02	----------No Report Received----------					
2307	Tex-Mex Feed Yards	01841-01	02	----------No Report Received----------					
2308	Whitfield Properties, Inc.	01989-01	76	----------No Discharge----------					
2308	Airco Welding Products	00688-01	28	----------No Discharge----------					
2308	Casuco, Inc.	01243-01	20	----------No Discharge----------					
2308	Chevron Oil Company	00517-01	29	----------No Discharge----------					
2308	El Paso Electric Company	00836-01	49	----------No Discharge----------					
2308	Guido Packing Company	01275-01	20	---	20	--	No Report Received		
2308	Mountain Pass Canning Company	00821-01	20	----------No Discharge----------					
2308	Phelps Dodge Refining Corp.	00461-01	33	----------No Discharge----------					
2308	Southwestern Portland Cement	00470-01	32	----------No Discharge----------					
2308	Texaco, Inc.	00412-01	29	----------No Discharge----------					
2308	Vinton Delinting Company	01530-01	07	----------No Discharge----------					
2311	Duval Corporation	01315-01	93	----------No Discharge----------					
2311	Sul Ross State University	20699-01	02	---------Exempted from Reporting---------					

TABLE II-B-3
RIO GRANDE BASIN
MUNICIPAL SOLID WASTE SITES

COUNTY	DIST	PERMIT & REG NO	SEQMT	OPERATOR	LOCATION		CLASS	SIZE	NOTES
					LONG	LAT			
Brewster		PA 354		Alpine	N30.35°	W103.[illegible]°	I		2
Brewster		PA 380		Brewster County	N30.21°	W103.24°	III		2
Cameron		PA 169		Harlingen	N26.1[illegible]°	W97.[illegible]°	I		2
Cameron		PA 638		San Benito	N26°0[illegible].6'	W97°35.7'	I		2
Cameron		PA 761		San Benito	N26.18°	W97.63°	I		2
Cameron		PA 537		Los Fresnos	N26.06°	W97.49°	I		2
Cameron		PA 259		Sanitary Landfill Corp.	N25°53'	W97°24'	I		2
Cameron		PA 193		Brownsville	N25.94°	W97.38°	I		2
Cameron		PA 210		FWSD #1 Cameron County	N26°03.45'	W97°13.30'	VI		2
Cameron		PA 230		FWSD #1 Cameron County	N26°03.45'	W97°13.30'	VI		2
Crane		PA 427		Crane City	N31.44°	W102.39°	II		
Crockett		PA 587		Ozona	N30.72°	W101.15°	II		2
Culberson		PA 693		Van Horn	N31.03°	W104.82°	I		2
El Paso		PA 134		El Paso Co.	N31.31°	W106.57°	I		2
El Paso		PA 729		El Paso City	N31.99°	W106.43°	I		2
El Paso		PA 730		El Paso City	N31.78°	W106.28°	I		2
El Paso		PA 728		El Paso City			VI		2
El Paso		PA 135		El Paso Co.	N31.60°	W106.17°	I		2
El Paso		PA 136		El Paso Co.	N31.53°	W106.12°	I		2
El Paso		PA 901		El Paso Co.	N31.49°	W106.14°	I		2
Hidalgo		PA 256		LM Solid Waste Disp Co.	N26.27°	W98.41°	I		2
Hidalgo		PA 258		Havana Materials Corp.	N26.28°	W98.30°	I		2
Hidalgo		PA 489		Hidalgo Co. Site C	N26.30°	W98.38°	I		2
Hidalgo		PA 226		Mission	N26.26°	W98.30°	IV		2
Hidalgo		PA 225		Mission	N26.19°	W98.33°	I		2
Hidalgo		PA 490		Mission City	N26.11°	W98.24°	I		2
Hidalgo		PA 748		Pharr			VI		2
Hidalgo		PA 254		Pharr	N26.17°	W98.19°	IV		2
Hidalgo		PA 129		Hidalgo Co. Pct. 2	N26.17°	W98.17°	I		2
Hidalgo		PA 170		Alamo	N26.15°	W98.10°	I		2
Hidalgo		PA 446		Donna	N26.15°	W98.05°	I		2
Hidalgo		PA 310		Hidalgo Co.	N26.45°	W98.16°	I		2
Hidalgo		PA 243		Edinburg	N26.32°	W98.13°	I		2
Hidalgo		PA 1123		Weslaco			VI		2
Hidalgo		PA 488		Hidalgo Co. Site A	N26.13°	W97.90°	I		2
Hidalgo		PA 554		Mercedes			VI		2
Hudspeth		PA 495		Hudspeth Co.	N31.89°	W105.12°	III		2

NOTES 1 BASE INFORMATION FROM TEXAS DEPARTMENT OF HEALTH FILES (1976 1977)
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4 SITE SHOWN ON TEXAS DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION COUNTY MAPS (1976 1977)

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TABLE II-B-3 (Cont'd)
RIO GRANDE BASIN
MUNICIPAL SOLID WASTE SITES

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	LOCATION		CLASS	[illegible]	NOTES
					[illegible]	[illegible]			
Hudspeth		PA 404		Hudspeth Co.	1 mi east of Hincock on IH 10		III		2
Hudspeth		PA 327		Hudspeth Co.	N31.11°	W105.33°	III		2
Hudspeth		PA 406		Hudspeth Co.	1.5 mi S of Sierra Blanca on Hwy 9		III		2
Hudspeth		PA 957		Hudspeth Co.	N31.13°	W105.36°	III		2
Jeff Davis		PA 833		Jeff Davis Co.	N30.60°	W103.67°	III		2
Jeff Davis		PA 1045		Valentine	N30.58°	W104.49°	III		2
Kinney		PA 1036		Bracketville	N29°19'46"	W100°28'48"	III		2
Maverick		PA 721		Eagle Pass	N28.74°	W100.49°	I		
Maverick		PA 448		Eagle Pass	N28.71°	W100.50°	I		
Pecos		PA 461		Fort Stockton	2 mi NE of	Ft. Stockton	VI		
Pecos		PA 976		Fort Stockton	N30.93°	W102.93°	I		
Presidio		PA 547		Marfa	N30.32°	W103.98°	II		2
Presidio		PA 548		Marfa	N30.27°	W104.31°	IV		2
Reeves		PA 776		Pecos	N31°22.9	W103°24'	I		2
Reeves		PA [illegible]		Pecos			IV		2
Reeves		PA 602		Pecos City	N31.38°	W103.52°	I		2
Reeves		PA 759		Balmorhea	N30.95°	W103.75°	III		2
Starr		PA 454		Roma	N26.37°	W99.08°	II		
Starr		PA 661		Starr Co.	N26°24'	W98°50.50'	I		
Starr		PA 342		Starr Co.	N26°22'	W98°47.5'	IV		
Starr		PA 1033		LaGrulla	N26.29°	W99.66°	III		
Sutton		PA 658		Sonora	N30.57°	W100.65°	II		2
Terrell		PA 673		Terrell Co.	N30.06°	W102.36°	III		2
Upton		PA 566		McCamey	N31.12°	W102.21°	II		
Upton		PA 691		Upton Co.	N31.23°	W101.83°	I		
Val Verde		PA 207		Del Rio	N29.67°	W101.17°	I		2
Val Verde		PA 760		Pecos River Company	12 mi West US 90	Comstock	III		2
Ward		PA 1113		Ward Co. Pct 1	N31.45°	W103.41°	I		
Ward		PA 1116		Ward Co.	N31.57°	W103.13°	III		
Ward		PA 705		Wickett			I		
Ward		PA 772		Monahans	N31.60°	W102.96°	I		
Ward		PA 912		Grandfalls	N31.32°	W102.84°	III		
Ward		PA 736		Grandfalls			III		
Webb		PA 519		Laredo	N27.58°	W99.51°	I		
Webb		PA 1144		Laredo			I		
Willacy		PA 189		Raymondville	N26.54°	W97.85°	I		2

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[illegible]

TABLE II-B-3 (Cont'd)
RIO GRANDE BASIN
MUNICIPAL SOLID WASTE SITES

COUNTY	DIST	PERMIT & REG NO	SEGMT	OPERATOR	LOCATION		CLASS	SIZE	NOTES
					LONG	LAT			
Willacy		PA 541		Lyford	N26.41°	W97.79°	III		2
Willacy		PA 176		Port Mansfield Naval District	N26.54°	W97.44°	III		2
Winkler		PA 758		Kermit	N31.87°	W103.08°	I		2
Winkler		PA 779		Winkler Co.	N31.97°	W103.08°	IV		2
Winkler		PA 722		Wink	N31.78°	W103.18°	III		2
Zapata		PA 714		Zapata Co.	N27°03'	W99°26.50'	I		
Zapata		PA 783		Zapata Co.	N27.03°	W99.41°	II		
Zapata		PA 713		Zapata Co.	N26.90°	W99.28°	I		

NOTES
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TABLE II-B-4
RIO GRANDE BASIN
INDUSTRIAL SOLID WASTE SITES

COUNTY	DIST	PERMIT & REG NO	SEGMT	OPERATION	LOCATION		CLASS	HZD	NOTES
					LONG	LAT			
Cameron		20267		Elliott Aviation Co.					
Cameron		30763		Valley Co-op Mill					
Cameron		20670		Ag-Air Inc			I		
Cameron		10332		Brownsville Navigation District, North Side Plant					
Cameron		31108		Union Carbide Corp.					
Cameron		20266		South Texas By-Products Inc.			III		
El Paso		30257		Frohler International					
El Paso		30929		Airco, Inc.					
El Paso		30253		Hanley Paint Mfg.					
El Paso		30026		Texaco, Inc.					
El Paso		30104		Phelps Dodge Refining Corp.					
El Paso		30825		Phelps Dodge Copper Products					
El Paso		30260		W. R. Weaver Co.					
El Paso		30774		T&R Chemicals					
Hidalgo		20650		Dutz Aerial Service Co.			I		3
Hidalgo		30010		R. E. Chastain			II		
Hidalgo		20594		International Frozen	3 mi. West of Hidalgo on Hwy 336		I		3
Hidalgo		30461		Soil-Nu Company					
Hidalgo		20714		Valley Spray, Inc.			I		3
Hidalgo		30044		Texas Plastics, Inc.					
Hidalgo		20712		Cannon Agricultural Aviation					
Hidalgo		20720		Neal Flying Services					
Hidalgo		20613		Texas Planting Seed Association					
Hidalgo		20684		Gonzales Brothers Produce			II		
Webb		30052		Texas Mining & Smelting Division	5 mi. north of Laredo		I		

NOTES
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TABLE II-B-5
RIO GRANDE BASIN
FEEDLOTS

COUNTY	LIST	PERMIT & REG NO.	SEGMT	OPERATOR	LOCATION		CLASS	SIZE	NOTES
					LONG	LAT			
Brewster		20699	2311	Sul Ross State Univ					
Cameron		01466	2201	Har-Tex Cattle Co.					
Cameron		01439	2201	Robert G. Spear Dairy					
Cameron		TX 0038935	2201	F. D. Kornegay, Inc.					
Cameron		TX 0060119	2491	Hygeia Dairy Co.					
El Paso		TX 0039276	2307	Paso Pork Producers #2					
El Paso		TX 0036129	2307	Clint Feed Yards					
El Paso		TX 0051365	2307	Lee Moor Farms					
El Paso		01841	2307	Tex-Mex Feed Yards					
El Paso		TX 0035823	2307	Bill's Ellis Feed Lot, Inc.					
El Paso		TX 0051357	2307	Island Dairies & Livestock Co., Inc.					
El Paso		TX 0051349	2307	Fabens Dairy					
El Paso		TX 0051713	2307	Three-way Cattle Feeders (Feedlot #2)					
El Paso		TX 0051764	2307	Tornello Feed Yards					
El Paso		TX 0037800	2307	Three-Way Cattle Feeders, Inc.					
Hidalgo		TX 0039494	2491	M. F. Klose, Jr.					
Hidalgo		TX 0063134	2491	Texas Agriculture Experiment Station					
Hidalgo		TX 0060143	2201	C & H Farms					
Hudspeth		TX 0052329	2312	B. K. Farms					
Hudspeth		TX 0039276	2307	Paso Pork Producers #2					
Maverick		TX 0038652 Inc.	2304	Alta Verde Industries.					
Maverick		20660	2304	Hans D. D. Paterson					
Maverick		01425	2304	Maverick Beef Producers Inc.					
Pecos		TX 0037672	2311	Ranchers Feedyards, Inc.					
Pecos		TX 0039055	2311	Seven D Pens					
Presidio		01334	2306	Kuykedall & Black Cattle Co.					
Reeves		TX 0037541	2311	Pecos Feedyards, Inc.					
Reeves		TX 0036234	2311	Davidson Feed Pens					
Reeves		TX 0051390	2311	Trans-Pecos Dairies, Inc.					
Reeves		TX 0051977	2311	Kesey Brothers Feedbrs, Inc.					
Reeves		TX 0051292	2311	Balmorhea Feeders, Inc.					
Reeves		TX 0038933	2311	J & J Farms, Inc.					
Reeves		TX 0043206	2311	Reeves Co. Feeders, Inc.					

NOTES
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4. SITE SHOWN ON TEXAS DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION COUNTY MAPS (1978 1977)

TABLE II-B-5 (Cont'd)
RIO GRANDE BASIN
FEEDLOTS

COUNTY	MAP	PERMIT & REG NO.	REGMT	OPERATOR	LOCATION		TEXAS	FE	NOTES
					LONG	LAT			
Uvalde		TX 0045170	2302	Grace Feedyards					
Terrell		20007	2306	Harkins Bros. Pig Farm					
Webb		01431	2304	Sciblenski, T. S.					

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FORM 0367

CHAPTER C

SUMMARY OF PLAN

1. WASTE LOAD ALLOCATIONS FOR WATER QUALITY SEGMENTS

Texas Department of Water Resources has analyzed Segment 2308 water quality and designated it as water quality limited. Sections 130.24, 130.25, and 130.26 of Title 40 of the Code of Federal Regulations require a waste load allocation for water quality limited segments. The allocations have been addressed in the "Waste Load Evaluation for Water Quality Segment No. 2308 of the Rio Grande Basin", prepared 28 August 1974.

In 1972, the municipal waste discharges in this segment totalled 5,496 lbs/day of BOD_5. The permitted rate allowed for a load of 6,910 lbs/day. An equitable treatment level of 30 mg/l is recommended for all dischargers with the exception of Anthony. At an equivalent BOD_5 level of 30 mg/l and the 1974 flow rates, the load would be reduced to 4,899 lbs/day. At present the BOD_5 load is 10,659 lbs/day and is projected to be 7,930 lbs/day in the year 2000.

More stringent effluent levels were not recommended because of the quality of discharges emanating from the Mexican side of the river, and because all of the water in the river is normally removed for irrigation purposes within a few miles of El Paso. Effluent limits for all dischargers are subject to change when the allocation is re-evaluated.

Segment 2311 has been redesignated as a water quality limited river segment. Texas Department of Water Resources prepared a "Waste Load Evaluation for Segment 2311 of the Rio Grande Basin" in August of 1974. This document states the water quality problems from September 1972 through August 1973. The segment was classified water quality limiting because of violations of stream pH criteria. At each testing station, the occurrence of many DO concentrations in the river greater than saturation indicate the possible influence of algal populations. Algae obtain part of their CO_2 needs from the carbonate-bicarbonate equilibrium which has the effect of increasing the pH. Therefore, it is possible that the high pH values are a natural condition attributable to the algae.

It was the recommendation of the 1974 Wasteload Evaluation that the stream be reclassified as effluent limited since there were no permitted discharges to the segment. There

were no waste load allocations presented in the report due to this recommendation and the lack of man-related activity which could degrade water quality.

2. 1983 PLAN

Sewerage Planning areas are defined as those areas requiring sewerage collection and treatment facilities within the next 5 years and not having a Section 201 facility plan in progress or completed. Thus, by definition, each designated sewerage planning area must require some facilities by the year 1983. A summary of the costs for the municipal wastewater collection and treatment facilities recommended for the year 1983 are presented in TABLE II-C-1. Recommended improvements and associated costs are listed by sewerage planning area and grouped by TDWR designated stream segments. Costs include total construction costs for the planning year as presented subsequently in Chapter II-D. Chapter II-D presents a more detailed description of the recommended facilities.

3. 1990 PLAN

A summary of the costs for the municipal wastewater collection and treatment facilities recommended for the sewerage planning areas in the year 1990 is presented in TABLE II-C-2. Recommended improvements and associated costs are listed by sewerage planning area and grouped by TDWR designated stream segments. Costs include total construction costs for the planning year. A more detailed description of the recommended facilities is presented subsequently in Chapter II-D for each sewerage planning area.

4. 2000 PLAN

A summary of the costs for municipal wastewater collection and treatment facilities recommended for the sewerage planning areas in the year 2000 is presented in TABLE II-C-3. Recommended improvements and associated costs are listed by sewerage planning area and grouped by TDWR designated stream segment. Costs include total construction costs for the planning year. A more detailed description of the recommended facilities is presented subsequently in Chapter II-D for each sewerage planning area.

5. SCHEDULE OF IMPLEMENTATION

Pursuant to 40 CFR 131.11(m), a schedule of implementation has been prepared for the Water Quality Management Plan.

TABLE II-C-1

1983 PLAN

SEGMENT/ Planning Area	Facility Description	Initial System Cost (dollars) Collection System	Treatment System	Total
2302				
La Grulla	Package plant	486,000	238,000	724,000
Falcon Heights	Package plant	244,000	127,000	371,000
Segment Total		730,000	365,000	1,095,000
2303				
None	-----	---	---	---
2304				
Mirando City	Package plant	497,000	159,000	656,000
San Ygnacio	Package plant	385,000	194,000	579,000
Laredo	System expansion	4,720,000	2,276,000	6,996,000
Segment Total		5,602,000	2,629,000	8,231,000
2305				
Comstock	Package plant	345,000	109,000	454,000
Segment Total		345,000	109,000	454,000

TABLE II-C-1 (Continued)

SEGMENT/ Planning Area	Facility Description	Initial System Cost (dollars) Collection System	Treatment System	Total
2306				
Sanderson	Stabilization lagoon	574,000	417,000	991,000
Marathon	Plant expansion	-0-	61,000	61,000
Marfa	System expansion	450,000	107,000	557,000
Segment Total		1,024,000	585,000	1,609,000
2307				
Clint	Stabilization lagoon	598,000	624,000	1,222,000
Presidio	Package plant	740,000	158,000	898,000
Sierra Blanca	Stabilization lagoon	579,000	376,000	955,000
Valentine	Stabilization lagoon	273,000	267,000	540,000
Van Horn	System expansion	94,000	389,000	483,000
Segment Total		2,284,000	1,814,000	4,098,000
2308				
Canutillo	Package plant	1,071,000	481,000	1,552,000
Anthony	Collection line expansion	166,000	-0-	166,000
Segment Total		1,237,000	481,000	1,718,000

TABLE II-C-1 (Continued)

SEGMENT/ Planning Area	Facility Description	Initial System Cost (dollars) Collection System	Treatment System	Total
2309				
NONE	-----	---	---	---
2310				
NONE	-----	---	---	---
2311				
Balmorhea	Stabilization lagoon	377,000	316,000	693,000
Imperial	Stabilization lagoon	424,000	316,000	740,000
Crane	Plant expansion	-0-	177,000	177,000
Ft. Davis	System expansion	273,000	196,000	469,000
Iraan	Collection line expansion	71,000	-0-	71,000
Sheffield	System expansion	53,000	140,000	193,000
Segment Total		1,198,000	1,145,000	2,343,000
BASIN TOTAL		12,420,000	7,128,000	19,548,000

TABLE II-C-2
1990 PLAN

SEGMENT/ Planning Area	Facility Description	Initial System Cost (dollars) Collection System	Treatment System	Total
2302				
NONE	-----	---	---	---
2303				
NONE	-----	---	---	---
2304				
Laredo	Collection system expansion	2,611,000	1,447,000	4,058,000
Segment Total		2,611,000	1,447,000	4,058,000
2305				
NONE	-----	---	---	---
2306				
NONE	-----	---	---	---
2307				
Van Horn	Collection system expansion	374,000	-0-	374,000
Segment Total		374,000	-0-	374,000

TABLE II-C-2 (Continued)

SEGMENT/ Planning Area	Facility Description	Initial System Cost (dollars) Collection System	Treatment System	Total
2308				
NONE	-----	---	---	---
2309				
NONE	-----	---	---	---
2310				
NONE	-----	---	---	---
2311				
NONE	-----	---	---	---
2312				
NONE	-----	---	---	---
BASIN TOTAL		2,985,000	1,147,000	4,432,000

TABLE II-C-3
2000 PLAN

SEGMENT/ Planning Area	Facility Description	Initial System Cost (dollars) Collection System	Treatment System	Total
2302				
NONE	-----	---	---	---
2303				
NONE	-----	---	---	---
2304				
Laredo	Collection system expansion	2,798,000	-0-	2,798,000
Segment Total		2,798,000	-0-	2,798,000
2305				
NONE	-----	---	---	---
2306				
Marfa	Collection system expansion	406,000	-0-	406,000
Segment Total		406,000	-0-	406,000
2307				
NONE	-----	---	---	---

TABLE II-C-3 (Continued)

SEGMENT/ Planning Area	Facility Description	Initial System Cost (dollars) Collection System	Treatment System	Total
2308				
Anthony	Collection system expansion	270,000	-0-	270,000
Segment Total		270,000	-0-	270,000
2309				
NONE	-----	---	---	---
2310				
NONE	-----	---	---	---
2311				
Iraan	Treatment system expansion	-0-	181,000	181,000
Segment Total		-0-	181,000	181,000
2312				
NONE	-----	---	---	---
BASIN TOTAL		3,474,000	181,000	3,655,000

This schedule identifies major actions which must be accomplished in order to fulfill the requirements of the plan. The schedule is presented in two parts: an institutional schedule and a construction grant schedule. Prior to submitting an application for construction grant funds, a community must be organized into a political body with the necessary legal and fiscal authority and resources to construct, operate, and maintain the planned facilities. Thus, establishment of a political entity is a necessary first step. In several instances, county, city, or special districts are now in operation and desire to assume the role of management agency. In these cases, the special district formation requirements may be omitted and a construction grant application may be submitted immediately. The creation of a special district has been recommended for those communities with no existing management agency. The implementation schedule for establishment of a municipal utility district (MUD) is presented. This MUD creation schedule may be shortened somewhat by first creating a fresh water supply district and then converting to a MUD, a procedure which is discussed subsequently in this chapter. The schedule for creation of a MUD is presented in TABLE II-C-4. Close coordination with the Texas Department of Water Resources is recommended.

A schedule for completion of Steps 1, 2, and 3 of a 201 grant is presented in TABLE II-C-5. The time required to obtain a grant for each of these steps cannot be accurately determined. The variables which affect this time include: total annual federal funds available to Texas for construction grant projects, the number and magnitude of construction grant applications received by the Texas Department of Water Resources, and the priority which is assigned to individual sewerage planning areas under the statewide priority ranking system.

The schedule portrayed in this section may vary considerably depending on the magnitude of the individual project. One item, the Infiltration and Inflow Survey, is required only after an Infiltration and Inflow Analysis of the existing system indicates the need. Therefore, it is not required for those areas without existing collection systems and may not be required for those with existing systems.

6. INSTITUTIONAL AND LEGAL REQUIREMENTS

Existing management agencies which have been designated within the Rio Grande Basin have all the required authority for implementing the water quality management plan. For those areas where there are no existing agencies which can be designated, the creation of a special district for each area is recommended.

TABLE II-C-4
SPECIAL DISTRICT CREATION SCHEDULE

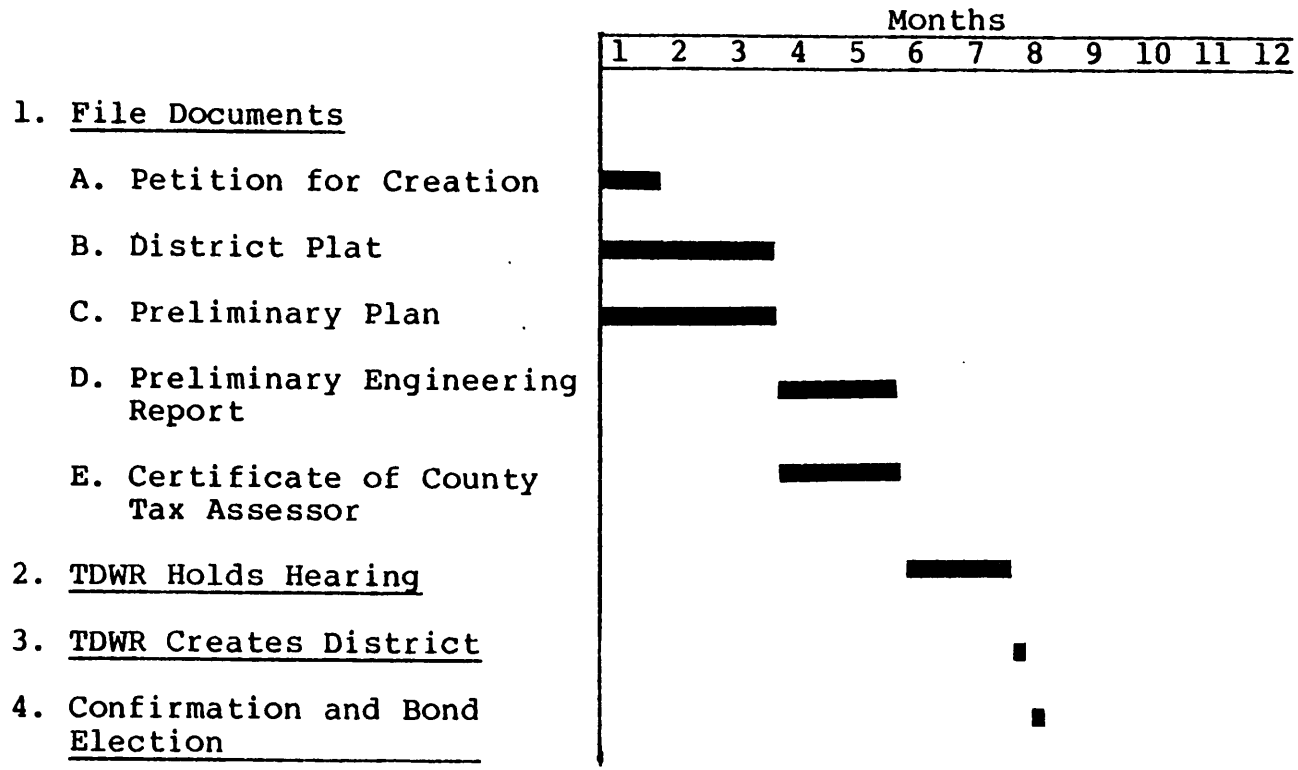
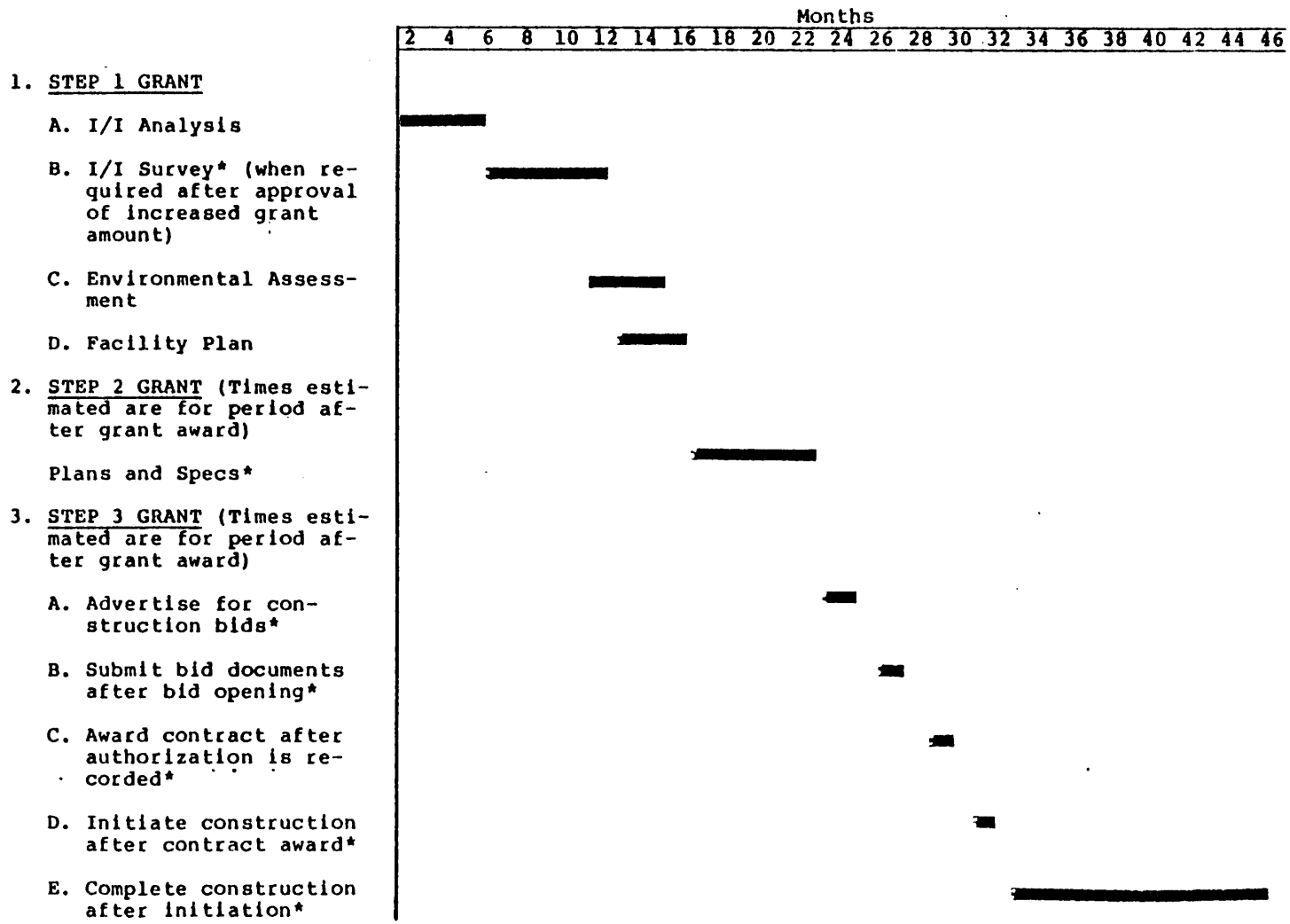


TABLE II-C-5

CONSTRUCTION GRANT WORK SCHEDULE



* Uneven left-hand edge indicates that an undetermined period of time preceeding this action is required for State or Federal authorization and/or review of the previously listed item.

Chapters 50 through 63 of the Texas Water Code deal with various kinds of special districts, including Water Control and Improvement Districts, Underground Water Conservation Districts, Fresh Water Supply Districts, Municipal Utility Districts, Water Improvement Districts, Drainage Districts, Levee Improvement Districts, and several kinds of Navigation Districts. Most, if not all, of these districts have the power to provide sewer service and would satisfy the management and financial requirements of 208(c)(2).

Prior to 1971, most special districts were created by special act of the Legislature, because this was easier than going through the various creation procedures set forth in the general laws. In 1971, the Legislature wrote what is now Chapter 54 of the Texas Water Code, dealing with Municipal Utility Districts (MUD). Chapter 54 of the Texas Water Code was written to make creation of these districts relatively simple, and was also written to make operation of these districts much less cumbersome than the other kinds of districts. Accordingly, most districts are now created as MUD's. This removes the need for creation of districts by special act, now a rare procedure.

To create a MUD it is necessary to retain an attorney, an engineer and a market feasibility expert. The petition for creation is filed with the Texas Department of Water Resources, and is accompanied by a preliminary plan showing the location of existing utility facilities, proposed facilities, recreational areas, commercial and school sites, highways and roads, and other related information. A preliminary engineering report is also filed, showing the proposed improvements, their estimated costs, and the evidence to support the conclusion that creation of the district is feasible and will benefit all the land included in the district. The petition must also be accompanied by a market feasibility study, and consent from any city in whose extraterritorial jurisdiction the project lies.

When all the necessary preliminary engineering and other information has been accumulated and filed, the Department sets the matter for hearing and either approves or disapproves creation of the district. Preparation of the necessary information and processing through the Department takes approximately six months.

The cost of creation is usually around $20,000.00, which is required for legal, engineering and market feasibility fees.

MUD's are usually created by developers who own raw land and are preparing to go in and develop streets, drainage, and utilities. The initial creation expense is usually discouraging where the area is already populated and needs a political subdivision with taxing power to provide sewer

Service. In that case the usual procedure is to hold the creation cost down to $6,000 or $7,000 by creating a Fresh Water Supply District under Chapter 53 of the Texas Water Code. This district is created by presenting a petition to the county commissioners, signed by 50 residents or a majority of the electors of the proposed district who own land in the district. The petition must be accompanied by a metes and bounds description of the boundaries of the proposed district, and describe the general nature of the projects proposed to be done. The county judge holds the hearing, and causes an election to be held. If the voters approve, the district is created.

After creation of the Fresh Water Supply District, the next step is to proceed under Section 54.030 of the Texas Water Code to convert the Fresh Water Supply District into a MUD. This is done by applying for conversion to the Texas Water Commission. The Texas Water Commission has routinely allowed such conversions in the past. This is simply a less costly way of creating a MUD under appropriate circumstances, and holds the cost down below $10,000 because no preliminary engineering report or market feasibility study is required.

One special issue must be discussed relating to district formation. Section 8B of Art. 970a, VTCS, provides that no water district can be created within the extraterritorial jurisdiction of any city without the written consent of the city.

There has been no recommendation for the creation of other types of management agencies. A report on Management Agencies is included as an Appendix.

7. FINANCIAL REQUIREMENTS

Section 208 of PL 92-500 provides that the management agency or system must have certain kinds of financial powers, including:

- the authority to accept and utilize grants, or other funds from any source, for waste treatment management purposes;
- the authority to raise revenues, including the assessment of waste treatment charges; and
- the authority to incur short- and long-term indebtedness.

All local governments, defined as cities, counties, water districts, and river authorities are authorized to execute agreements with each other and with TDWR for:

> . . . the transfer of money or property from any party to the agreement to another party to the agreement for the purpose of (WQM) inspection, enforcement, technical aid and education, and the construction, ownership, purchase, maintenance, and operation of disposal systems.

TDWR may accept funds from any Federal agency for research, development, investigation, planning, studies, programming and construction related to methods, procedures, and facilities for the collection, treatment, and disposal of waste or other water quality control activities.

The Texas Water Quality Act authorizes all cities, counties, water districts, and river authorities that own or operate a waste treatment facility to establish the charges and assessments to be collected from all persons discharging into the system. The charges and assessments may include user charges, connection fees, and any other methods of obtaining revenues from the treatment system.

Counties and cities have the power to raise revenues by taxation. Cities having a population of 5,000 or less (usually a general law city) may levy an ad valorem tax not exceeding $1.50 per $100 assessed valuation of the taxable property in the city for current expenses and the construction or purchase of public buildings, waterworks, and other permanent improvements. A city exceeding 5,000 in population may levy an ad valorem tax up to $2.50 per $100 assessed valuation of the taxable property in the city for the same purposes. Likewise, counties may levy and collect a tax for the erection of public buildings, streets, sewers, waterworks, and other permanent improvements, not to exceed twenty-five cents on the one hundred dollars valuation in any one year.

Most special districts have taxation authority and may utilize the revenues to maintain, repair, and operate all works and facilities of the district. Districts must adopt a tax plan based on one of several alternatives outlined in the statute. Certain statutes prescribe limitations on the taxation authority of various types of special districts; these limitations are as follows:

- fresh water supply districts may levy a tax to pay the interest on and provide a sinking fund for bonded indebtedness and to pay the cost of acquiring and repairing sanitary sewer systems and maintaining and operating them;

- municipal utility districts may levy a tax to satisfy debt retirement obligations and for the maintenance of facilities and equipment;

- water improvement districts may levy a tax to satisfy district indebtedness and for maintenance and operating expenses;

- drainage districts may levy a tax for debt retirement and for maintenance, repair, and preservation of district facilities.

The power to contract encompasses the power to incur short-term debt, usually debt payable during the current fiscal year. Thus, all potential management agencies have the authority to incur debt on a short-term basis.

Section 208's requirement of authority to incur long-term debt raises the question of debt financing of treatment works through the issuance of tax and revenue bonds. No express authority gives counties the power to issue bonds for waste treatment facilities. However, a statute exists which empowers counties, when acting in conjunction with one or more cities, to issue tax bonds for purchasing land and improving and equipping the same for several purposes, including sewage treatment plants and systems. Sharp limitations on county taxing power, however, effectively preclude counties from exercising even this limited authority.

Cities may issue tax bonds for waste treatment purposes, if a majority of the voters approve. The Texas Constitution provides that a city may not incur debt without levying a tax sufficient to pay the interest and to provide a sinking fund of two percent of the principal. The Constitution also limits ad valorem taxes to an annual rate of one and one-half percent of the taxable property for cities of 5,000 population or less, and two and one-half percent for larger cities. These tax rate ceilings effectively limit the total amount of tax-secured indebtedness that a city may incur. Cities may also issue bonds secured by the operating revenues of the sewage treatment facilities constructed with the bond proceeds.

Cities and counties may also issue, without the voters' approval, certificates of obligation to pay for the construction of public works. The Certificate of Obligation Act was intended to provide flexibility in local government finance.

River authorities and special districts may also issue revenue bonds and, with voter approval, tax bonds, for waste treatment purposes. Article XVI, Section 59 (Conservation Amendment) was added to the Constitution in 1917

expressly to avoid the debt limitations imposed on districts by an earlier provision. It allows the legislature to authorize districts to incur all such indebtedness which may be necessary to provide all improvements and maintenance thereof requisite to the achievement of the purposes of the (conservation) Amendment.

TDWR may grant financial assistance to cities, counties, and special districts by purchasing local bonds issued for waste treatment purposes. These water quality enhancement funds enable the state to participate indirectly in debt financing of treatment works.

8. INFORMATIONAL REQUIREMENTS FOR UPDATES

a. Segment 2302. This segment of the Rio Grande has only been sampled twice for pesticide contamination. Both of these samples were taken from bottom sediment. On neither occasion were pesticides above detection levels. In order to be certain that pesticides applied to crops in the area are not reaching the river, a routine sampling program of bottom sediments should be instituted by TDWR. Sampling should be conducted in appropriate seasons. Sampling stations should be located to provide data concerning the nature and source of contaminants.

Ground water quantity and quality in the portion of the Gulf Coast Aquifer within the Rio Grande Basin should be monitored by TDWR at key designated wells on a routine basis. Declining levels have been noted, but at the present time data is insufficient to assess the impact of the declining levels. In particular, the monitoring of quality should allow an assessment of the extent of salt water intrusion.

b. Segment 2303. Only one sampling for pesticides has been taken in Falcon Reservoir. Since bottom sediment showed the presence of PCB's, it is recommended that a routine monitoring program be conducted by TDWR on the water and bottom sediments.

c. Segment 2304. Pesticide sampling has been conducted only once in Segment 2304. Although no contamination was noted, a routine program of sampling seems warranted. Agricultural activities along the river may significantly affect water quality in the future. A sampling program aimed at identifying pesticide levels should be conducted routinely. TDWR should assume the responsibility for those monitoring programs.

d. Segment 2305. During the month of August, water temperatures were above TDWR stream standards in both 1974 and 1975. Although an Intensive Study Program was carried out which found all temperatures within range, the program was conducted during the month of February. Extreme seasonal temperature variations may have accounted for the apparent improved temperature conditions which should not be viewed as conclusive evidence of compliance. Another Intensive Study Program is warranted to adequately determine the extent of any existing temperature problems. This program should be conducted during the summer months when water is exposed to intense solar radiation.

There have been no samples of pesticides taken within Amistad Reservoir. In order to insure that contamination of the reservoir from upstream reaches of the Rio Grande does not go undetected, a routine program of pesticide sampling should be conducted.

e. Segment 2306. The majority of all water entering Segment 2306 originates from Mexico via the Rio Conchos. It is assumed that water quality problems are either a result of activities outside of the country or are due to natural characteristics of the region.

Pesticide sampling that is being accomplished in this segment is extremely important since the tests have resulted in determining the presence of various pesticides including DDT which has been banned from use in this country. Continued monitoring is recommended. The monitoring responsibility is assigned to TDWR.

Testing of mercury levels has detected their presence in bottom sediments. As mercury mines frequently operate in this region, a determination should be made as to the extent mercury is contaminating the water and impacting the environment. If sufficient data indicates that mercury contamination is sufficiently high to create a water quality problem or health hazard, a stream-to-source survey may be desired to determine the source of the pollution prior to implementing control measures. TDWR must make this determination.

Due to the lack of routing groundwater sampling, it was not possible to determine the extent of water table declines. Quantity and quality of groundwater within this segment should be monitored by TDWR at key designated wells on a routine basis. Apparent declines have been noted, but at the present time data is insufficient to thoroughly analyze the extent and impact. In particular, the sampling program should assess the extent of salt water intrusion.

f. Segment 2307. Pesticides are generally used in large quantities on the cotton corps grown in this region. PCB's and DDD's have been detected in this segment. Data is presently insufficient to determine the impact these contaninants are having on the aquatic environment. It is recommended that both bottom sediment and water sampling be accomplished routinely and an analysis made of impacts of these contaminents. A stream-to-source study may be warranted if the effects are deemed significant. TDWR should conduct the sampling and analysis and determine if the survey is required.

Highly saline irrigation return flows are significantly affecting water quality in this segment. They should continue to be monitored by TDWR.

Due to the lack of information regarding groundwater quality in the vicinity of the sulfur mines in this area, it is not possible to determine their effect on the water resources of the area. Further sampling should be conducted by TDWR within a mile of the mine sites. With this information, an analysis of the impact can then be accomplished.

g. Segment 2308. The majority of water quality problems now being experienced in Segment 2308 that are not a result of activities on the Mexican side of the Rio Grande should be corrected when the City of El Paso complies with the current board order. Permit requirements for the City of El Paso Haskell Street STP are now more stringent than the levels shown in the most recent waste load elevation (WLE). TDWR should revise this WLE to reflect the more recent information.

Continued groundwater quantity and quality sampling should be conducted in the area by TDWR.

h. Segment 2309. No recommendations.

i. Segment 2310. A survey of data on water quality within this segment is compared to Segment 2311 should be made in order to determine if the high sulfate, chloride, and nitrate levels, along with the low DO levels are characteristic of this river segment. Contamination due to man is insignificant in this area since activities which affect water quality do not occur. The water entering this area from Segment 2311 is of very poor quality and may justify a broadening of the acceptable ranges of the listed pollutants. TDWR should review the stream segments and make any necessary adjustments.

j. Segment 2311. Occasional high ammonia levels may be due to man-related activities. If the levels continue to exceed the standards in future sampling programs, a stream-

to-source study should be conducted by TDWR to determine the source of the pollutants.

Pesticide levels should be monitored routinely by TDWR. It is also important that the results of the sampling be analyzed to determine the exact impact, if any, on the aquatic environment.

Continued monitoring of groundwater in this region is recommended. It is further recommended that the Leon-Belding Water Conservation Association continue to promote water conservation in the area. Determination of quantity and quality relationships should be a high priority for TDWR within this region since the continued availability of fresh water is essential to the continued economic well-being of the area.

Due to the lack of information regarding groundwater quality in the vicinity of the sulfur mining operations in this area, it is not possible to determine their effect on the water resources of the area. Further sampling should be conducted by TDWR within a mile of the mine sites. With this information, analysis of the impact can then be accomplished.

k. Segment 2312. Monitoring of phosphorus levels by TDWR should continue on a routine basis. If the extreme high levels occasionally observed should reoccur, a stream-to-source study may be warranted to determine the cause. It is highly unlikely that the high concentrations are due to man-related activities since there is very little activity in the area.

9. STREAM STANDARDS

A. Segment 2302. There are no recommended changes in the established stream standards in this segment.

b. Segment 2303. There are no recommended changes in the established stream standards in this segment.

c. Segment 2304. There are no recommended changes in the established stream standards in this segment.

d. Segment 2305. A special study for the purpose of investigating temperature levels should be conducted at the reservoir. This study should be conducted during the warm summer months in order to accurately determine whether or not temperature levels exceed the established standards and stratification of the lake occurs.

e. Segment 2306. There are no recommended changes in the established stream standards in this segment.

f. Segment 2307. There are no recommended changes in the established stream standards in this segment.

g. Segment 2308. There are no recommended changes in the established stream standards in this setment.

h. Segment 2309. There are no recommended changes in the established stream standards in this segment.

i. Segment 2310. The pH level of this segment is occasionally above the standard 8.5. The allowable range should be revised from the present 6.5-8.5 to 7.0-9.0. Both the upstream reach, Segment 2311, and the downstream reach, Segment 2305, have established standards which allow pH levels of 9.0.

j. Segment 2311. There are no recommended changes in the established stream standards in this segment.

k. Segment 2312. There are no recommended changes in the established streat standards in this segment.

10. CONTINUING PLANNING

It is recommended that the West Texas Council of Governments continue as the responsible agency for all basin wide planning activities for the Upper Rio Grande Basin during the continuing planning process. This would include such activities as may be determined in the State/EPA agreement as well as those items identified in this plan. The Texas Department of Water Resources should retain these responsibilities for the Middle Rio Grande Basin.

CHAPTER D

SEGMENT SUMMARIES

INTRODUCTION:

I. Objective

This chapter is intended to provide an overview of established water quality standards and existing water quality, and to develop and select technical alternatives for treatment of point source effluents which are consistent with the achievement of the stated standards for each stream segment. Further, this report is intended to present management alternatives for implementation of the technical alternatives.

II. Scope

The study area with which this report deals includes the non-designated portion of the Rio Grande Basin which lies within the State of Texas. Water Quality is discussed for each stream segment receiving a four digit numerical designation by the Texas Department of Water Resources (TDWR). Technical and management alternatives and associated impacts are presented for each designated sewerage planning area within the study area. A sewerage planning area is any area which has been identified as possibly requiring either treatment or collection facilities within five years and where planning is not presently in progress or completed under a Step 1 (facility planning) construction grant authorized by provisions of PL 92-500. The analysis of water quality for each segment and the choice of technical alternatives assumes that discharges from the Mexican side of the Rio Grande will not increase beyond present levels.

III. Organization

The presentation of material in this report has been organized into major groupings by numerically designated stream segments. Within each stream segment there is a description of existing agencies and programs, and a segment analysis which deals with the water quality and water quality standards of that segment. The segment analysis is followed by a discussion which presents technical and management alternatives available to each designated sewerage planning area located within the stream segment. The technical presentation is followed by a discussion of other local management agencies.

IV. Methodology

A. Segment Analysis

This section defines the segment and states the water uses which the Texas Department of Water Resources (TDWR) has deemed desirable for each stream segment. Water quality standards for each segment, established by TDWR to be consistent with the water uses, are then stated. Water quality data is compared to the standards to determine whether the standards are being achieved. When appropriate, causes for the failure to achieve the established standards are discussed briefly.

Land use, as it relates to non-point source water pollution is reviewed for each segment. In particular, those non-point source activities which may be expected to significantly affect water quality are discussed.

B. Alternative Discussion

An alternative discussion is presented for each sewerage planning area and consists of two basic parts, technical and management alternatives. The technical alternatives develop the requirement for establishing each sewerage planning area and present technical means of initiating or improving wastewater collection and treatment facilities. These alternatives have been chosen consistent with the requirements presented in the Statewide Methodology for Municipal Waste Treatment Needs Assessment which was provided by TDWR. This document includes procedures for establishing effluent requirements, selecting alternative treatment schemes to yield the required effluent, evaluating collection and transport system needs, and preparing cost estimates. Preferred alternatives have been identified after consultation with local officials. It shall be noted that these effluent requirements presented in this section are those indicated by application of the methodology. In some cases, TDWR may have policies which require that a more stringent effluent set be applied for a particular treatment process.

Cost estimates contained in this report are based upon costs provided in the statewide methodology. These costs have been updated to represent 1978 values. The procedure for preparing cost es-

timates includes the preparation of present worth values. The present worth value is the money that would need to be on hand and drawing interest today to build the recommended facilities on schedule and operate and maintain those facilities through the year 2000. The present worth represents a conversion of all costs for each alternative to a single lump sum value. This value can easily be compared to a similar value for each of the other alternatives for that sewerage planning area.

Collection system costs are comprised of system installation costs and operation and maintenance costs. System installation costs include capital cost for sewage lines and lift stations; allowances for pavement replacement, excavation in rocky terrain, right-of-way acquisition, manholes, and inspection. Engineering and contractor fees have been estimated and included in the figure presented. Finally, since federal aid has been assumed on all projects discusses, a cost factor (normally about 30%) has been added to account for the increased cost resulting from federal involvement.

Operation and maintenance costs include the cost of maintaining lines and the cost of labor, energy, and materials for lift stations.

Treatment system costs are also comprised of installation costs and operation and maintenance costs. Installation costs include capital costs for construction of the facilities, yard piping, site work, and general electrical work; engineering fees; legal and administrative fees; contingency fees; and the acquisition of land when necessary.

Operation and maintenance costs include: labor charges for operation and maintenance, supervisory personnel, and clerical help; energy costs; and the acquisition and transportation of chemicals.

Costs were calculated in 1975 dollars and updated to 1977 values by ENR cost index for the Dallas-Ft. Worth area. No adjustment has been allowed for the effects of future inflation. When facility construction was recommended for more than one planning period, the calculation of present worth allowed for this phasing.

Significant costs not considered in this plan are the cost of individual residence connections to the main system and costs attributable to flood protection devices.

The statewide methodology did not include provisions for considering septic systems. These systems may represent an acceptable, economical alternative under proper conditions. Each individual septic system will normally cost between $250 and $350 annually for amortized construction costs, operation and maintenance. These individual septic systems may be considered when the cost of central collection and treatment facilities appears too expensive and local conditions are appropriate to the use of septic systems. However, septic systems were only seriously considered for those communities requesting such consideration. This was due primarily to the difficulty in establishing and improving when necessary the condition of existing systems and the continuing regulation of system installation and maintenance. In addition, communities for which this alternative is chosen would effectively be eliminated from consideration for Step 1 facility planning grants, thus reducing the probability of more detailed study.

Effluent requirements are defined by effluent sets established by TDWR. Three effluent sets were deemed applicable to the Rio Grande Basin under TDWR criteria. These sets are defined below.

	30 Day Average	
Effluent Set	BOD mg/l	TSS mg/l
0	30	30
1	20	20
2	10	15

Management alternatives for each sewerage planning area have been determined based on input from Peat, Marwick, Mitchell and Company who prepared a report on the management agencies within the study area. In the Rio Grande Basin, there is a void in areawide agencies with authority to operate, control, or regulate wastewater treatment facilities. The Texas Department of Water Resources is the only agency with

water quality management responsibilities throughout the Rio Grande Basin. In this basin the governmental entities (special districts, cities, and counties) with authority to treat liquid wastes are widely separated and do not appear to have a cohesive political bond which would facilitate centralized action. Thus a decentralized system is generally recommended. The exception to this may be in the El Paso Area where the El Paso Public Service Board (PSB) may be able to meld a common need to a cohesive political base for the purpose of wastewater treatment. In this case an areawide agency may be viable and should be considered. However, the PSB is an agency of the City of El Paso and can only provide those functions which the City allows. For the remainder of the basin, the decentralized approach appears to be the most feasible. It closely approximates the situation which presently exists, and relies on local governmental entities to provide wastewater treatment facilities and local planning. These local entities will normally be municipal governments or special districts. Counties may become involved but they generally have limited financial capabilities for accomplishing these tasks. Hence, the normal recommendations of this report are to have municipal governments provide services. In the absence of a municipal government, the formation of special districts to handle waste treatment is preferred. It should be noted that one county in the basin has already assumed a management role. Zapata County operates equipment owned by water control and improvement districts.

Local officials in the Middle Rio Grande Basin Planning area have shown an interest in receiving assistance from state agencies in developing and enforcing septic tank regulations. These officials have cited the cost of reviewing plans and maintaining an enforcement staff while requesting state aid in accomplishing this function.

C. Impact Analysis

Impacts of similar treatment facilities are similar throughout the Rio Grande Basin. A brief summary of the nature of the treatment process and the associated impacts are presented below.

Primary treatment is used to remove suspended particles from wastewater. The potential exists, with this type of treatment, for several negative impacts. Odors may be a problem unless pre-aeration or pre-chlorination is used. Solids which are collected must be removed and provided further treatment prior to final disposal. This requires a commitment of electrical energy to operate the sludge collectors.

Aerobic digestion stabilizes the sludge generated during the primary treatment. During this process, biodegradable solids are oxidized and improved dewaterability is realized. The major advantages of this technique include: simple operation; reduced odor; reduced pathogenic organisms; lowered BOD, solids, and total phosphorus in the supernatent; and a relatively small capital expenditure as compared to anaerobic digestion.

The digested sludge is transported by truck to a landfill site. Inclusion of municipal wastewater sludges in sanitary landfills has met with concern due to the following potential effects:

- Contamination of groundwater by leaching.
- Contamination of surface water by uncontrolled runoff.
- Disease spread by vectors.
- Disease spread through direct contact.
- Odor problems from gases of decomposition.

Regulation of landfill operations and proper sludge digestion significantly reduce these risks.

Land application is a common method for the final disposal of effluent. Irrigation is the most common method in practice. The effluent is applied either by spraying or by surface spreading. Land application removes 98 percent or more of the BOD and TSS in the effluent. The process is adaptable to most climates, functioning particularly well in warmer, more arid regions.

Irrigation has several advantages. It can achieve an economic return by producing marketable crops, prevent surface discharge of nutrients, and conserve water.

Land application requires certain irretrievable commitments of resources. Electricity is re-

quired for pumps and fuel may also be needed to operate distribution machinery.

Although irrigation does not generate solids, aerosols are produced during spray irrigation. These aerosols can be carried from the disposal site by winds. If not properly disinfected, they may be contaminated with various pathogens harmful to humans, livestock, and wildlife.

Land requirements for this process are extensive, but the effluent is an excellent source of nutrients for crops and it is often sold to farmers as fertilizer or diverted to nearby cropland which helps to recover the cost of land purchases.

The use of stabilization lagoons for treatment of wastewater is also common in arid regions of Texas.

Stabilization lagoons or oxidation ponds consist of a relatively shallow body of water contained in a flat bottom tank and enclosed by an earth dike. Organic materials present in the wastewater are effectively stabilized by natural biological processes. Oxygen is provided to the system through algae synthesis and through atmospheric diffusion. Contents of the pond are mixed periodically with surface pumps.

Major advantages of stabilization lagoons include low initial cost and ease in operation. When required, effluent discharges may be regulated to minimize discharges during critical times of the year. This type of treatment normally does not require chemicals.

The most significant disadvantages associated with this treatment are odors which may be generated and area requirements. Cold temperatures may retard the performance of the process. This treatment process also periodically requires an electrical energy commitment to drive pumps or surface aerating equipment.

Other disadvantages are the residual solids and algae which is generated by this process. Algae is often discharged with the effluent. The settled solids build up on the lagoon bottom and therefore must be periodically removed.

The effectiveness of this method in removing BOD and TSS is 95 percent at best.

Disinfection selectively destroys disease-causing organisms by means of a chemical agent. It normally results in the expenditure of chlorine and energy. Experience indicates the chlorine dosage is normally in the range of 1 to 25 mg/l. In recent years both energy and chemical costs have increased sharply, thus increasing the financial burden placed on the community employing this treatment technique.

Basically, disinfection aids the community and its surrounding environment by decreasing odor and disease problems. With careful management chlorine residuals can be kept at a minimum, thus eliminating the possibility of water quality degradation from excessive quantities.

Operation of a package plant, which employs the contact stabilization process includes primary treatment sludge collection and digestion, and disinfection.

Contact stabilization uses microorganisms to oxidize organics contained in domestic wastewater. The organisms are fed to and contacted with wastewater in continuous flow-through treatment tanks. Aeration is provided by mechanical tanks. Aeration is provided by mechanical means. Suspended microorganisms are separated in the settling tank from the effluent for reuse.

Package plant treatment requires certain irretrievable commitments of resources. It would need land to implement the process. Electrical energy is required to run pumps and aeration equipment. Chlorine in the amount of approximately 10 mg/l is required to disinfect the effluent.

Other negative aspects of the process include the solids generated (generally 2,000 lbs/mgd) and occasional musty odors if the plant is not properly operated or toxic materials are put into the system. Cold climatic conditions may limit the biological reaction rate.

Generally contact stabilization is very reliable and not complex in operation. The process will normally achieve secondary treatment requirements.

Reduced pathogenic organisms; lowered BOD, solids, and total phosphorus in the supernatent; and a relatively small capital expenditure as compared with the other alternatives all make this option attractive.

SEGMENT DISCUSSION

I. Segment 2302

A. Existing Agencies and Programs

1. Local Agencies and/or Governments. Starr County comprises the majority of the non-designated portion of Segment 2302. The authority of county governments in the area of water quality management is limited. Lack of general zoning powers and limited fiscal authority serve to diminish the role that counties may play.

The City of Roma-Los Saenz and the City of La Grulla are both general law cities within Segment 2302. General law municipalities have the statutory authority to construct and operate sewage treatment facilities, but do not have as extensive planning and enforcement tools available to them as do cities deriving powers from home rule.

Also, in Segment 2302 is the Starr County Water Control and Improvement District (WCID) #2. WCID's are governed by Chapter 51 of the Texas Water Code. They are charged with planning to control, store, preserve, and distribute surface waters for irrigation, power, and all other useful purposes. They have the necessary authority to perform these tasks within their political boundaries.

2. Intergovernmental Arrangements/Programs. There have been no intergovernmental arrangements or programs identified.

The City of Roma-Los Saenz sends water samples for water quality testing to the Laredo-Webb County Health Department Laboratory located in Laredo. Laboratory operations are supported by funds provided by the Texas State Department of Health Resources, Webb County, and the City of Laredo. Tests are made free of charge, except for postage.

The City of La Grulla purchases treated water for drinking from the Starr County

WCID #2 on a contractual basis. There is some concern on the part of the City that the WCID's water delivery system cannot meet present service demands of the City's residents and will not be able to meet increased demand in the future. The WCID, on the other hand, is concerned over its water rights and whether or not these will be expanded to enable it to meet projected increases in demand.

B. Segment Analysis

Texas Department of Water Resources (TDWR) designated Stream Segment 2302 extends from the international bridge at Brownsville to Falcon Dam. Only that portion of Segment 2302 which lies upstream of Hidalgo County is in the non-designated portion of the Rio Grande Basin. This segment has been designated by TDWR for non-contact recreation, propagation of fish and wildlife and domestic raw water supply. Accordingly, the following standards have been established:

Chlorides (average not to exceed)	300 mg/l
Sulfates (average not to exceed)	400 mg/l
Total Dissolved Solids (average not to exceed)	1,500 mg/l
Dissolved Oxygen (not less than)	5.0 mg/l
pH Range	6.5 to 9.0
Fecal Coliform (log avg. not more than)	1,000/100 ml
Temperature (not to exceed)	90° F

There have been no violations of these standards recorded in the non-designated area.

Land use in the Rio Grande Basin has been segmented into seven categories. Area devoted to each of the categories within Segment 2302 are estimated below:

Land Use	Area (SQ Miles)
Dry Cropland	303
Irrigated Cropland	70
Forest Land	3
Urban Land	8
Water	1
Range Land	694
Barren Land	0
Total	1079

Agricultural activity is the primary source of non-point pollution in the segment. Approximately 35 percent of the area is devoted to agricultural use and together with rangeland, 99% of the segment's area is accounted for. Surface erosion from pasture, range and idle land is generally not severe due to the dense vegetative cover. An expected increase in both urban and non-urban population over the planning period will result in construction activities which contribute to non-point source pollution. However, the pollution from these activities is not expected to significantly affect water quality in the segment since the 1975 estimated population of the segment was only 16,860 and this population is expected to grow to only 24,210 by the year 2000. This growth should not cause significant problems.

There is only minor mining activity in the segment drainage basin. One company processes pumicite from volcanic ash and another mines miscellaneous clays.

TDWR has not issued injection well permits within this area. However, there are several permitted municipal solid waste disposal sites located in Starr County. These sites have not been identified as problems but represent potential non-point sources of pollution. The sites are shown on Plate 7(C).

Salt water intrusion is not a current problem in this segment. However, ground water levels are declining in the Gulf Coast aquifer and continued declines will increase the threat of saline water encroachment.

Several areas have been identified as septic tank areas in the non-designated portion of Segment 2302. These areas are: El Sauz, Falcon Heights, La Casita-Garciaville, Garceno-Rosita, Olmos, Fronton, and Salineno, and are shown on Plate 7(C). There does not appear to be any water quality problems resulting from these septic tank areas at the present time.

There are no planned hydrologic modifications for this segment.

C. Alternative Discussion

There are two designated sewerage planning areas in Segment 2302, La Grulla and Falcon Heights. Wastewater treatment and collection needs for each of these communities is discussed below.

1. La Grulla

a. Technical Alternatives

La Grulla is located in Starr County and had an estimated 1975 population of 1440. Projected populations are presented below:

Year	Population
1975	1440
1983	1670
1990	2000
2000	2410

These persons are expected to occupy approximately 180 acres in the La Grulla vicinity and the population density over the planning period is expected to vary between 8 persons/acre to 13 persons/acre. Because of the population, La Grulla was designated a sewerage planning area and a collection and treatment system has been planned according to the statewide methodology. Planning for this system assumes that the total area population will be services.

The collection system should consist of approximately:

Collection line length	4.5 miles
Inch miles of sewer	39
Lift stations required	1

The cost for the construction of this sewage collection and transport system is presented in Tables II-D-1, 2 and 3. It is assumed that the collection system will be installed and for purposes of calculating present worth, all costs will be incurred in the year 1983.

TABLE II-D-1

LA GRULLA

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 1

Total System Cost		
Collection		$ 486,000
Treatment		$ 552,000
Annual Community Cost		
Capital	$ 24,000	
O & M	$ 50,000	
Total	$ 74,000	
Annual per Capita Cost		
Maximum; based on 1670 persons in 1983		$44.00
Minimum; based on 2410 persons in 2000		$31.00
Present Worth	$1,607,000	
Equivalent Annual Cost	$ 140,000	
Year(s) of collection line improvements	1983	
Year(s) of treatment system improvement	1983	

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

TABLE II-D-2

LA GRULLA

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 2

Total System Cost		
Collection		$ 486,000
Treatment		$ 691,000
Annual Community Cost		
Capital	$ 27,000	
O & M	$ 37,000	
Total	$ 64,000	
Annual per Capita Cost		
Maximum; based on 1670 persons in 1983		$38.00
Minimum; based on 2410 persons in 2000		$26.00
Present Worth	$1,602,000	
Equivalent Annual Cost	$ 140,000	
Year(s) of collection line improvements	1983	
Year(s) of treatment system improvement	1983	

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

TABLE II-D-3

LA GRULLA

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 3

Total System Cost		
Collection		$ 486,000
Treatment		$ 238,000
Annual Community Cost		
Capital	$ 16,000	
O & M	$ 33,000	
Total	$ 49,000	
Annual per Capita Cost		
Maximum; based on 1670 persons in 1983		$29.00
Minimum; based on 2410 persons in 2000		$20.00
Present Worth	$1,099,000	
Equivalent Annual Cost	$ 96,000	
Year(s) of collection line improvements		1983
Year(s) of treatment system improvement		1983

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

Alternative treatment facilities have been considered. Design of each of these alternatives was developed to meet the requirements of Effluent Set 0 which was determined adequate to protect the waters of the segment by procedures set forth in the statewide methodology. The alternatives considered are presented below:

Alternative 1	Alternative 2	Alternative 3
Primary treatment	Primary treatment	Package plant
Disinfection	Stabilization Lagoon	(Contact stabili-
Land application	Disinfection	zation)
Aerobic digestion	Aerobic digestion	Truck transport
Truck transport	Truck transport	Landfill
Landfill	Landfill	

Each treatment alternative was planned to handle average wastewater flows of 0.256 MGD and peak flows of 0.584 MGD, projected through the year 2000. This flow, with treatment to the levels required by the specified effluent set, would result in average daily discharges of approximately 65 lbs. BOD and 65 lbs. TSS. The facility plan assumes that no industrial wasteloads will be discharged to the municipal system. Additional capacity will be required should it be desired to treat industrial wastes.

A summary of the costs for the collection and treatment facilities of alternative 1 is presented in Table 1. Summaries of the costs for alternatives 2 and 3 presented in Tables 2 and 3, respectively. Alternative 3 has been selected as the most appropriate treatment alternative. It is assumed that the treatment facility will be installed and, for purposes of calculating present worth all costs will be incurred in the year 1983. The annual community costs are based upon the assumption that all capital costs except land and right-of-way purchases are eligible for federal grant funds under Section 201 of PL 92-500 and that these funds will be made available to the community.

b. Management System

A review of existing governmental entities capable of providing wastewater collection and treatment facilities to La Grulla shows that the city is incorporated under the general laws of the State of Texas. Since incorporated municipalities clearly have the authority to finance, construct, and operate and maintain sewerage facilities, the City of La Grulla is designated as the management agency.

c. Impacts of Alternative Plans

Impact of the individual processes of each alternative were presented in the introduction to this chapter. Areal requirements for the alternatives considered are as follows:

Alternative	Acres
1	15.4
2	7.5
3	1

2. Falcon Heights

a. Technical Alternatives

Falcon Heights is located in Starr County and had an estimated 1975 population of 440. Projected populations for the community are presented below:

Year	Population
1975	440
1983	525
1990	620
2000	750

These persons are expected to occupy approximately 57 acres in the vicinity of Falcon Heights and the population density over the planning period is expected to vary between 8 and 13 persons/acre. Because of the population, and because Falcon Heights does not have existing wastewater collection and treatment facilities, it has been designated a sewerage planning area. Accordingly, alternative plans are developed below as prescribed by the statewide methodology. It has been assumed that the total populated area will be serviced.

The collection system should consist of approximately:

Collection line length	1.7 miles
Inch miles of sewer	15
Number of lift stations	1

The cost for the construction of this sewage collection and transport system is presented in Table II-D-4 through 6. It is assumed that the collection system will be installed and for purposes of calculating present worth, all costs will be incurred in the year 1983.

Alternative treatment facilities have been considered. Design of each of these alternatives was developed to meet the requirements of Effluent Set 0 which was determined adequate to protect the waters

TABLE II-D-4

FALCON HEIGHTS

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 1

Total System Cost		
Collection		$244,000
Treatment		$368,000
Annual Community Cost		
Capital	$17,000	
O & M	$22,000	
Total	$39,000	
Annual per Capita Cost		
Maximum; based on 525 persons in 1983		$ 75.00
Minimum; based on 750 persons in 2000		$ 53.00
Present Worth	$ 870,000	
Equivalent Annual Cost	$ 76,000	
Year(s) of collection line improvements	1983	
Year(s) of treatment system improvement	1983	

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

TABLE II-D-5

FALCON HEIGHTS

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 2

Total System Cost		
Collection		$244,000
Treatment		$367,000
Annual Community Cost		
Capital	$14,000	
O & M	$27,000	
Total	$41,000	
Annual per Capita Cost		
Maximum; based on 525 persons in 1983		$ 79.00
Minimum; based on 750 persons in 2000		$ 55.00
Present Worth	$ 925,000	
Equivalent Annual Cost	$ 81,000	
Year(s) of collection line improvements	1983	
Year(s) of treatment system improvement	1983	

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

TABLE II-D-6

FALCON HEIGHTS

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 3

Total System Cost		
Collection		$ 244,000
Treatment		$ 127,000
Annual Community Cost		
Capital	$ 8,000	
O & M	$ 21,000	
Total	$ 29,000	
Annual per Capita Cost		
Maximum; based on 525 persons in 1983		$55.00
Minimum; based on 750 persons in 2000		$39.00
Present Worth	$609,000	
Equivalent Annual Cost	$ 53,000	
Year(s) of collection line improvements		1983
Year(s) of treatment system improvement		1983

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

of the segment by procedures set forth in the statewide methodology. The alternatives considered are presented below:

Alternative 1	Alternative 2	Alternative 3
Primary treatment	Primary treatment	Package plant
Disinfection	Stabilization lagoon	(Contact stabi-
Land application	Aerobic digestion	lization)
Aerobic digestion	Truck transport	Truck transport
Truck transport	Landfill	Landfill
Landfill		

Each treatment alternative was planned to handle average wastewater flows of 0.079 MGD and peak flows of 0.21 MGD, the maximum projected requirement through the year 2000. This flow, with treatment to the levels required by the specified effluent set, would result in average daily discharges of approximately 20 lbs. BOD and 20 lbs. TSS. The facility plan assumes that no industrial wasteloads will be discharged to the municipal system. Additional treatment capacity will be required should it be desired to treat industrial wastes.

A summary of the costs for the collection and treatment facilities of alternative 1 if presented in Table 4. Summaries of the costs for alternatives 2 and 3 are presented in Tables II-D-5 and 6, respectively. Alternative 3 has been selected as the most appropriate treatment alternative. It is assumed that the treatment facility will be installed and, for purposes of calculating present worth values, all costs will be incurred in the year 1983. The annual community costs are based upon the assumption that all capital costs except are eligible for federal grant funds under Section 201 of PL 92-500 and that these funds will be available to the community.

b. Management System

A review of the existing governmental entities capable of providing wastewater collection and treatment facilities to Falcon Heights shows that only Starr County

has all the necessary authority and powers at the present time. However, in view of the limited powers of taxation available to county governments in dealing with wastewater collection and treatment, it is recommended that the community create a special district. Alternatively, the community may incorporate under the general laws of Texas. To either incorporate or create a special district, a confirmation election must be held, detailed plans drawn, and a bond authorization must pass.

c. Impacts of Alternative Plans

Impacts of the individual processes of each alternative were presented in the introduction to this chapter. Areal requirements for the alternatives considered are as follows:

Alternative	Acres
1	2.4
2	5.0
3	0.5

D. Identification of Other Local Management Entities

There is one facility planning area in the non-designated portion of Segment 2302. This area, Roma-Los Saenz, has received a grant under Section 201 of PL92-500 to prepare a facility plan for its defined service area. As a facility planning area, Roma has assumed responsibility for construction, operation and management of the wastewater collection and treatment facilities and is designated as the management agency for that community.

Another agency located within this segment is Starr County Water Control and Improvement District Number 2. This agency has authority to plan, construct, operate and maintain wastewater collection and treatment facilities within its established, political boundaries, and is designated the management agency for that area within its boundaries.

II. Segment 2303

A. Existing Agencies and Programs

1. Local Agencies and/or Governments. Zapata County comprises the vast majority of this river segment. The authority held by county governments in the area of water quality management is limited. Lack of general zoning powers and limited fiscal authority serve to diminish the role that counties may play.

The Zapata County Water Control and Improvement District in San Ygnacio is governed by Chapter 51 of the Texas Water Code. WCID's are charged with planning to control, store, preserve, and distribute surface waters for irrigation, power, and all other useful purposes.

2. Intergovernmental Arrangements. The Zapata County WCID (San Ygnacio) sends water samples for water quality testing to the Laredo Webb County Health Department Laboratory located in Laredo. Laboratory operations are supported by funds provided by the State Department of Health Resources, Webb County, and City of Laredo. Tests are made free of charge, except for postage.

B. Segment Analysis

Texas Department of Water Resources (TDWR) designated Stream Segment 2303 is Falcon Lake. This segment has been designated by TDWR for contact recreation, non-contact recreation, propagation of fish and wildlife and as a domestic raw water supply. Accordingly, the following standards have been established:

Chloride (average not to exceed)	200 mg/l
Sulfate (average not to exceed)	250 mg/l
Total Dissolved Solids (average not to exceed)	700 mg/l
Dissolved Oxygen (not less than)	5.0 mg/l
pH Range	7.0 to 9.0
Fecal Coliform (log avg. not more than)	200/100 ml
Temperature (not to exceed)	93° F

Review of TDWR water quality data shows that there has been only one water quality violation in that segment. This was a low dissolved oxygen level (4.8 mg/l) recorded on 6 September 1974. The problem has not recurred and it is assumed this was an isolated instance since there is only one permitted discharger to the segment. However, since the segment is a reservoir designated as a domestic raw water supply, effluent set 2A is considered the minimum adequate to protect the water quality of this segment. The effluent set 2A limits concentrations of BOD to 10 mg/l and TSS to 15 mg/l and the logarithmic average of Fecal Coliform organisms to 200/100 ml.

Land use in the Rio Grande Basin has been segmented into seven categories. Area devoted to each of the categories within Segment 2303 are estimated below:

Land Use	Area (SQ Miles)
Dry Cropland	262
Irrigated Cropland	0
Forest Land	0
Urban Land	3
Water	80
Range Land	696
Barren Land	0
Total	1041

The largest land use in the segment which contributes to non-point source pollution is range land which uses 67 percent of the area's land. Twenty five percent is devoted to agriculture as non-irrigated cropland. Only a very small area of land in this drainage basin is irrigated cropland.

Some minor non-point source pollutants can be expected from construction activities in the segment since the population is projected to increase from the 1975 estimate of 3,600 to 4,260 by the year 2000. Since there are no known forest lands, mines, or injection wells within the segment drainage basin, these activities are not suspected of generating non-point source pollution. Since there are no major or minor aquifers located within the segment, the area

is not expected to experience salt water intrusion problems. The only septic tank area in this segment is Guerra. It is well removed from the river and should not pose a threat to water quality.

The major hydrologic modification in the area is Falcon Dam and Reservoir. This reservoir now traps much of the sediment which previously was distributed to downstream areas causing sedimentation problems. There are no plans at present to expand or construct additional modifications in this area.

The non-point sources of pollution discussed above do not appear to threaten water quality in Segment 2303.

C. Alternative Discussion

There are no designated sewerage planning areas of Segment 2303. Therefore there is no discussion of point source alternatives presented.

D. Identification of Other Local Management Entities

There is one facility planning area in segment 2303. This area, Zapata, has received a grant under Section 201 of PL 92-500 to prepare a facility plan for its defined service area. The Zapata County government has assumed the responsibility for construction, operation, and management of the facilities. Other areas which are adjacent to Zapata and should be included in facility plans for that community include the Medina and Veleno additions. Zapata County has assumed the role of management agency for the community of Zapata and is therefore designated as the management agency.

III. Segment 2304

A. Existing Agencies and Programs

1. Local Agencies and/or Governments. Several county governments are a part of this segment. They include Webb, Maverick, Dimmit, Kinney, Val Verde, Edwards, and Zapata Counties. The authority of county governments in the area of water quality management is limited. Lack of general zoning powers and limited fiscal authority serve to diminish the role that counties may play.

Various city governments take part in local water quality management planning. These cities include Laredo, Eagle Pass, Del Rio, Spofford and Brackettville. All of these municipalities have the statutory authority to construct and operate sewage treatment facilities, although planning and enforcement tools available to the home rule cities of Laredo, Eagle Pass, and Del Rio are more extensive than those of Spofford and Brackettville which derive their powers from general law. The home rule cities in the Rio Grande Basin 208 area have adopted charters giving them sufficient fiscal and police powers to apply the full measure of water quality controls.

The Del Mar Conservation District (Municipal Utility District), Maverick County Water Control and Improvement District #1, Maverick County Soil and Water Conservation District #228, Fort Clark Municipal Utility District, Devil's River Soil and Water Conservation District #224, and Upper Nueces-Frio Soil and Water Conservation District #238 manage surface waters in various locales within Segment 2304. WCID's are governed by Chapter 51 of the Texas Water Code. They are charged with planning to control, store, preserve, and distribute surface waters for irrigation, power, and all other useful purposes. They have the necessary authority to perform these tasks.

2. Intergovernmental Arrangements/Programs. The Fort Clark Municipal Utility District

provides the City of Brackettville with sewage collection and treatment on a contractural basis which began on January 1, 1977.

The City of Laredo has recently completed some planning processes under the Comprehensive Planning and Assistance Program (701), sponsored by the United States Department of Housing and Urban Development (HUD). In Laredo's plan, five-year recommendations were made for program-financed improvements among which were the renovation of present sewage treatment facilities and construction of an additional treatment plant. It appears that there was some concern on the part of City officials as to whether or notall recommendations could be met and, for this reason the program was not carried beyond the initial planning phases.

Val Verde County sends water samples for water quality testing to the State Department of Health Resources Laboratories located in San Antonio and Austin.

The Del Mar Conservation District provides water and sewer services for an unincorporated area adjacent to the northern city limit of Laredo. The District purchases water from the City of Laredo on a contractual basis.

B. Segment Analysis

Texas Department of Water Resources (TDWR) designated stream Segment 2304 extends from the headwaters of Falcon Reservoir to Amistad Dam. This segment has been designated by TDWR for non-contact recreation, propagation of fish and wildlife, and domestic raw water supply. Accordingly, the following standards have been established:

Chlorides (average not to exceed)	200 mg/l
Sulfates (average not to exceed)	300 mg/l
Total Dissolved Solids (average not to exceed)	1000 mg/l
Dissolved Oxygen (not less than)	5.0 mg/l
pH Range	7.0 to 9.0
Fecal Coliform (log avg. not to exceed)	1000.100ml
Temperature (not to exceed)	95° F

Review of TDWR water quality data shows that water quality is generally good in Segment 2304. The exception to this general condition is the portion of the segment immediately downstream of Laredo. A year long sampling program conducted by TDWR has shown a poor quality effluent being discharged into the segment. A recent TDWR board order addresses the problem and directs Laredo to take certain steps to correct the situation.

Land use in the Rio Grande Basin has been segmented into seven categories. Area devoted to each of the categories within Segment 2304 are estimated below:

Land Use	Area (SQ Miles)
Dry Cropland	428
Irrigated Cropland	251
Forest Land	28
Urban Land	60
Water	7
Range Land	3219
Barren Land	0
Total	3993

The land use categories of agriculture and rangeland are the primary land uses which contribute to non-point sources of pollution in the segment. These two land use categories account for approximately 98 percent of the area and may contribute to non-point source pollution through the return of irrigation waters to the Rio Grande. Records maintained by the International Boundary and Water Commission, indicate that irrigation return flows are insignificant. Since return flows are very minor, pollutants from these sources are assumed to be minor also. Growth of the urban center of Laredo is expected to generate non-point source pollution from construction activities.

There are approximately 28 square miles of land classified as forrested within the basin. None of this is being used for silvicultural activities.

Within the segment drainage basin there are deposits of both Butuminous and Lignite Coal, although neither is presently mined. Only sand and

gravel operations in the vicinity of Laredo may be found in the basin. The coal deposits are located on Plate 7(A).

This basin should experience a healthy population growth between 1975 and 2000. This growth should occur around the three principal urban areas of Laredo, Del Rio, and Eagle Pass. Construction activities in these areas are expected to result in non-point source pollutants being generated around specific job sites, which will be located around the urban areas. These pollutants may consist of organic matter, micro-organisms, inorganic solids, and most importantly, sediment. These pollutants will be generated over a rather long period of time and over a large area, and should not significantly degrade water quality in the segment.

The Texas Department of Water Resources has issued no permits for operation of injection wells in the segment drainage basin. There are several municipal solid waste disposal sites located near and serving the population centers and there is one industrial solid waste disposal site near Laredo. These sites, if properly operated, should not significantly affect ground or surface water quality in the basin. These sites are located on Plate 7(C).

There are two aquifers within this segment, the Edwards-Trinity (Plateau) in the north and the Carrizo-Wilcox Aquifer in the southern section. The Edwards-Trinity is not expected to have an intrusion problem since activities in the area are sparse and ground water is not a significant water source.

The Carrizo-Wilcox Aquifer is located in the Laredo area. The majority of water for public use comes directly from the river and hydrologic pressure changes, which result in salt water intrusion, are not a problem. A few private wells exist, none of which use large enough quantities to be significant.

There are several septic tank areas located within the segment drainage basin. They are San Ygnacio, Mirando City, El Indio, La Gloria, and Quemado and Normandy. Two of the areas are sewerage planning areas to be discussed in paragraph C. The septic tank areas are shown on Plate 7(C).

The drainage basin contains one major hydrologic modification, Lake Casa Blanca. This lake was completed in 1951 and is used for recreational purposes and provides water for irrigation of a golf course. No additional hydrologic modifications are planned for this segment.

Reviewing TDWR water quality data and standards, it does not appear that pollutants from non-point sources due to man's activities will significantly affect the ability of this segment to continue to meet established standards.

C. Alternative Discussion

There are two designated sewerage planning areas and one intensive study area located in this segment. Mirando City and San Ygnacio are the sewerage planning areas and wastewater collection and treatment needs are discussed below.

1. Mirando City

a. Technical Alternatives

Mirando City is located in Webb County and had an estimated 1975 population of 760. Projected populations for the community are presented below:

Year	Population
1975	760
1983	870
1990	960
2000	1120

These persons are expected to occupy approximately 160 acres in the vicinity of Mirando City and the population density over the planning period is expected to vary between 7 and 9 persons/acre. Because of this population, and because Mirando City does not have existing wastewater collection and treatment facilities, it has been designated as a sewerage planning area. Accordingly, alternative plans are developed below as prescribed by the statewide total populated area will be served.

The collection system should consist of:

Collection line length	4.5 miles
Inch miles of sewer	39
Number of lift stations	1

The cost for the construction of this sewage collection and transport system is presented in Table II-D-7 through 9. It is assumed that the collection system will be installed and, for purposes of calculating present worth values, all costs will be incurred in the year 1983.

Alternate treatment facilities have been considered. Design of each of these alternatives was developed to meet the requirements of Effluent Set 0 which was determined adequate to protect the waters of the segment by procedures set forth in the statewide methodology. The alternatives considered are presented below:

TABLE II-D-7

MIRANDO CITY

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 1

Total System Cost		
Collection		$497,000
Treatment		$391,000
Annual Community Cost		
Capital	$20,000	
O & M	$30,000	
Total	$51,000	
Annual per Capita Cost		
Maximum; based on 870 persons in 1983		$58.00
Minimum; based on 1120 persons in 2000		$45.00
Present Worth	$1,235,000	
Equivalent Annual Cost	$ 108,000	
Year(s) of collection line improvements	1983	
Year(s) of treatment system improvement	1983	

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

TABLE II-D-8

MIRANDO CITY

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 2

Total System Cost		
Collection		$497,000
Treatment		$456,000
Annual Community Cost		
Capital	$21,000	
O & M	$27,000	
Total	$48,000	
Annual per Capita Cost		
Maximum; based on 870 persons in 1983		$56.00
Minimum; based on 1120 persons in 2000		$43.00
Present Worth	$1,264,000	
Equivalent Annual Cost	$ 110,000	
Year(s) of collection line improvements	1983	
Year(s) of treatment system improvement	1983	

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

TABLE II-D-9

MIRANDO CITY

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 3

Total System Cost		
Collection		$ 497,000
Treatment		$ 159,000
Annual Community Cost		
Capital	$ 15,000	
O & M	$ 24,000	
Total	$ 38,000	
Annual per Capita Cost		
Maximum; based on 870 persons in 1983		$ 44.00
Minimum; based on 1120 persons in 2000		$ 34.00
Present Worth	$926,000	
Equivalent Annual Cost	$ 81,000	
Year(s) of collection line improvements		1983
Year(s) of treatment system improvement		1983

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

Alternative 1	Alternative 2	Alternative 3
Primary treatment	Primary treatment	Package plant
Disinfection	Stabilization lagoon	(Contact stabi-
Land application	Disinfection	lization)
Aerobic digestion	Aerobic digestion	Truck transport
Truck transport	Truck transport	Landfill
Landfill	Landfill	

Each treatment alternative was planned to accomodate average wastewater flows of 0.123 MGD and peak flows of 0.304 MGD, the projected requirement through the year 2000. This flow, with treatment to the levels required by the specified effluent set, would result in average daily discharges of approximately 30 lbs. BOD and 30 lbs. TSS. The facility plan assumes that no industrial wasteloads will be discharged to the municipal system. Additional treatment capacity will be required should it be desired to treat industrial wastes.

A summary of the costs for the collection and treatment facilities of alternative 1 is presented in Table II-D-7. Summaries of the costs for alternatives 2 and 3 are presented in Tables II-D-8 and 9, respectively. Alternative 3 has been selected as the most appropriate treatment alternative. It is assumed that the treatment facility will be installed and, for purposes of calculating present worth values, all costs will be incurred in the year 1983. The annual community costs are based upon the assumption that all capital costs except land purchases and right-of-way purchases are eligible for federal grant funds under Section 201 of PL 92-500 and that these funds will be available to the community.

b. Management System

A review of existing governmental entities capable of providing wastewater collection and treatment facilities to Mirando City shows that only Webb County has all the necessary management powers at the

present time. However, in view of the limited powers of taxation available to county governments in dealing with wastewater collection and treatment, it is recommended that the community create a special district. Alternatively, the community may incorporate under the general laws of Texas. To create either the special district of the municipality, an election must be held and taxing authority granted.

c. Impacts of Alternative Plans

Impacts of the individual processes of each alternative were presented in the introduction to this chapter. Areal requirements for the alternatives considered are as follows:

Alternative	Acres
1	9.4
2	4.7
3	0.5

2. San Ygnacio

a. Technical Alternatives

San Ygnacio is located in Zapata County and had an estimated 1975 population of 895. Projected populations for the community are presented below:

Year	Population
1975	895
1983	1210
1990	1360
2000	1550

These persons are expected to occupy approximately 150 acres in the vicinity of San Ygnacio and the population density is expected to vary between 6 and 10 persons/acre. Because of this population and because San Ygnacio does not have existing wastewater collection and treatment facilities, it is recognized as a sewage planning area at the request of local officials. Land application and stabilization lagoon alternatives are not considered in detail since review of these alternatives show that they are more expensive than the package plant alternative.

The collection system should consist of:

Collection line length	3 miles
Inch miles of sewer	26
Number of lift stations	1

The cost for the construction of this sewage collection and transport system is presented in Table II-D-10. It is assumed that the collection system will be installed and, for purposes of calculating present worth values, all costs will be incurred in the year 1983.

Design of the package plant was developed to meet the requirements of Effluent Set 1. This will adequately protect the waters of the segment as determined by the

TABLE II-D-10

SAN YGNACIO

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 1

Total System Cost		
Collection		$ 385,000
Treatment		$ 194,000
Annual Community Cost		
Capital	$ 13,000	
O & M	$ 33,000	
Total	$ 46,000	
Annual per Capita Cost		
Maximum; based on 1210 persons in 1983		$ 38.00
Minimum; based on 1550 persons in 2000		$ 29.00
Present Worth	$ 957,000	
Equivalent Annual Cost	$ 83,400	
Year(s) of collection line improvements		1983
Year(s) of treatment system improvement		1983

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

statewide methodology. The package plant will provide a contact stabilization type of activated sludge treatment. This form of treatment includes: primary treatment, biological treatment, sludge digestion and chlorination. Sludge drying beds and truck transport to a municipal landfill site has been provided for in the cost estimates.

The package plant was planned to accommodate average wastewater flows of 0.160 MGD, the projected requirement through the year 2000. This flow, with treatment to the levels required by the specified effluent set, would result in average daily discharges of approximately 25 lbs. BOD and 25 lbs. TSS. The facility plan assumes that no industrial wasteloads will be discharged to the municipal system. Additional treatment capacity will be required should it be desired to treat industrial wastes.

A summary of the costs for the collection and treatment facilities is presented in Table II-D-10. It is assumed that the treatment facility will be installed and, for purposes of calculating present worth values, all costs will be incurred in the year 1983. Annual community costs are based upon the assumption that all capital costs except land purchases and right-of-way purchases are eligible for federal grant funds under section 201 of PL 92-500 and that these funds are made available to the community.

b. Management System

A review of the existing governmental entities capable of providing wastewater treatment facilities to San Ygnacio shows that Zapata County Water Control and Improvement District, San Ygnacio, is located in the area. This WCID is presently involved in water supply. Since special districts are normally created for specific purposes, the WCID's powers may require expansion to allow collection and treatment of wastewater. A bond election must be called to authorize the required indebtedness. The

district is designated as the management agency for the area within its boundaries.

c. Impacts of Alternative Plans

A package plant was considered most appropriate for San Ygnacio. The impacts associated with this type of treatment facility were presented in the introduction. The plant would require approximately 0.5 acres of land.

3. Laredo

a. Technical Alternatives

Laredo is an incorporated, home rule city located in Webb County. The existing treatment facility consists of primary treatment, a trickling filter, clarifier, disinfection facilities, and drying beds and is permitted for a flow up to 8.0 MGD.

However, the Texas Department of Water Resources, (TDWR) has recently reviewed complaints concerning the effluent from this plant and determined certain improvements are required. These required improvements fall into two categories, immediate and long term improvements, and were defined in an enforcement order issued by TDWR April 19, 1978. Two assumptions have been made concerning the facilities in Laredo and they are consistent with the TDWR enforcement order. These assumptions are:

1. The City of Laredo has provided sewage collection and treatment services for an extended period and it is assumed that all populated areas of the city have sewage facilities available. Only newly developed areas will require collection facilities in the future.

2. As indicated in the enforcement order, wastewater is assumed to be generated at the rate of 120 gallons per capita per day.

The 1975 population of the Laredo Intensive Study Area (ISA) was estimated to be 77,350. The projected populations for the ISA are presented below:

Year	Population
1975	77,350
1983	87,830
1990	97,440
2000	113,430

Of this total population, less than 1.5% of the persons residing in the ISA reside in non-urban areas.

The Laredo ISA contains the sewerage planning area of Mirando City, discussed previously. Therefore, Mirando City is omitted from this discussion.

The existing collection system for Laredo has been estimated to consist of the following:

Length of sewer	220 miles
Inch miles of sewer	1900
Number of lift stations	5

Based on these estimates and the statewide methodology, it has been estimated that the collection system of Laredo will require expansion in each future planning year. A schedule for this expansion follows:

Planning Year	New Sewer Length	New Sewer Inch-Miles	New Lift Stations
1983	60	500	0
1990	30	270	0
2000	30	300	1

A summary of the cost of construction of this sewage collection and transport system expansion is presented in Table II-D-11. It is assumed that the collection system will be installed and, for purposes of calculating present worth values, costs will be incurred in the planning year expansion is required.

Treatment facility improvements are recommended for the first planning period, 1983, and by the end of the planning period, 2000. By 1983, the capacity of the existing treatment facility should be expanded by approximately 3.8 MGD. The recommended expansion should consist of:

Preliminary treatment
Primary clarification
Conventional activated sludge

TABLE II-D-11

LAREDO

COST OF COLLECTION FACILITIES

System Cost		
Collection		$10,129,000
Annual Community Cost		
Capital	$ 227,000	
O & M	$ 86,000	
Total	$ -0-	
Annual per Capita Cost		
Maximum; based on 113,430 persons in 2000		$2.80
Minimum; based on 87,830 persons in 1983		$1.60
Present Worth	$7,754,000	
Equivalent Annual Cost	$ 676,000	
Year(s) of collection line improvements		1983, 1990, 2000

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

Aerobic digestion
Drying beds
Disinfection
Truck Transport
Landfill

Cost of these improvements are estimated to be approximately $2.3 million.

Prior to the year 2000, additional expansion of approximately 2 MGD will be required to meet the needs of the projected population. The elements of this expansion should be identical to those recommended for 1983. Costs of this expansion is estimated to be approximately $1.4 million. All improvements are planned to meet the requirements of Effluent Set 1. The maximum projected flow of 13.8 MGD, with treatment to the level required by the specified effluent set, would result in average daily discharges of approximately 2300 lbs. BOD and 2300 lbs. TSS.

A summary of the costs for the treatment facilities is presented in Table II-D-12. It is assumed that the treatment facility will be installed and, for purposes of calculating present worth values, all costs will be incurred in the years 1983 and 2000. Annual community costs are based upon the assumption that all capital costs except land purchases and right-of-way purchases are eligible for federal grant funds under Section 201 of PL 92-500 and that these funds will be available to the community.

b. Management System

A review of existing governmental entities capable of providing wastewater collection and treatment facilities to the Laredo ISA show that two entitites now provide those services, the Del Mar Conservation District and the City of Laredo. The Conservation District lies within the ETJ of the City of Laredo and therefore must seek the City's approval before annexing new areas. Since the City of Laredo is a home rule city and clearly has the authority to finance, construct, operate

TABLE II-D-12

LAREDO

COST OF TREATMENT FACILITIES

System Cost		
Treatment		$3,723,000
Annual Community Cost		
Capital	$ 81,000	
O & M	$ 259,000	
Total	$ 340,000	
Annual per Capita Cost		
Maximum; based on 113,430 persons in 2000		$3.00
Minimum; based on 87,830 persons in 1983		$2.20
Present Worth	$6,662,308	
Equivalent Annual Cost	$ 580,953	
Year(s) of treatment system improvement		1983, 1990

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

and maintain sewerage facilities, and since the City of Laredo is involved in these functions through the Laredo waterworks system, it would be logical for this involvement to continue. Laredo may annex areas outside its corporate limits and may require residents of these areas to join existing sewer systems when such requirement is reasonable. Thus Laredo has all needed powers to direct and manage wastewater collection and treatment. The Laredo Waterworks System concurs with the recommendations of this plan. The City of Laredo is designated as the management agency for Laredo.

c. Impacts of Alternative Plans

Primary treatment is used to remove suspended particles from wastewater and the impacts of this treatment process have been discussed previously.

Conventional activated sludge is an aerobic biological treatment process in which wastewaters are treated with microorganisms. Oxygen is provided by mechanical or diffused air method. Soluble and colloidal organic matter contained in the wastewater is removed by synthesis and oxidation. A portion of the newly synthesized organic matter is separated in a settling tank, called a clarifier, and recycled to the reaction tank. This provides a balanced active mass of organisms for the system. The rest of the settled sludge is wasted from the system as residual sludge.

The process is 85 to 95 percent efficient. It requires no chemical inputs, although energy is necessary for running pumps, aeration equipment, and drive blowers. There are no land requirements for upgrading the existing system.

The process is generally reliable, though susceptible to conventional biological upsets. With proper operation it is free of any nuisance, although low influent BOD concentrations can reduce process efficiency.

Effluent is disinfected prior to being discharged. The impacts of disinfection have been discussed previously.

Aerobic digestion is used to aerate liquid sludge until it is stable. The impacts of aerobic digestion have been discussed previously.

The sludge is further dewatered in drying beds. Sludge is distributed evenly over sand beds and allowed to dry over a period of several weeks. Then the sludge cake is removed and used as fertilizer or disposed of in a landfill. There are no chemical requirements in this process and energy is necessary only if the sludge cake is removed by mechanical means.

Dewatering serves the following purposes:

- Reduction in sludge volume reduces the cost of ultimate disposal.
- Ease in sludge handling, and
- Reduction in leachate production at landfill site.

The digested sludge is transported by truck to a landfill site. The impacts have been discussed previously.

C. Idenfification of Other Local Management Entities

There is one facility planning area in Segment 2304. Del Rio has received a grant under Section 201 of PL 92-500 to prepare a facility plan for its defined service area. In applying for this grant the city has assumed the responsibility for management of wastewater collection and treatment facilities within its corporate limits and is therefore designated as the management agency.

Maverick County owns and operates a wastewater collection and treatment facility on the Eagle Pass Air Base. Thus, Maverick County has assumed the role of management agency for the community located on this base and is designated as the management agency for that community.

Eagle Pass owns and operates wastewater collection and treatment facilities within its boundaries. Eagle Pass has made application for 201 grant funds. It is clear that the City of Eagle Pass has assumed the role of management agency for the community within its corporate limits and is so designated.

Brackettville owns and operates a treatment facility for the City of Brackettville. Brackettville is therefore designated a management agency because of its demonstrated ability and leadership.

Grandfalls owns and operates a wastewater collection and treatment facility for the City of Grandfalls. Grandfalls is therefore designated a management agency because of its demonstrated ability and leadership.

IV. Segment 2305

A. Existing Agencies and Programs

1. Local Agencies and/or Governments. As previously mentioned, all of Segment 2305 lies within Val Verde County. The authority of governments in the area of water quality management is limited. Lack of general zoning powers and limited fiscal authority usually serve to diminish the role that counties play. However, within the drainage basin of Amistad Reservoir, Val Verde County has been extended all the zoning powers normally associated with home rule cities.

   Both the Val Verde Water Control and Improvement District (WCID) in Comstock and Devil's River Soil and Water Conservation District #224 operate within Segment 2305. WCID's are governed by Chapter 51 of the Texas Water Code. They are charged with planning to control, store, preserve, and distribute surface waters for irrigation, power, and all other useful purposes. They have the necessary authority to perform these tasks.

2. Intergovernmental Arrangements/Programs. Val Verde County sends water samples for water quality testing to the State Department of Health Resources Laboratories located in San Antonio and Austin.

   The Val Verde County WCID (Comstock) sends water samples for water quality testing to the State Department of Health Resources Laboratory located in Austin. Tests are made free of charge, except postage.

B. Segment Analysis

Texas Department of Water Resources (TDWR) designated stream Segment 2305 is Amistad Reservoir. This segment has been designated by TDWR for contact recreation, non-contact recreation, propagation of fish and wildlife and as a domestic raw water supply. Accordingly, the following standards have been established:

Chloride (average not to exceed)	150 mg/l
Sulfate (avg. not to exceed)	250 mg/l
Total Dissolved Solids (avg. not to exceed)	500 mg/l
Dissolved Oxygen (not less than)	5.0 mg/l
pH Range	7.0 to 9.0
Fecal Coliform (log avg. not to exceed)	200/100 ml
Temperature (not to exceed)	88° F

Review of TDWR water quality data shows that only two violations, both temperature, have been recorded. These violations each occurred during August sampling of surface water temperatures. A subsequent sampling program concluded that there was no water quality problem relating to temperature. There are no existing or projected industrial or domestic discharges to this segment or to the area which drains to this segment. However, should there be discharges in the future, the permit should be established to protect the water of the segment for its intended use. The minumum acceptable effluent set which is considered adequate for discharging domestic facilities would be set 2A. This effluent set limits concentrations of BOD and TSS to 10 mg/l and 15 mg/l, respectively. This effluent set also limits discharges of Fecal Coliform to concentrations of 200 per 100 ml of effluent.

Land use in the Rio Grande Basin has been segmented into seven categories. Area devoted to each of the categories within Segment 2305 are estimated below:

Land Use	Area (SQ Miles)
Dry Cropland	0
Irrigated Cropland	0
Forest Land	0
Urban Land	0
Water	57
Range Land	473
Barren Land	0
Total	530

All land in this segment is classified as rangeland with the exception of Comstock, a small urban area. Due to the lack of vegetation attributable to poor climatic conditions and pre-

vious practices of overgrazing, the area is no longer intensively used for livestock production and this land use should not cause significant non-point pollution problems.

Within the segment there is no silvicultural or mining activity. There is no significant construction anticipated in the segment and TDWR has issued no permits for injection wells.

Salt water intrusion has not been noted as a problem in the area, probably due to the minimal use of ground water in the area.

Comstock is the only populated area within the segment and is presently dependent upon septic tank systems for municipal waste disposal. This area does not present a threat to water quality at the present time but should be carefully monitored.

Amistad Dam is a major hydrologic feature of the segment. This dam and the associated reservoir significantly reduce the sediment load transported to downstream segments. There are no future plans for additional hydrologic modifications.

C. Alternative Discussion

There is one designated sewerage planning area in this segment, Comstock. Wastewater collection and treatment needs for this community are discussed below.

1. Comstock

a. Technical Alternatives

Comstock is located in Val Verde County and had an estimated 1975 population of 380. Projected populations for the community are presented below:

Year	Population
1975	380
1983	440
1990	470
2000	510

These persons are expected to occupy approximately 56 acres in the vicinity of Comstock and the population density over the planning period is expected to vary between 8 and 11 persons/acre. Because of this population, and because Comstock does not have existing wastewater collection and treatment facilities, it has been designated a sewerage planning area. Accordingly, alternative plans have been developed and are presented below. These alternatives are consistent with the statewide methodology and it has been assumed that the total population will be serviced.

The collection system should consist of approximately:

Collection line length	2.9 miles
Inch miles of sewer	25
Number of lift stations	1

The cost for the construction of this sewage collection and transport system is presented in Tables II-D-13 through 15. It is assumed that the collection system will be installed and, for purposes of calculating present worth values, all costs will be incurred in the year 1983.

Alternative treatment facilities have been considered. Design of each of these alternatives was developed to meet the re-

TABLE II-D-13

COMSTOCK

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 1

Total System Cost		
Collection		$345,000
Treatment		$343,000
Annual Community Cost		
Capital	$15,000	
O & M	$24,000	
Total	$39,000	
Annual per Capita Cost		
Maximum; based on 440 persons in 1983		$ 89.00
Minimum; based on 510 persons in 2000		$ 76.00
Present Worth	$ 959,000	
Equivalent Annual Cost	$ 84,000	
Year(s) of collection line improvements	1983	
Year(s) of treatment system improvement	1983	

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

TABLE II-D-14

COMSTOCK

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 2

Total System Cost		
Collection		$345,000
Treatment		$304,000
Annual Community Cost		
Capital	$14,000	
O & M	$19,000	
Total	$33,000	
Annual per Capita Cost		
Maximum; based on 440 persons in 1983		$ 76.00
Minimum; based on 510 persons in 2000		$ 65.00
Present Worth	$ 866,000	
Equivalent Annual Cost	$ 76,000	
Year(s) of collection line improvements	1983	
Year(s) of treatment system improvement	1983	

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

TABLE II-D-15

COMSTOCK

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 3

Total System Cost		
a. Collection		$345,000
b. Treatment		$109,000
Annual Community Cost		
Capital	$ 10,000	
O & M	$ 17,000	
Total	$ 27,000	
Annual per Capita Cost		
Maximum; based on 440 persons in 1983		$61.00
Minimum; based on 510 persons in 2000		$52.00
Present Worth	$647,000	
Equivalent Annual Cost	$ 56,000	
Year(s) of collection line improvements	1983	
Year(s) of treatment system improvement	1983	

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

quirements of Effluent Set 0, since no discharge is anticipated. The alternatives considered are presented below:

Alternative 1	Alternative 2	Alternative 3
Primary treatment	Primary treatment	Package plant
Disinfection	Stabilization lagoon	(Contact stabili-
Land application	Aerobic digestion	zation)
Aerobic digestion	Truck transport	Truck transport
Truck transport	Landfill	Landfill
Landfill		

Each treatment alternative is planned to handle average wastewater flows of 0.056 MGD and peak flows of 0.157 MGD, the projected requirement through the year 2000. This flow, with treatment to the level required by the specified effluent set, would result in average daily discharges of approximately 15 lbs. BOD and 15 lbs. TSS. The facility plan assumes that no industrial wasteloads will be discharged to the municipal system. Additional treatment capacity will be required should it be desired to treat industrial wastes.

A summary of the costs for the collection and treatment facilities of alternative 1 is presented in Table II-D-13. Summaries of the costs for alternatives 2 and 3 are presented in Tables II-D-14 and 15, respectively. Alternative 3 has been selected as the most appropriate treatment alternative. It is assumed that the treatment facility will be installed and, for purposes of calculating present worth values, all costs will be incurred in the year 1983. The annual community costs are bases upon the assumption that all capital costs except land purchases and right-of-way purchases are eligible for federal grant funds under Section 201 of PL 92-500 and that these funds will be available to the community.

b. Management System

A review of the existing governmental entities capable of providing wastewater collection and treatment facilities to Com-

stock shows that a water control and improvement district has already been formed in the Comstock area. Voter authorization of a bond issue in sufficient size would be required prior to initiating a waste treatment program.

In addition to the WCID, Val Verde County has the necessary authority and powers required to construct and operate a wastewater treatment facility but the county has limited powers of taxation in that regard. Hence, the WCID is the preferred avenue for attempting to provide adequate collection and treatment. However, the WCID does not desire to be designated at the present time.

c. Impacts of Alternative Plans

Impacts of the individual processes of each alternative were presented in the introduction to this Chapter. Areal requirements for the alternatives considered are as follows.

Alternative	Acres
1	4.2
2	2.2
3	0.5

D. Identification of Other Local Management Entities

There are no other local management entities in Segment 2305 dealing with wastewater collection and treatment.

V. Segment 2306

A. Existing Agencies and Programs

1. Local Agencies and/or Governments. Segment 2306 is composed of several counties, including Val Verde, Terrell, Pecos, Brewster, Presidio, and Jeff Davis Counties. County authority in the area of water quality management is limited. Lack of general zoning powers and limited fiscal authority serve to diminish the role that counties play.

   The City of Marfa is a general law city located within the segment drainage basin. General law municipalities have the statutory authority to construct and operate sewage treatment facilities, but do not have as extensive planning and enforcement tools available to them as do cities deriving powers from home rule.

   There are several WCID's in Segment 2306, including Devil's River Soil and Water Conservation District #224, Terrell County Water Control and Improvement District #1, Rio Grande-Pecos Soil and Water Conservation District #237, Toyah-Limpia Soil and Water Conservation District #209, Trans-Pecos Soil and Water Conservation District #231, Big Bend Soil and Water Conservation District #227, and Highland Soil and Water Conservation District #210. WCID's are governed by Chapter 51 of the Texas Water Code. They are charged with planning to control, store, preserve, and distribute surface waters for irrigation, power, and all other useful purposes. They have the necessary authority to perform these tasks.

2. Intergovernmental Arrangements/Programs. Val Verde County sends water samples for water quality testing to the State Department of Health Resources Laboratories located in San Antonio and Austin.

B. Segment Analysis

Texas Department of Water Resources (TDWR) designated stream Segment 2306 extends from Amistad

Reservoir headwaters to the confluence of the Rio Grande and the Rio Conchos near Presidio, Texas. This segment has been designated by TDWR for contact recreation, non-contact recreation, propagation of fish and wildlife, and as a domestic raw water supply. Accordingly, the following standards have been established:

Chlorides (avg. not to exceed)	200 mg.l
Sulfates (avg. not to exceed)	500 mg/l
Total Dissolved Solids (avg. not to exceed)	1200 mg/l
Dissolved Oxygen (not less than)	5.0 mg/l
pH Range	6.5 to 8.5
Fecal Coliform (log avg. not to exceed)	200/100 ml
Temperature (not to exceed)	93° F

Review of TDWR water quality records indicates that water quality is fair in Segment 2306. On 21 October 1971, a dissolved oxygen violation was noted. This is the only recorded violation of D.O. standards in this segment and is not considered indicative of a water quality problem at the present time. Several pH violations have been recorded in Segment 2306. Water inflows to this segment appear to have a naturally high pH value, particularly since there is little human activity within the drainage area of this segment. The pH values are considered a natural phenomenon and not indicative of a water quality problem.

Samples above the standards for chlorides and total dissolved solids have also been recorded. Again, these appear due to natural causes. Only one violation of fecal coliform has been recorded in the segment, in 1973.

There is only one permitted discharger in the Segment 2306 drainage area and only three projected dischargers.

Land use in the Rio Grande Basin has been segmented into seven categories. Area devoted to each of the categories within Segment 2306 are estimated below:

Land Use	Area (SQ Miles)
Dry Cropland	0
Irrigated Cropland	1
Forest Land	48
Urban Land	7
Water	0
Range Land	10134
Barren Land	1
Total	10191

Ninety nine percent of the land in the segment's drainage area is used as rangeland. Due to the lack of vegetation attributable to climatic conditions and previous practices of overgrazing, the area is no longer intensively used for livestock production and this land use should not cause significant non-point pollution problems.

Due to the unsuitable soil conditions and arid climate silviculture is not practiced within the segment.

There are two operating flourite mines located in Brewster County as shown on Plate 7(A). This plate also shows three additional known flourite deposits and a general area in southern Brewster County of Bituminous Coal deposits. Each of these mines and deposits represent potential sources of pollution although no present problem is attributed to them. However, additional study, as recommended in Chapter II-C, should be considered to determine the extent of impact these mines have.

Due to the moderate growth expected in the area, very little construction activity is anticipated.

TDWR has not issued any injection well permits within the segment and the two aquifers underlying portions of the segment drainage basin are naturally saline. Salt water intrusion problems have not been detected.

There are several septic tank areas within the segment drainage basin. These are: Langtry, Sanderson, Marathon, and Marfa. Marathon and Marfa are well removed from the river and should cause no water quality problems. Langtry and

Presidio are each close to the receiving stream and represent potential sources of pollution although there are no present problems attributed to these septic tank areas.

There are no hydrologic modifications presently being planned for this segment.

There is presently legislation before the United States House of Representatives which, if passed and signed into law, would designate about one half of the stream segment as a wild and scenic river. This would afford that portion of the segment protection under the provisions of this law.

C. Alternative Discussion

There are three designated sewerage planning areas in Segment 2306. These planning areas are Marfa, Marathon, and Sanderson. All these areas are well removed from the designated stream segment but lie within the drainage basin of that segment. Wastewater collection and treatment needs are discussed below for each sewerage planning area.

1. Sanderson

a. Technical Alternatives

Sanderson is an unincorporated community located in Terrell County and had an estimated 1975 population of 1200. Projected populations for the community are presented below:

Year	Population
1975	1200
1983	1180
1990	1140
2000	1070

These persons are expected to occupy approximately 170 acres in the vicinity of Sanderson and the population density over the planning period is expected to vary between 6 and 7 persons/acre. Because of the population, and because Sanderson does not have existing wastewater collection and treatment facilities, it has been designated a sewerage planning area. Accordingly, alternative plans are developed below as prescribed by the statewide methodology. These plans assume that the total populated area will be serviced.

The collection system should consist of approximately:

Collection line length	5.0 miles
Inch miles of sewer	43
Number of lift stations	2

The cost for the construction of this sewage collection and transport system is presented in Tables II-D-16 through 18. It is assumed that the collection system will be installed and, for purposes of calculating present worth values, all costs will be incurred in the year 1983.

Alternative treatment facilities have been considered. Design of each alternative was developed to meet the requirements of Effluent Set 0 which was determined adequate

TABLE II-D-16

SANDERSON

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 1

Total System Cost		
Collection		$ 574,000
Treatment		$ 365,000
Annual Community Cost		
Capital	$21,000	
O & M	$38,000	
Total	$59,000	
Annual per Capita Cost		
Maximum; based on 1070 persons in 2000		$55.00
Minimum; based on 1180 persons in 1983		$50.00
Present Worth	$1,373,000	
Equivalent Annual Cost	$ 120,000	
Year(s) of collection line improvements	1983	
Year(s) of treatment system improvement	1983	

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

TABLE II-D-17

SANDERSON

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 2

Total System Cost		
Collection		$ 574,000
Treatment		$ 417,000
Annual Community Cost		
Capital	$22,000	
O & M	$34,000	
Total	$56,000	
Annual per Capita Cost		
Maximum; based on 1070 persons in 2000		$52.00
Minimum; based on 1180 persons in 1983		$47.00
Present Worth	$1,377,000	
Equivalent Annual Cost	$ 120,000	
Year(s) of collection line improvements	1983	
Year(s) of treatment system improvement	1983	

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

TABLE II-D-18

SANDERSON

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 3

Total System Cost		
Collection		$ 574,000
Treatment		$ 162,000
Annual Community Cost		
Capital	$ 16,000	
O & M	$ 30,000	
Total	$ 47,000	
Annual per Capita Cost		
Maximum; based on 1070 persons in 2000		$ 44.00
Minimum; based on 1180 persons in 1983		$ 40.00
Present Worth	$1,084,000	
Equivalent Annual Cost	$ 95,000	
Year(s) of collection line improvements		1983
Year(s) of treatment system improvement		1983

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

to protect the waters of the segment by procedures set forth in the statewide methodology. The alternatives considered are presented below:

Alternative 1	Alternative 2	Alternative 3
Primary treatment	Primary treatment	Package plant
Disinfection	Stabilization lagoon	(Contact stabili-
Land application	Disinfection	zation)
Aerobic digestion	Aerobic digestion	Truck transport
Truck transport	Truck transport	Landfill
Landfill	Landfill	

Each treatment alternative was planned to handle average wastewater flows of 0.125 MGD and peak flows of 0.311 MGD, the maximum projected requirement through the year 2000. This flow, with treatment to the level required by the specified effluent set, would result in average daily discharges of approximately 30 lbs. BOD and 30 lbs. TSS. The facility plan assumes that no industrial wasteloads will be discharged to the municipal system. Additional treatment capacity will be required should it be desired to treat industrial wastes.

A summary of the costs for the collection and treatment facilities of alternative 1 is presented in Table II-D-16. A summary of the costs for alternatives 2 and 3 are presented in Tables II-D-17 and 18, respectively. Alternative 3 has been selected as the most appropriate treatment alternative. It is assumed that the treatment facility will be installed and, for purposes of calculating present worth values, all costs will be incurred in the year 1983. The annual community costs are based upon the assumption that all capital costs except land purchases and right-of-way purchases are eligible for federal grant funds under Section 201 of PL 92-500 and that these funds are made available to the community.

b. Management System

A review of the existing governmental entities capable of providing wastewater collection and treatment facilities to San-

derson shows that a Water Control and Improvement District already exists in the Sanderson area. Since these districts are normally formed for specific purposes and their powers are limited to their needs for the stated purposes, the powers may need to be expanded to include those necessary for wastewater collection and treatment. Additionally, voter authorization of bonded indebtedness would be required. Terrell County WCID #1 is designated the Management agency for Sanderson.

c. Impacts of Alternative Plans

Impacts of the individual processes of each alternative were presented in the introduction to this chapter. Areal requirements for each alternative considered are as follows:

Alternative	Acres
1	9.6
2	4.8
3	0.5

2. Marathon

a. Technical Alternatives

Marathon is an unincorporated community located in Brewster County and has an estimated 1975 population of 810. Projected populations for the community are presented below:

Year	Population
1975	810
1983	840
1990	853
2000	884

These persons are expected to occupy approximately 144 acres in the vicinity of Marathon. The community is only partially served by a central collection and treatment facility. There are a reported 137 connections to the system accounting for an estimated 480 of the persons presently living in Marathon. The remaining population is assumed to be using septic tanks, cess pools, and other methods of disposal of liquid wastes.

Present and projected influent wasteloads are presented below:

Year	AVG Flow (MGD)	BOD lb/day	TSS lbs/day	NH_5-N lbs/day	Phos. lbs/day
Base Year	0.0280	24	16	9.3	2.3
1983	0.0639	85	89	13.6	5.2
1990	0.0653	87	92	13.8	5.3
2000	0.0684	92	98	14.2	5.5

The existing collection system is composed of approximately 7 miles of trunk lines which comprise 47 inch miles of sewer lines in the city. Although only 480 persons of the existing population are presently served, no major additions to the collection system should be required during the planning period.

The existing treatment facility consists of two oxidation ponds with mechanical

aeration. The permitted capacity of the plant is 0.028 MGD with concentrations of BOD and TSS limited to 20 and 25 mg/l, respectively. This meets the requirements at Effluent Set O. The projected flow, with treatment to the level required by the specified Effluent Set, would result in average daily discharges of approximately 7 lbs. BOD and 7 lbs TSS. An analysis of the existing system was conducted to determine what improvements would be required to provide services to the entire population of Marathon. The existing area of the oxidation ponds should be sufficient to handle all domestic wastewater flows from this community. The only expansion of the existing facilities which will be required to treat wastes from the entire population through the year 2000 is expansion of the primary treatment and drying bed facilities. A summary of the cost for the construction and operation and maintenance of this expansion is presented in II-D-19. It is assumed for the purposes of present worth calculations that all costs will be incurred in the year 1983. The annual community costs are based upon the assumption that all eligible capital costs will receive funding under Section 201 of PL 92-500.

b. Management System

Presently the wastewater collection and treatment facilities for Marathon are provided by the Marathon Water Supply Corporation. This organization is not a political entity and therefore is not entitled to receive grant funds under Section 201 of PL 92-500 for construction of sewerage facilities. However, other federal funding may be obtained from sources such as the Farmers Home Administration. This funding does not provide as large a percentage of treatment facility costs as 201 grants. In view of the limited expansion required, the residents of Marathon should consider continued use of the present facility. Should federal grant funds under Section 201 of PL 92-500 be desired by the community, several alternatives are available. Brewster County has agreed to act as the management agency for the community of Marathon

TABLE II-D-19

MARATHON

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 1

Total System Cost		
Collection		$ -0-
Treatment		$61,000
Annual Community Cost		
Capital	$1,300	
O & M	$6,900	
Total	$8,200	
Annual per Capita Cost		
Maximum; based on 840 persons in 1983		$9.80
Minimum; based on 884 persons in 2000		$9.30
Present Worth	$140,000	
Equivalent Annual Cost	$ 12,000	
Year(s) of collection line improvements	1983	
Year(s) of treatment system improvement	1983	

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

until such time that the Community initiates steps to assume local control. The community may either incorporate or form a special district as provided for in the laws of Texas.

c. Impacts of Alternative Plan

The only expansion of the existing facilities which will be required to treat wastes from the entire population through the year 2000 is expansion of the primary treatment and drying bed facilities. There are no necessary land commitments for this expansion. The economic commitment for construction, operation and maintenance are irretrievable. Basically, this project has minor impacts on the environment during the construction period which are temporary in nature. The ultimate effect will be the maintenance of water quality in the community, less disease hazards from bypassing due to overloading of the system, and more aesthetic surroundings.

3. Marfa

a. Technical Alternatives

Marfa is incorporated under the general laws of Texas and is located in Presidio County. Marfa owns and operates a wastewater collection and treatment system which consists of two sewer plants. The estimated 1975 population of Marfa was 2754. The projected populations for the town are presented below:

Year	Population
1975	2754
1983	2800
1990	2800
2000	2950

The existing sewer collection system consists of:

Collection line length	18.9 miles
Inch miles of sewer	120.7
Number of lift stations	2

Review of the Sewerage System map provided by WTCOG indicates that approximately 4 miles of line needs to be added to the existing system to adequately serve the present population. In addition, approximately 4 miles of line should be required by the year 2000 to accomodate population expansion. Costs of the recommended improvements are presented in Table II-D-20.

The existing treatment facilities in Marfa have "no discharge" permits. Accordingly, Effluent Set 0 is considered adequate for this facility. Present and projected influent waste and wastewater flows are presented below:

TABLE II-D-20

MARFA

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 1

Total System Cost		
Collection		$856,000
Treatment		$107,000
Annual Annual Community Cost		
Capital	$ 21,000	
O & M	$ 30,000	
Total	$ 51,000	
Annual per Capita Cost		
Maximum; based on 2950 persons in 2000		$17.00
Minimum; based on 2800 persons in 1983		$11.00
Present Worth	$925,000	
Equivalent Annual Cost	$ 81,000	
Year(s) of collection line improvements	1983, 2000	
Year(s) of treatment system improvement	1983	

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

Ft. Russel Plant

Year	Avg. flow (MDG)	BOD lb/day	TSS lb/day	NH_3-N lb/day	Phos lb/day
Base Year	0.030	28	16	6.5	1.6
1983	0.031	29	17.2	6.6	1.6
1990	0.031	29	17.2	6.6	1.6
2000	0.033	32	21.3	6.8	1.8

Main Plant

Base Year	0.200	184	107	43	11
1983	0.210	191	115	44	11
1990	0.212	191	115	44	11
2000	0.230	213	141	45	12

The maximum required average capacity for the treatment facility is calculated to be 0.263 MGD in the year 2000. The total combined average capacity is 0.354 MGD, more than adequate to handle the projected flows. Only the sludge drying beds appear to need expansion. Since this is a "no discharge" facility, effluent wasteloads have not been projected.

Per capita costs to improve the sludge drying beds at the treatment facility and costs of operation and maintenance associated with these facilities are presented in Table II-D-20. In preparing these cost estimates it was assumed that the recommended modifications and improvements to the existing collection and treatment system would be completed and paid for in 1983. Expansion of the collection system to new service areas was assumed to be accomplished in the year 2000, the first year of significant population growth. Annual community costs are based upon the assumption that all eligible capital costs will receive funding under section 201 of PL 92-500.

b. Management System

The existing wastewater collection and treatment facilities are owned and operated by the City of Marfa. Since incorporated municipalities clearly have the authority to construct and operate and maintain sewerage facilities, and to finance

these facilities and since the City is presently actively involved in these functions, the City is designated as the management agency. At this printing the City of Marfa has not responded to the proposed alternatives and efforts are continuing to obtain their comments. WTCOG has concurred in the recommendations of this plan. Should future development occur outside the existing town limits, the City may provide treatment services by annexing the territory if a majority of the residents of that territory vote for annexation or the residents may form a special district which can contract with the City to provide these services. Marfa is designated as the management agency for the area within its corporate limits.

c. Impacts of Alternative Plan

The only expansion required of Marfa's wastewater treatment facilities to meet future needs is a minor addition to the line capacities and the sludge drying beds. Land commitments for the collection system and for the drying beds are not necessary. The financial commitments involved in the construction of these components are irretrievable. The minor environmental impacts created during the construction period are temporary in duration. The ultimate effect will be expansion of the served population and maintenance of water quality in the community. The probability of bypassing will be decreased which will lessen the chances of disease problems, odor problems, and will create a more aesthetic environment overall.

D. Identification of Other Local Management Entities

There are no other local management agencies in Segment 2306 dealing with wastewater collection and treatment.

VI. Segment 2307

A. Existing Agencies and Programs

1. Local Agencies and/or Governments. Segment 2307 is composed of several counties, including Presidio, Culberson, Hudspeth, El Paso, and Jeff Davis Counties. County authority in the area of water quality management is limited. Lack of general zoning powers and limited fiscal authority serve to diminish the role that counties play.

   Various city governments take part in local water quality management planning. These cities include Van Horn, Dell City, Clint and Valentine. They derive their authority from general law. General law municipalities have the statutory authority to construct and operate sewage treatment facilities, but do not have as extensive planning and enforcement tools available to them as do cities deriving powers from home rule.

   Segment 2307 contains a number of WCID's. They include Presidio County Water Improvement District #1, Highland Soil and Water Conservation District #210 High Point Soil and Water Conservation District #230, Fort Hancock Water Control and Improvement District #1, Hudspeth County Water Control and Improvement District (WCID) #1, Hudspeth County Underground Water Conservation District #1, Hudspeth County Conservation and Reclamation District #1, El Paso-Hudspeth Counties' Soil and Water Conservation District #205, El Paso Water Authority, and Toyah-Limpia Soil and Water Conservation District #209. WCID's are governed by Chapter 51 of the Texas Water Code. They are charged with planning to control, store, preserve, and distribute surface waters for irrigation, power, and all other useful purposes. They have been given the necessary authority to perform these tasks.

2. Intergovernmental Arrangements/Programs. The City of Dell City sends water samples for water quality testing to the State Department of Health Resources Laboratory located at Austin.

The Hudspeth County WCID #1 sends water samples for water quality testing to laboratories operated by El Paso City-County Laboratory. Laboratory operations are supported by funds provided by the State Department of Health Resources, El Paso County, and the City of El Paso.

B. Segment Analysis

Texas Department of Water Resources (TDWR) designated stream Segment 2307 extends from the confluence of the Rio Conchos near Presidio to the Riverside Diversion Dam, in El Paso County. This segment has been designated by TDWR for non-contact recreation, propagation of fish and wildlife, and as a domestic raw water supply. Accordingly, the following standards have been established:

Chlorides (avg. not to exceed)	300 mg/l
Sulfates (avg. not to exceed)	550 mg/l
Total Dissolved Solids (avg. not to exceed)	1500 mg/l
Dissolved Oxygen (not less than)	5.0 mg/l
pH Range	6.5 to 8.5
Fecal Coliform (log avg. not to exceed)	1000/100 ml
Temperature	93° F

Review of TDWR water quality data indicates there may be several water quality problems in the segment. Chlorides, sulfates, and total dissolved solids exhibit individual high values. Individual high values for fecal coliform have also been recorded. A major factor influencing water quality in this segment is its low flow caused by upstream diversion of normal river flows for irrigation. The river is normally dry in the upstream portion of the segment as a result of these diversions, and to establish that water quality violations have occurred would not be justified based on the limited data available. However, there do appear to be some problems in the downstream portion of the segment. Since there is very little activity attributable to man's activities in the U.S. the problems are thought to arise from natural causes or from the Mexican side of the river.

Since flows in the segment are quite low, discharge permit requirements must be established that will not degrade water quality. A wasteload evaluation prepared in 1974 recommended discharge permits require that effluents not exceed a concentration of 30 mg/l BOD. This requirement is found in effluent set 0 which also requires that total suspended solids concentrations be limited to 30 mg/l. These requirements are considered adequate and more stringent levels were not recommended since oxidation pond type treatment systems are the prevailing treatment method and since there is no control over the quality of discharges emanating from the Mexico side of the river.

The drainage area described for Segment 2307 includes a closed basin which comprises over 1/2 the total subbasin area. A closed basin is an area from which there is no surface drainage and all surface water either evaporates or percolates to the groundwater supplies. This portion of the segment subbasin has been denoted as subbasin 2307C.

Land use in the Rio Grande Basin has been segmented into seven categories. Area devoted to each of the categories within Segment 2307 are estimated below:

Land Use	Area (SQ Miles)		
	Closed	Non Closed	Total
Dry Cropland	0	3	3
Irrigated Cropland	159	165	324
Forest Land	7	0	7
Urban Land	5	4	9
Water	0	1	1
Range Land	5591	3583	9174
Barren Land	4	1	5
Total	5766	3757	9523

Over 95 percent of the land in this subbasin is used as rangelend. Due to the lack of vegetation attributable to poor climatic conditions and previous practices of overgrazing, the area is no longer intensively used for livestock production with estimates of only one beef animal or less per square mile. Some construction activity may be expected in the segment in El Paso

County. This would be attributable to a continuation of the growth patterns established within that county. Generally, these non-point sources of pollution are not expected to significantly affect water quality in the segment since rainfall is so sparse and activity so limited.

There is no silvicultural activities in the segment drainage basin due to the poor growing conditions.

The Texas Department of Water Resources currently has no permitted injection disposal wells in the segment's drainage basin. Salt water intrusion may be a significant factor if ground water levels continue to decline in areas of heavy pumping. Additionally, salt cedar populations along the river have a salt concentrating effect. Control of these may lessen salinity problems in the river.

There is one operating strip mine and a small Bituminous coal deposit and a Flourite deposit in Hudspeth County within this segment drainage basin. Also located within the basin are a flourite deposit and another Bituminous coal deposit, all within Presidio County. In the closed portion of the drainage basin there are two operating Talc mines, one in Hudspeth County and the other in Culberson County.

There are seven septic tank areas identified in this segment drainage basin. They are identified on Plate 7 (C) as Presidio, Valentine, Van Horn, Sierra Blanca, Fort Hancock, Fabens, and Clint. Sierra Blanca, Van Horn and Valentine are located within the closed portion of the basin.

Two hydrologic projects are anticipated for this segment. The first, clearing of sediment to stabilize the border between the United States and Mexico, is being evaluated in an environmental impact study. The second is a planned levy system to be constructed along both banks of Cibolo Creek in Presidio. This is being constructed to prevent periodic flooding now experienced in the area.

C. Alternative Discussion

There are five (5) designated sewerage planning areas located in Segment 2307. These are Clint, Sierra Blanca, Van Horn, Valentine, and Presidio. Wastewater collection and treatment needs for each of these communities are discussed below.

1. Clint

a. Technical Alternatives

Clint is an incorporated community located in El Paso County and had an estimated 1975 population of 960. Projected populations for the community are presented below:

Year	Population
1975	960
1983	1050
1990	1200
2000	1420

These persons are expected to occupy approximately 269 acres in the vicinity of Clint and the population density over the planning period is expected to be in the neighborhood of 5 persons/acre. Because of the population, and because Clint does not have existing wastewater collection and treatment facilities, it has been designated a sewerage planning area. Accordingly, alternative plans are developed below as prescribed by the statewide methodology. These plans assume that the total populated area will be serviced.

The collection system should consist of approximately:

Collection line length	6.0 miles
Inch miles of sewer	52
Number of lift stations	2

The cost for the construction of this sewage collection and transport system is presented in Tables II-D-21 through 23. It is assumed that the collection system will be installed and, for purposes of calculating present worth values, all costs will be incurred in the year 1983.

Alternative treatment facilities have been considered. Design of each of these alternatives was developed to meet the re-

TABLE II-D-21

CLINT

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 1

Total System Cost		
Collection		$ 598,000
Treatment		$ 459,000
Annual Community Cost		
Capital	$ 24,000	
O & M	$ 41,000	
Total	$ 65,000	
Annual per Capita Cost		
Maximum; based on 1050 persons in 1983		$ 62.00
Minimum; based on 1420 persons in 2000		$ 46.00
Present Worth	$1,529,000	
Equivalent Annual Cost	$ 133,000	
Year(s) of collection line improvements	1983	
Year(s) of treatment system improvement	1983	

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

TABLE II-D-22

CLINT

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 2

Total System Cost		
Collection		$ 598,000
Treatment		$ 624,000
Annual Community Cost		
Capital	$ 27,000	
O & M	$ 33,000	
Total	$ 61,000	
Annual per Capita Cost		
Maximum; based on 1050 persons in 1983		$ 58.00
Minimum; based on 1420 persons in 2000		$ 43.00
Present Worth	$1,604,000	
Equivalent Annual Cost	$ 140,000	
Year(s) of collection line improvements	1983	
Year(s) of treatment system improvement	1983	

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

TABLE II-D-23

CLINT

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 3

Total System Cost		
Collection		$ 598,000
Treatment		$ 213,000
Annual Community Cost		
Capital	$ 18,000	
O & M	$ 33,000	
Total	$ 51,000	
Annual per Capita Cost		
Maximum; based on 1050 persons in 1983		$ 48.00
Minimum; based on 1420 persons in 2000		$ 36.00
Present Worth	$1,188,000	
Equivalent Annual Cost	$ 104,000	
Year(s) of collection line improvements		1983
Year(s) of treatment system improvement		1983

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

quirements of Effluent Set 0. The alternatives considered are described below:

Alternative 1	Alternative 2	Alternative 3
Primary treatment	Primary treatment	Package plant
Disinfection	Stabilization lagoon	(Contact stabilization)
Land application	Disinfection	Truck transport
Aerobic digestion	Aerobic digestion	Landfill
Truck transport	Truck transport	
Landfill	Landfill	

Each treatment alternative is planned to handle average wastewater flows of 0.159 MGD and peak flows of 0.313 MGD, the projected requirement through the year 2000. This flow, with treatment to the level required by the specified Effluent Set, would result in average daily discharges of approximately 40 lbs. BOD and 40 lbs. TSS. The facility plan assumes that no industrial wasteloads will be discharged to the municipal system. Additional treatment capacity will be required should it be desired to treat industrial wastes.

Alternative 2 has been selected as the most appropriate treatment alternative.

A summary of the costs for the collection and treatment facilities of alternative 1 is presented in Table II-D-21. Summaries of the costs for alternatives 2 and 3 presented in Tables II-D-22 and 23 respectively. It is assumed that the treatment facility will be installed and, for purposes of calculating present worth values, all costs will be incurred in the year 1983. Annual community costs are based upon the assumption that all capital costs except land purchases and right-of-way purchases are eligible for federal grant funds under Section 201 of PL 92-500 and that these funds will be available to the community.

b. Management System

A review of the existing governmental entities capable of providing wastewater

collection and treatment facilities to Clint shows that the town is incorporated under the general laws of Texas and thus has the full authority and power to initiate the construction and maintenance of the wastewater collection and treatment facilities discussed above. The town of Clint is designated as the management agency. The town of Clint concurs with the provisions of this plan.

c. Impacts of Alternative Plans

Impacts of the individual processes of each alternative were presented in the introduction to this chapter. Areal requirements for the alternatives considered are as follows:

Alternative	Acres
1	12.1
2	5.9
3	0.5

2. Presidio

a. Technical Alternatives

Presidio is an unincorporated community located in Presidio County and had an estimated 1975 population of 1070. Projected populations for the community are presented below:

Year	Population
1975	1070
1983	1090
1990	1125
2000	1110

These persons are expected to occupy approximately 155 acres in the vicinity of Presidio and the population density over the planning period is expected to vary between 7 and 10 persons/acre. Because of the population, and because Presidio does not have existing wastewater collection and treatment facilities, it has been designated a sewerage planning area. Accordingly, alternative plans are developed below as prescribed by the statewide methodology. These plans assume that the total populated area will be serviced.

The collection system should consist of approximately:

Collection line length	6.8 miles
Inch miles of sewer	59
Number of lift stations	2

The cost for the construction of this sewage collection and transport system is presented in Table II-D-24 through 26. It is assumed that the collection system will be installed and, for purposes of calculating present worth values, all costs will be incurred in the year 1983.

Alternative treatment facilities have been considered. Design of each of these

TABLE II-D-24

PRESIDIO

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 1

Total System Cost		
Collection		$ 740,00
Treatment		$ 491,00
Annual Community Cost		
Capital	$ 27,000	
O & M	$ 34,000	
Total	$ 61,000	
Annual per Capita Cost		
Maximum; based on 1090 persons in 1983		$ 56.00
Minimum; based on 1125 persons in 1990		$ 54.00
Present Worth	$1,616,000	
Equivalent Annual Cost	$ 141,000	
Year(s) of collection line improvements	1983	
Year(s) of treatment system improvement	1983	

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

TABLE II-D-25

PRESIDIO

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 2

Total System Cost		
Collection		$ 740,000
Treatment		$ 420,000
Annual Community Cost		
Capital	$ 26,000	
O & M	$ 37,000	
Total	$ 63,000	
Annual per Capita Cost		
Maximum; based on 1090 persons in 1983		$ 58.00
Minimum; based on 1125 persons in 1990		$ 56.00
Present Worth	$1,582,000	
Equivalent Annual Cost	$ 138,000	
Year(s) of collection line improvements	1983	
Year(s) of treatment system improvement	1983	

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

TABLE II-D-26

PRESIDIO

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 3

Total System Cost		
Collection		$ 740,000
Treatment		$ 158,000
Annual Community Cost		
Capital	$ 20,000	
O & M	$ 31,000	
Total	$ 51,000	
Annual per Capita Cost		
Maximum; based on 1090 persons in 1983		$ 46.00
Minimum; based on 1125 persons in 1990		$ 45.00
Present Worth	$1,254,000	
Equivalent Annual Cost	$ 109,000	
Year(s) of collection line improvements		1983
Year(s) of treatment system improvement		1983

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

alternatives was developed to meet the requirements of effluent set 0. The alternatives considered are described below:

Alternative 1	Alternative 2	Alternative 3
Primary treatment	Primary treatment	Package plant
Disinfection	Stabilization lagoon	(Contact stabi-
Land application	Disinfection	lization)
Aerobic digestion	Aerobic digestion	Truck transport
Truck transport	Truck transport	Landfill
Landfill	Landfill	

In the case of Presidio, the community may elect to spread sludges over land at the project site or let local farmers use the dried sludges as a soil enrichment for approved farm products. This option may be more acceptable since the nearest permitted landfill site is approximately 60 miles from Presidio.

Each treatment alternative is planned to handle average wastewater flows of 0.121 MGD and peak flows of 0.30 MGD, the maximum projected requirement through the year 2000. This flow, with treatment to the level required by the specified effluent set, would result in average daily discharges of approximately 30 lbs. BOD and 30 lbs. TSS. The facility plan assumes that no industrial wasteloads will be discharged to the municipal system. Additional treatment capacity will be required should it be desired to treat industrial wastes.

A summary of the costs for the collection and treatment facilities of alternative 1 is presented in Table II-D-24. Summaries of the costs for alternatives 2 and 3 are presented in Tables II-D-25 and 26 respectively. Alternative 3 has been selected as the most appropriate treatment alternative. It is assumed that the treatment facility will be installed and, for purposes of calculating present worth values, all costs will be incurred in the year 1983. Annual community costs are based upon the

assumption that all capital costs except land purchases and right-of-way purchases are eligible for federal grant funds under Section 201 of PL 92-500 and that these funds will be available to the community.

b. Management System

A review of the existing governmental entities capable of providing wastewater collection and treatment facilities to Presidio shows that only Presidio County has all the necessary management powers at the present time. At this printing the community of Presidio has not responded to the proposed alternatives and efforts are continuing to obtain their comments. WTCOG has determined that the County should serve as the management agency and it is so designated.

c. Impacts of Alternative Plans

Impacts of the individual processes of each alternative were presented in the introduction to this chapter. Areal requirements for the alternatives considered are as follows:

Alternative	Acres
1	4.6
2	9.3
3	0.5

3. Sierra Blanca

a. Technical Alternatives

Sierra Blanca is an unincorporated community located in Hudspeth County and had an estimated 1975 population of 660. Projected populations for the community are presented below:

Year	Population
1975	660
1983	700
1990	725
2000	825

These persons are expected to occupy approximately 435 acres in the vicinity of Sierra Blanca and the population density over the planning period is expected to vary between 2 and 3 persons/acre. Because of the population, and because Sierra Blanca does not have existing wastewater collection and treatment facilities, it has been designated a sewerage planning area. Accordingly, alternative plans are developed below as prescribed by the statewide methodology. These plans assume that the total populated area will be serviced.

The collection system should conist of approximately:

Collection line length	5.6 miles
Inch miles of sewer	48
Number of lift stations	2

The cost for the construction of this sewage collection and transport system is presented in Tables II-D-27 through 29. It is assumed that the collection system will be installed and, for purposes of calculating present worth values, all costs will be incurred in the year 1983.

Alternative treatment facilities have been considered. Design of each of these alternatives was developed to meet the

TABLE II-D-27

SIERRA BLANCA

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 1

Total System Cost		
Collection		$ 579,000
Treatment		$ 323,000
Annual Community Cost		
Capital	$ 20,000	
O & M	$ 30,000	
Total	$ 50,000	
Annual per Capita Cost		
Maximum; based on 700 persons in 1983		$ 72.00
Minimum; based on 825 persons in 2000		$ 61.00
Present Worth	$1,245,000	
Equivalent Annual Cost	$ 109,000	
Year(s) of collection line improvements	1983	
Year(s) of treatment system improvement	1983	

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

TABLE II-D-28

SIERRA BLANCA

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 2

Total System Cost		
Collection		$ 579,000
Treatment		$ 376,000
Annual Community Cost		
Capital	$ 21,000	
O & M	$ 25,000	
Total	$ 57,000	
Annual per Capita Cost		
Maximum; based on 700 persons in 1983		$ 81.00
Minimum; based on 825 persons in 2000		$ 69.00
Present Worth	$1,245,000	
Equivalent Annual Cost	$ 109,000	
Year(s) of collection line improvements	1983	
Year(s) of treatment system improvement	1983	

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

TABLE II-D-29

SIERRA BLANCA

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 3

Total System Cost		
Collection		$ 579,000
Treatment		$ 150,000
Annual Community Cost		
Capital	$16,000	
O & M	$28,000	
Total	$44,000	
Annual per Capita Cost		
Maximum; based on 700 persons in 1983		$64.00
Minimum; based on 825 persons in 2000		$54.00
Present Worth	$1,054,000	
Equivalent Annual Cost	$ 92,000	
Year(s) of collection line improvements		1983
Year(s) of treatment system improvement		1983

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

requirements of Effluent Set 0, and has been developed as a "no discharge" process. The alternatives considered are decribed below:

Alternative 1	Alternative 2	Alternative 3
Primary treatment	Primary treatment	Package plant
Disinfection	Stabilization lagoon	(Contact stabili-
Land application	Aerobic digestion	zation)
Aerobic digestion	Truck transport	Truck transport
Truck transport	Landfill	Landfill
Landfill		

Each treatment alternative is planned to handle average wastewater flows of 0.094 MGD and peak flows of 0.0247 MGD, the maximum projected requirement through the year 2000. This flow, with treatment to the level required by the specified effluent set, would result in average daily discharges of approximately 25 lbs. BOD and 25 lbs. TSS. The facility plan assumes that no industrial wasteloads will be discharged to the municipal system. Additional treatment capacity will be required should it be desired to treat industrial wastes.

Alternative 4, septic systems, has been considered for Sierra Blanca. Individual septic systems will normally cost between $250 and $350 annually to operate and maintain. This cost includes amortization of initial construction costs.

A summary of the costs for the collection and treatment facilities of alternative 1 is presented in Table II-D-27. Summaries of the costs for alternatives 2 and 3 are presented in Tables II-D-28 and 29, respectively. Alternative 2 has been selected as the most appropriate treatment alternative. It is assumed that the treatment of calculating present worth values, all costs will be incurred in the year 1983. Annual community costs are based upon the assumption that all capital costs except land purchases and right-of-way purchases are eligible for federal grant funds under

Section 201 of PL 92-500 and that these funds are made available to the community.

b. Management System

A review of the existing governmental entities capable of providing wastewater collection and treatment facilities to Sierra Blanca shows that Hudspeth County Water Control and Improvement District Number 1 is located in Sierra Blanca. This WCID is presently involved in water supply. Since special districts are normally created with authority and powers for specific purposes, the WCID's powers may require expansion to allow collection and treatment of wastewater. Hudspeth County WCID concurs with the provisions of this plan and the WCID is designated as the management agency.

c. Impacts of Alternative Plans

Impacts of the individual processes of each alternative were presented in the introduction to this chapter. Areal requirements for the alternatives considered are as follows:

Alternative	Acres
1	7.3
2	3.5
3	0.5
4	N/A

4. Valentine

a. Technical Alternatives

Valentine is an incorporated community located in Jeff Davis County and had an estimated 1975 population of 270. Projected populations for the community are presented below:

Year	Population
1975	270
1983	290
1990	305
2000	348

These persons are expected to occupy approximately 34 acres in the vicinity of Valentine and the population density over the planning period is expected to vary between 8 and 10 persons/acre. Because of the population, and because Valentine does not have existing wastewater collection and treatment facilities, it has been designated a sewerage planning area. Accordingly, alternative plans are developed below as prescribed by the statewide methodology. These plans assume that the total populated area will be serviced.

The collection system should consist of approximately:

Collection line length	2.6 miles
Inch miles of sewer	23
Number of lift stations	1

The cost for the construction of this sewage collection and transport system is presented in Tables 30 through 32. It is assumed that the collection system will be installed and, for purposes of calculating present worth values, all costs will be incurred in the year 1983.

Alternative treatment facilities have been considered. Design of each of these alternatives was developed to meet the requirements of Effluent Set 0, and has been

TABLE II-D-30

VALENTINE

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 1

Total System Cost		
Collection		$273,000
Treatment		$321,000
Annual Community Cost		
Capital	$13,000	
O & M	$17,000	
Total	$30,000	
Annual per Capita Cost		
Maximum; based on 290 persons in 1983		$103.00
Minimum; based on 348 persons in 2000		$ 87.00
Present Worth	$ 594,000	
Equivalent Annual Cost	$ 52,000	
Year(s) of collection line improvements	1983	
Year(s) of treatment system improvement	1983	

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

TABLE II-D-31

VALENTINE

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 2

Total System Cost		
Collection		$273,000
Treatment		$267,000
Annual Community Cost		
Capital	$12,000	
O & M	$16,000	
Total	$28,000	
Annual per Capita Cost		
Maximum; based on 290 persons in 1983		$ 96.00
Minimum; based on 348 persons in 2000		$ 81.00
Present Worth	$ 725,000	
Equivalent Annual Cost	$ 63,000	
Year(s) of collection line improvements	1983	
Year(s) of treatment system improvement	1983	

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

TABLE II-D-32

VALENTINE

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 3

Total System Cost		
Collection		$ 273,000
Treatment		$ 94,000
Annual Community Cost		
Capital	$ 8,000	
O & M	$ 14,000	
Total	$ 23,000	
Annual per Capita Cost		
Maximum; based on 290 persons in 1983		$ 77.00
Minimum; based on 348 persons in 2000		$ 65.00
Present Worth	$533,000	
Equivalent Annual Cost	$ 46,000	
Year(s) of collection line improvements		1983
Year(s) of treatment system improvement		1983

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

developed as a "no discharge" facility. The alternatives considered are presented below:

Alternative 1	Alternative 2	Alternative 3
Primary treatment	Primary treatment	Package plant
Disinfection	Stabilization lagoon	(Contact stabili-
Land application	Aerobic digestion	zation)
Aerobic digestion	Truck transport	Truck transport
Truck transport	Landfill	Landfill
Landfill		

Each treatment alternative is planned to handle average wastewater flows of 0.039 MGD and peak flows of 0.117 MGD, the maximum projected requirement through the year 2000. This flow, with treatment to the level required by the specified effluent set, would result in average daily discharges of approximately 10 lbs. BOD and 10 lbs. TSS. The facility plan assumes that no industrial wasteloads will be discharged to the municipal system. Additional treatment capacity will be required should it be desired to treat industrial wastes.

A summary of the costs for the collection and treatment facilities of alternative 1 is presented in Table II-D-30. Summaries of the costs for alternatives 2 and 3 are presented in Tables II-D-31 and 32, respectively. Alternative 2 has been selected by WTCOG as the most appropriate treatment alternative. It is assumed that the treatment facility will be installed and, for purposes of calculating present worth values, all costs will be incurred in the year 1983. Annual community costs are based upon the assumption that all capital costs except land purchases and right-of-way purchases are eligible for federal grant funds under Section 201 of PL 92-500 and that these funds will be available to the community.

b. Management System

A review of the existing governmental entities capable of providing wastewater

collection and treatment facilities to Valentine shows that the city is incorporated under the general laws of Texas and thus has the full authority and power to initiate the construction and maintenance of the wastewater collection and treatment facilities discussed above. An election to approve bond debt would be required. Other management alternatives have not been explored. At this printing the town of Valentine has not responded to the proposed alternatives and efforts are continuing to obtain their comments. However, the City is designated as the areas management agency, pending acceptance of the designation.

c. Impacts of Alternative Plans

Impacts of the processes involved in each alternative were presented in the introduction to this chapter. Areal requirements for the alternatives considered are as follows:

Alternative	Acres
1	2.8
2	1.6
3	0.5

5. Van Horn

a. Technical Alternatives

Van Horn is incorporated under the general laws of Texas and is located in Culberson County. The City is situated in the closed portion of the basin. Thus surface water leaves this portion of the basin only by percolation to groundwater supplies or through evaporation. The City of Van Horn has an existing wastewater collection and treatment system which consists of a collection network, two anaerobic lagoons and three aerobic lagoons.

The estimated 1977 population of Van Horn was 2570. The projected populations for the city are presented below:

Year	Population
1977	2570
1983	2969
1990	3200
2000	3700

The existing collection system consists of:

Collection line length	13.6 miles
Inch miles of sewer	86.2
Number of lift stations	1

Expansion of the existing collection system's capacity to meet present needs appears warranted. Service will have to be extended to new areas. Based on procedures outlined in the statewide methodology and a review of sewerage system maps supplied by WTCOG it has been estimated that the system should be expanded by approximately 1 mile in 1983 and another 4 miles by the year 2000.

Year	Line Additions (miles)	Capacity Additions (inch miles)
1980	0	0
1983	1	8.6
1990	0	0
2000	4.0	34.5

A summary of the costs of these improvements is presented in Table II-D-33.

The maximum required average capacity for the treatment facility is calculated to be 0.439 MGD. Present and projected influent waste and wastewater flows are presented below:

Year	Avg. Flow (MGD)	BOD (lb/day)	TSS (lb/day)	NH_3 -N (lb/day)
Base Year	0.300	312	271	106
1983	0.349	380	352	111
1990	0.379	419	398	114
2000	0.439	504	499	120

Expansion of the stabilization lagoon area from 6.3 acres to 7.8 acres appears to be sufficient to meet the requirements of Effluent Set 0. This effluent set appears adequate since Van Horn is located in a closed basin, and does not discharge to receiving waters. However, an estimate of future wasteloads may be appropriate. The projected flow, with treatment to the level required by the specified effluent set, would result in average daily discharges of approximately 109 lbs. BOD and 109 lbs. TSS. All liquid effluent will be disposed of by percolation or evaporation and there appears to be no justification for imposition of a more stringent effluent set.

A summary of the costs associated with these improvements is presented in Table II-D-33. Annual community costs are based upon the assumption that all capital costs except land purchases and right-of-way purchases are eligible for federal grant funds under Section 201 of PL 92-500 and that these funds will be available to the community.

TABLE II-D-33

VAN HORN

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 1

Total System Cost		
Collection		$ 468,000
Treatment		$ 389,000
Annual Community Cost		
Capital	$ 19,000	
O & M	$ 34,000	
Total	$ 53,000	
Annual per Capita Cost		
Maximum; based on 2969 persons in 1983		$18.00
Minimum; based on 3700 persons in 2000		$14.00
Present Worth	$1,249,000	
Equivalent Annual Cost	$ 109,000	
Year(s) of collection line improvements	1983, 2000	
Year(s) of treatment system improvement	1983	

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

b. Management System

Van Horn is incorporated under the general laws of the State of Texas. The City operates the existing wastewater collection and treatment facility. Since incorporated municipalities clearly have the authority to finance, construct, and operate and maintain sewerage facilities, and since the City of Van Horn is actively involved in these functions, it would be logical for the involvement to be continued. The City of Van Horn concurs with the provisions of this plan, and is therefore designated as the management agency within the corporate limits.

Should future development occur outside the existing town limits, the city may provide sewerage services after annexation or by contract with a special district.

c. Impacts of Alternative Plan

The only expansion required of Van Horn's wastewater treatment facilities to meet future needs is a minor addition to the collection line capacities and the stabilization lagoon. Land commitments for the collection system and stabilization lagoon are not necessary. The financial commitments involved in the construction of these components are irretrievable. The minor environmental impacts created during the construction period are temporary in duration. The ultimate effect will be expansion of the served population and maintenance of water quality in the community. The probability of bypassing will be decreased which will lessen the chances of disease problems, odor problems, and will create a more aesthetic environment overall.

D. Identification of Other Local Management Entities

Other agencies located within Segment 2307 which have responsibility for management of wastewater collection and treatment facilities include:

El Paso WCID #4, El Paso County Water Authority, Dell City, Fort Hancock WCID #7, and the El Paso Public Service Board (PSB). Each of these entities has assumed responsibility for operation of collection and treatment facilities in its jurisdiction and are designated as a management agency. The El Paso PSB is designated to serve as a regional management agency within El Paso County. Within that county, individual management agencies for collection and treatment facilities would maintain their integrity under the regional management concept, but the PSB would co-ordinate efforts and provide regional systems when advantageous.

VII. Segment 2308

A. Existing Agencies and Programs

1. Local Agencies and/or Governments. All of the Segment 2308 region is contained within El Paso County. The authority of counties in water quality management is limited. Lack of general zoning powers and limited fiscal authority serve to diminish the role that counties play.

   The City of El Paso and the Town of Anthony are both within this segment. Both of these municipalities have the statutory authority to construct and operate sewage treatment facilities, although planning and enforcement tools available to the City of El Paso, a home rule city, are more extensive than those of Anthony which derives its powers from general law. The home rule cities in the Rio Grande Basin 208 area have adopted charters giving them sufficient fiscal and police powers to apply the full measure of water quality controls.

   Four water districts have been established in Segment 2308. They are El Paso County Water Control and Improvement District #4, El Paso County Water Control and Improvement District-Westway, El Paso County Water Improvement District #1, and El Paso-Hudspeth Counties Soil and Water Conservation District #205. WCID's are governed by Chapter 51 of the Texas Water Code. They are charged with planning to control, store, preserve, and distribute surface waters for irrigation, power, and all other useful purposes. They have the necessary authority to perform these tasks.

2. Intergovernmental Arrangements/Programs for Wastewater Treatment. The City of El Paso provides sewage collection and treatment services to the United States Army Post of Fort Bliss.

The Town of Anthony provides sewage collection and treatment services to the La Tuna Federal Correction Institution.

The City of El Paso provides municipal water supplies for the communities of Borderland, Canutillo, Clint, Socorro, and San Elizario.

The El Paso City-County Laboratory, located in El Paso, makes water quality tests on water samples in its laboratories for the United States' Bureau of Reclamation and the International Boundary and Water Commission. Laboratory operations are supported by funds provided by the State Department of Health Resources, El Paso County, and the City of El Paso.

The City of El Paso has five projects operating under the sponsorship of the Environmental Protection Agency's Construction Grants Program, Section 201. Three projects have been completed through the construction phase (Step 3), and the other two projects have been completed through the design phase (Step 2).

B. Segment Analysis

Texas Department of Water Resources (TDWR) designated Segment 2308 extends from Riverside Diversion Dam to New Mexico. The segment is an intensive study area and contains the City of El Paso and surrounding communities. It has been designated by TDWR for non-contact recreation, propagation of fish and wildlife, and as a domestic raw water supply. Accordingly, the following standards have been established:

Chlorides (avg. not to exceed)	500 mg/l
Sulfates (avg. not to exceed)	700 mg/l
Total Dissolved Solids (avg. not to exceed)	1800 mg/l
Dissolved Oxygen (not less than)	5.0 mg/l
pH Range	7.0 to 9.0
Fecal Coliform (log avg. not to exceed)	1000/100 ml
Temperature	95° F

Review of TDWR water quality data shows that water quality is generally good but individual high concentrations of fecal coliform and low concentrations of dissolved oxygen have been recorded on several occasions. These high concentrations may be due primarily from the Mexican side of the river. A wasteload evaluation prepared in 1974 recommended that since the prevalent wastewater treatment processes employed are oxidation pond processes or land application and since major discharges occur on the Mexican side of the river which are not presently controlled, BOD discharge limitations of 30 mg/l would be adequate. This requirement is found in effluent set 0 which also requires that total suspended solids concentrations be limited to 30 mg/l. These requirements are considered adequate to protect the water quality of the segment. Usually all flows in the river are diverted for irrigation in the vicinity of El Paso and the river is normally dry below that point. Chlorination may be required depending on the accessibility of irrigated areas to the public.

Land use in the Rio Grande Basin has been segmented into seven categories. Area devoted to each of the categories within Segment 2308 are estimated below:

Land Use	Area (SQ. MILES)
Dry Cropland	0
Irrigated Cropland	47
Forest Land	0
Urban Land	75
Water	0
Rangeland	332
Barrenland	0
TOTAL	454

Land within the segment drainage area is primarily used as rangeland but this segment contains a relatively large urban area.

Irrigated croplands are used for production of cotton, alfalfa, feed grains, and some vegetables. Due to the scarcity of water in this area, most of the water in the Rio Grande is removed for use. Less than ten percent of the water removed is normally returned, and this is normally removed further downstream.

There is no forestland in the segment drainage basin and therefore there is no silvicultural activity.

The large urban areas of the segment drainage basin are expected to be the focus of considerable construction activities during the next twenty five years. This activity should center on the rapidly growing El Paso community. Pollutants from construction activity occur in association with rainstorms. These are rare in the vicinity of El Paso and thus construction activities are not expected to create significant water quality problems.

Mining in the segment drainage basin is limited to those activities required to support the construction activities. This includes sand, gravel, limestone, sandstone, and dolomite mining. There are no significant deposits of other minerals within the basin as can be seen on Plate 7(A).

Groundwater resources are found in a number of alluvial and bolson deposits of the Upper Rio Grande Planning Region. The greatest quantity of fresh groundwater available for beneficial uses are contained in the Hueco Bolson which serves as the major source of municipal water supply for the City of El Paso and other communities within El Paso County.

The La Mesa Bolson, which underlies the Mesilla Valley west of the Franklin Mountains, is a secondary source of municipal water for El Paso, supplying about 15 percent of the City's present consumption. This water is generally of very good quality and is currently being recharged at a rate approximately equal to the rate of pumpage.

Both the Hueco and La Mesa Bolsons are overlain by shallow alluvial deposits in the Rio Grande Valley. The water contained in the alluvium is generally brackish and unsuitable for municipal use. However, during periods when surface water is in short supply, the alluvium has often provided much of the irrigation water needed by farmers.

The major ground water problem in the future to the Rio Grande Basin is in the El Paso area, particularly in the Hueco Bolson Aquifer. The aquifer is being heavily "mined", with water levels declining about 1 to 2 feet per year. Saline water encroachment due to this "mining" is presently and will continue to deteriorate ground water quality. To alleviate this problem, the City of El Paso (largest user of groundwater in the area) is currently constructing all new wells such that in-well blending of fresh and slightly saline groundwater takes place during pumpage. This controlled blending should minimize encroachment on a long-term basis and extend the usable life of the recoverable fresh groundwater storage available in the Hueco Bolson.

The Texas Department of Water Resources has issued no permits within this segment drainage basin for the operation of waste disposal injection wells. However, there are several municipal solid waste disposal sites and several industrial solid waste disposal sites serving the area of El Paso. These sites are located on Plate 7(C).

Numerous hydrologic modifications have been constructed in the El Paso area. These modifications normally provide irrigation, prevent flooding, or serve to stabilize the international boundary. Some of the major modifications are the American Dam, the El Paso Diversion Channel, Ft. Bliss Diversion Channel, Government Hill Outfall Conduit, and Mountain Avenue Conduit. These are all projects of the United States Army Corps of Engineers.

A non-point source sampling program is being conducted to determine the effects of urban run-off and irrigation return flows on the segment water quality. Although urbanization and irrigation are prevalent over a large portion of this basin, non-point sources of pollution do not present major problems since rainfall is scarce and all water is normally consumed within the segment.

C. Alternative Discussion

There are two (2) designated sewerage planning areas located in Segment 2308. They are Anthony and Canutillo. Wastewater collection and treatment needs for each of these communities are discussed below.

1. Canutillo

a. Technical Alternatives

Canutillo is an unincorporated community located in El Paso County and had an estimated 1975 population of 4000. Projected populations for the community are presented below:

Year	Population
1975	4000
1983	4750
1990	5200
2000	6100

These persons are expected to occupy approximately 220 acres in the vicinity of Canutillo and the population density over the planning period is expected to vary between 25 and 27 persons/acre. Because of the population, and because Canutillo does not have existing wastewater collection and treatment facilities, it has been designated a sewerage planning area. Accordingly, alternative plans are developed below as prescribed by the statewide methodology. These plans assume that the total populated area will be serviced.

The collection system should consist of approximately:

Collection line length	10.5 miles
Inch miles of sewer	91
Number of lift stations	2

The cost for the construction of this sewage collection and transport system is presented in Tables II-D-34 through 36. It is assumed that the collection system will be installed and, for purposes of calculating present worth values, all costs will be incurred in the year 1983.

TABLE II-D-34

CANUTILLO

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 1

Total System Cost		
Collection		$1,071,000
Treatment		$3,260,000
Annual Community Cost		
Capital	$ 99,000	
O & M	$ 93,000	
Total	$191,000	
Annual per Capita Cost		
Maximum; based on 4750 persons in 1983		$40.00
Minimum; based on 6100 persons in 2000		$31.00
Present Worth	$5,392,000	
Equivalent Annual Cost	$ 470,000	
Year(s) of collection line improvements	1983	
Year(s) of treatment system improvement	1983	

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

TABLE II-D-35

CANUTILLO

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 2

Total System Cost		
Collection		$1,071,000
Treatment		$1,345,000
Annual Community Cost		
Capital	$ 55,000	
O & M	$ 75,000	
Total	$130,000	
Annual per Capita Cost		
Maximum; based on 4750 persons in 1983		$27.00
Minimum; based on 6100 persons in 2000		$21.00
Present Worth	$3,275,000	
Equivalent Annual Cost	$ 286,000	
Year(s) of collection line improvements	1983	
Year(s) of treatment system improvement	1983	

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

TABLE II-D-36

CANUTILLO

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 3

Total System Cost		
Collection		$1,071,000
Treatment		$ 481,000
Annual Community Cost		
Capital	$ 34,000	
O & M	$ 73,000	
Total	$ 108,000	
Annual per Capita Cost		
Maximum; based on 4750 persons in 1983		$ 23.00
Minimum; based on 6100 persons in 2000		$ 18.00
Present Worth	$2,394,000	
Equivalent Annual Cost	$ 209,000	
Year(s) of collection line improvements		1983
Year(s) of treatment system improvement		1983

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

Alternative treatment facilities have been considered. Design of each of these alternatives was developed to meet the requirements of Effluent Set 0. The alternatives considered are presented below:

Alternative 1	Alternative 2	Alternative 3
Primary treatment	Primary treatment	Package plant
Disinfection	Stabilization	(Contact stabilization)
Land application	Disinfection	Truck transport
Aerobic digestion	Aerobic digestion	Landfill
Truck transport	Truck transport	
Landfill	Landfill	

Each treatment alternative is planned to handle average wastewater flows of 0.642 MGD and peak flows of 1.245 MGD, the maximum projected requirement through the year 2000. This flow, with treatment to the level required by the specified effluent set, would result in average daily discharges of approximately 160 lbs. BOD and 160 lbs. TSS. The facility plan assumes that no industrial wasteloads will be discharged to the municipal system. Additional treatment capacity will be required should it be desired to treat industrial wastes.

Alternative 4, Septic systems has been considered for Canutillo. Individual septic systems will normally cost between $250 and $350 annually to operate and maintain. This cost includes amortization of initial construction costs.

A summary of the costs for the collection and treatment facilities of alternative 1 is presented in Table II-D-34. Summaries of the costs for alternatives 2 and 3 are presented in Tables II-D-35 and 36, respectively. Alternative 3 has been selected as the most appropriate treatment alternative. It is assumed that the treatment facility will be installed and for purposes of calculating present worth values, all costs will be incurred in the year 1983.

Annual community costs are based upon the assumption that all capital costs except land purchases and right-of-way purchases are eligible for federal grant funds under Section 201 of PL 92-500 and that these funds are made available to the community.

b. Management System

A review of the existing governmental entities capable of providing wastewater collection and treatment facilities to Canutillo shows that only El Paso County has all the necessary authority and powers at the present time. El Paso County has agreed to act as management agency for the community of Canutillo until such time that the community takes the necessary actions to assume the management responsibilities. These actions may either be incorporation of the city or the formation of a special district created under the laws of Texas. Until such District is formed or incorporation occurs, El Paso County is designated as the management agency.

c. Impacts of Alternative Plans

Impacts of the individual processes of each alternative were presented in the introduction to this chapter. Areal requirements for the alternatives considered are as follows:

Alternative	Acres
1	47.3
2	22.4
3	1
4	N/A

2. Anthony

a. Technical Alternatives

Anthony is incorporated under the general laws of Texas and is located in El Paso County and is adjacent to the New Mexico border. Anthony owns and operates a collection and treatment system which consists of a collection system, lift station, oxidation ditch, treatment plant, and retention pond. The effluent is stored in the retention pond until needed for irrigation of nearby lands. The 1975 population of Anthony was estimated to be 2200. The projected populations for the town are presented below:

Year	Population
1975	2200
1983	2847
1990	3300
2000	4350

The existing collection system for Anthony consists of:

Length of sewer	8.4 miles
Inch miles of sewer	59
Number of lift stations	1

It appears that this system should be expanded by approximately 2 miles in 1983 to meet the flow requirements of the existing population. This assumes that per capita sewage flows will increase above present levels as the town becomes more affluent and economic growth occurs. Future population expansion is expected to occur outside the reach of the existing sewerage system and therefore the existing system will require addition of approximately 2 miles by the year 2000. Cost of the recommended improvements are presented in Table II-D-37.

TABLE II-D-37

ANTHONY

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 1

Total System Cost		
Collection		$ 436,000
Treatment		$ -0-
Annual Community Cost		
Capital	$ 10,000	
O & M	$ 14,000	
Total	$ 24,000	
Annual per Capita Cost		
Maximum; based on 4350 persons in 2000		$ 5.40
Minimum; based on 2847 persons in 1980		$ 1.60
Present Worth	$264,000	
Equivalent Annual Cost	$ 23,000	
Year(s) of collection line improvements	1983, 2000	
Year(s) of treatment system improvement	N/A	

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

The existing treatment facilities have discharge permits but do not discharge since effluent is used for irrigation purposes. Present and projected influent waste and wastewater flows are presented below:

Year	Avg. Flow (MGD)	BOD (lb/day)	TSS (lb/day)	NH_3-N (lb/day)	Phos. (lb/day)
Base Year	0.275	459	459	92	23
1983	0.331	535	549	97	27
1990	0.384	612	641	103	30
2000	0.503	791	683	115	39

The maximum required average capacity is estimated to be 0.503 MGD in the year 2000. The total permitted capacity is 0.5 MGD. This appears to be adequate to handle the projected flows through the year 2000 and no improvements are recommended at this time. Since this ia a nondischarging facility the requirements of Effluent Set 0 are adequate to protect the segment's quality and no estimate of wasteloads has been prepared.

Annual community costs for improvement of the collection line have been based on the assumption that lines will be installed and paid for in the same year, and that all eligible capital costs will receive funding under Section 201 of PL 92-500.

b. Management System

The existing wastewater collection and treatment facilities are owned and operated by the City of Anthony. Since incorporated municipalities clearly have the authority to finance, construct, operate and maintain sewerage facilities, and since the City of Anthony is actively involved in these functions, it would be logical for this involvement to be continued. The City of Anthony concurs with the provisions of this plan and is designated as the management agency for this community.

The City of Anthony, Texas, is in the unique position of adjoining the community of Anthony, New Mexico. If desired by the local constituents of both communities, and if the community of Anthony, New Mexico, obtains the legal basis necessary to provide waste treatment facilities and enter into contracts for such services, then the two communities may enter into an agreement for joint performance of waste collection and treatment. Such a contract must specify its duration and purpose; the manner of joint financing to be utilized; methods of termination and disposal of property; methods of enforcement; and the precise organization, composition, and powers of any separate legal or administrative entity created by the contract. If the contract does not provide for a spearate legal entity to conduct the joint undertaking, it must include provisions for administering the agreement and provisions specifiying methods of acquiring, holding, and disposing of property necessary to the undertaking.

Should a joint venture be desired, careful review of this water quality management plan and the plan for the State of New Mexico will be necessary to assure conformance to both.

Should future development occur outside the existing town limits, the city may provide sewerage services after annexation or by contract with a special district. A majority of the residents of an area outside the city limits and desiring service must approve either the creation of a special district or the annexation. Local governments obliged to make payments under an interlocal contract must do so from current revenues available to the paying party. Consequently, a local government may not issue bonds or otherwise incur debts to satisfy its contract obligations but must rely solely on current revenues.

c. Impacts of Alternative Plan

The only expansion required of Anthony's wastewater treatment facilities to meet future needs is a minor addition to the collection line capacities. The necessary financial commitment's involved are irretrievable. The minor environmental impacts created during the constructing period are temporary in duration. The ultimate effect will be expansion of the served population and maintenance of water quality in the community. The probability of bypassing will be decreased which will lessen the chances of disease problems, odor problems, and will create a more aesthetic environment overall.

D. Identification of Other Local Management Entities

There is one facility planning area in Segment 2308. This area is El Paso and it has received a grant under Section 201 of PL 92-500 to prepare a facility plan for its projected needs. The El Paso Public Service Board (PSB) is the agency responsible for managing wastewater collection and treatment facilities for El Paso. The PSB has its authority extended to a large portion of El Paso County and is designated as a regional management agency in the county. Individual management agencies for collection and treatment facilities would maintain their integrity under the regional management concept, but the PSB would co-ordinate efforts and provide regional systems when advantageous and mutually agreed upon. The El Paso Public Service Board designated as the management agency for the City of El Paso.

VIII. Segment 2309

A. Existing Agencies and Programs

1. Local Agencies and/or Governments. Segment 2309 is composed of several counties, including Val Verde, Edwards, Sutton, Schleicher, and Crockett Counties. The authority of county governments in the area of water quality management is limited. Lack of general zoning powers and severely restricted fiscal authority serve to diminish the role that counties may play.

   The City of Sonora and the City of Ozona are both general law cities. General law municipalities have the statutory authority to construct and operate sewage treatment facilities, but do not have as extensive planning and enforcement tools available to them as do cities deriving powers from home rule.

   Also within the Segment 2309 planning area are Devil's River Soil and Water Conservation District #224, Upper Nueces, Frio Soil and Water Conservation District #238, and Crockett County Water Control and Improvement District #1. WCID's are governed by Chapter 51 of the Texas Water Code. They are charged with planning to control, store, preserve, and distribute surface waters for irrigation, power, and all other useful purposes. They have the necessary authority to perform these tasks.

2. Intergovernmental Arrangements/Programs. Val Verde County sends water samples for water quality testing to the State Department of Health Resources Laboratories located in San Antonio and Austin.

B. Segment Analysis

Texas Department of Water Resources (TDWR) designated stream segment 2309 is Devil's River extending to the headwaters of Amistad Reservoir. This segment has been designated by TDWR for

contact recreation, non-contact recreation, propagation of fish and wildlife, and as a domestic raw water supply. Accordingly, the following standards have been established:

Chloride (avg. not to exceed)	20 mg/l
Sulfates (avg. not to exceed)	20 mg/l
Total Dissolved Solids (avg. not to exceed)	300 mg/l
Dissolved oxygen (not less than)	6.0 mg/l
pH Range	6.5 to 8.5
Fecal Coliform (log avg. not to exceed)	200/100 ml
Temperature	90° F

Review of TDWR water quality records indicates that water quality of Segment 2309 is the best of the Rio Grande River Basin, and the standards the most stringent. Two violations of chloride and one violation of D.O. levels have occurred in the basin but these are not considered indicative of deteriorating water quality.

The City of Sonora and Crockett County WCID #1 serving the community of Ozona, are permitted dischargers in the segment. Sonora currently discharges 0.256 MGD within the segment drainage area. Crockett County WCID has no reported discharges from its oxidation ponds.

Permit requirements must be established which protect the quality of water for its intended uses. Effluent sets 0 and 1 have been chosen for permittees in the segment drainage area. Each new discharger will have to be considered individually in establishing the appropriate set.

Land use in the Rio Grande Basin has been segmented into seven categories. Area devoted to each of the categories within Segment 2309 are estimated below:

Land Use	Area (SQ. MILES)
Dry Cropland	83
Irrigated Cropland	0
Forest Land	0
Urban Land	2
Water	0
Range Land	2878
Barrenland	0
TOTAL	2963

Approximately ninety seven percent of the land within the drainage area is used as rangeland, although there are minor areas of urban land use and dry cropland.

Due to the lack of vegetation attributable to climatic conditions and previous practices of overgrazing, the area is no longer intensively used for livestock production.

There are no areas within the segment drainage basin that are engaged in silvicultural activities. Nor are there any mining activities, as can be seen on Plate 7(A).

There is very little growth projected for the area and only minimal construction is expected.

There is one permitted injection well located in this segment drainage basin, northwest of Ozona. Each month 300,000 gallons of cooling tower blowdown, drainage from gas and hydrocarbon processes, and zeolite regeneration waters are injected into the well ranging in depth from 1094 feet to 1750 feet below the surface. This is well below the usable waters of the Edwards-Trinity Aquifer and is not expected to degrade groundwater quality. In addition to the disposal well there are two municipal solid waste disposal sites located within the basin, one near Sonora and one near Ozona.

There are no septic tank areas identified within the drainage basin nor are there any hydrologic modifications.

C. Alternative Discussion

There is one designated sewerage planning area in Segment 2309. This sewerage planning area is Ozona. Review of the planning area shows that the reason for designation, dischargers not meeting requirements, has been removed. The permit for outfall number 3 has been cancelled and the outfall is no longer in operation. The flow to this plant has been diverted to other plants. There is no longer any need for improvement within the next five (5) years and the area is withdrawn as a sewerage planning area.

D. Identification of Other Local Management Entities

There is one facility planning area in Segment 2309. This area is Sonora and the city has received a grant under Section 201 of PL 92-500 to prepare a facility plan for its projected needs. Sonora has assumed the responsibility for operation of the collection and treatment facilities and is designated as the management agency for those areas within its corporate limits.

Another management agency, Crockett County WCID #1 provides wastewater collection and treatment facilities for the unincorporated community of Ozona. This WCID, is designated as a management agency serving the area within its political boundary.

IX. Segment 2310

A. Existing Agencies and Programs

1. Local Agencies and/or Governments. Segment 2310 is located in Val Verde and Terrell Counties. The authority of county governments in the area of water quality management is limited. Lack of general zoning powers and limited fiscal authority serve to diminish the role that counties play.

   Two water districts are established within the segment planning area. They are the Devil's River Soil and Water Conservation District #224 and the Rio Grande-Pecos Soil and Water Conservation District #237. WCID's are governed by Chapter 51 of the Texas Water Code. They have the necessary authority to plan the control, storage, preservation, and distribution of surface waters for irrigation, power, and all other useful purposes.

2. Intergovernmental Arrangements/Programs. Val Verde County sends water samples for water quality testing to the State Department of Health Resources Laboratories located in San Antonio and Austin.

B. Segment Analysis

Texas Department of Water Resources (TDWR) designated stream Segment 2310 is the Pecos River from the headwaters of Amistad Reservoir to the county road low water crossing near Pandale. The segment has been designated by TDWR for contact recreation, non-contact recreation, propagaton of fish and wildlife, and as a domestic raw water supply. Accordingly, the following standards have been established:

Chlorides (avg. not to exceed)	1000 mg/l
Sulfates (avg. not to exceed)	500 mg/l
Total Dissolved Solids (avg. not to exceed)	3000 mg/l
Dissolved Oxygen (not less than)	5.0 mg/l
pH Range	6.5 to 8.5

Fecal Coliform (log avg. not to exceed)	200/100 ml
Temperature	92° F

Review of TDWR water quality data shows that waters of the Pecos River contain naturally high levels of dissolved solids. These have contributed to standards violations of total dissolved solids, sulfates, and pH. These violations are not attributable to human activities within Segment 2310 since there are no permitted disch argers present.

There are no existing or projected permitted dischargers within the segment drainage area. However, should there be discharges in the future, the permit should be established to protect the water of the segment for its intended use. The minimum acceptable effluent set which would be considered adequate for domestic facilities would be effluent set 0. This effluent set limits discharges of BOD and TSS to 30 mg/l each.

Land use in the Rio Grande Basin has been segmented into seven categories. Area devoted to each of the categories within segment 2310 are estimated below:

LAND USE	AREA (SQ. MILES)
Dry Cropland	0
Irrigated Cropland	0
Forest Land	0
Urban Land	0
Water	0
Range Land	705
Barren land	0
TOTAL	705

All land in this segment is used as rangeland. Due to the lack of vegetation attributable to climate and previous practices of overgrazing, the area is no longer intensively used for livestock production, and this non-point source of pollution is not expected to generate significant problems.

There is no silvicultural, mining, or construction, activity in this area. There are no permitted injection wells and no evidence of salt water intrusion, although the basin's groundwater supplies are relatively unexplored. There are presently no plans for hydrologic modifications.

C. Alternative Discussions

There are no designated sewerage planning areas within this segment's drainage area. Therefore there is no discussion of point source alternatives.

D. Identification of Other Local Management Entities

There are no local management agencies in Segment 2310 dealing with wastewater collection and treatment.

X. Segment 2311

A. Existing Agencies and Programs

1. Local Agencies and/or Governments. Segment 2311 encompasses a large area which includes seventeen different counties. These are Val Verde, Terrell, Crockett, Pecos, Upton, Reagan, Crane, Winkler, Ward, Loving, Reeves, Presidio, Andrews, Brewster, Jeff Davis, Ector and Culberson Counties. The authority of county governments in the area of water quality management is limited. Lack of general zoning powers and limited fiscal authority serve to diminish the role that counties play.

The cities of Fort Stockton, Iraan, McCamey, Rankin, Crane, Kermit, Wink, Pyote, Wickett, Grandfalls, Barstow, Pecos, Toyah, Balmorhea, Alpine, and Monahans all have the statutory authority to construct and operate sewage treatment facilities. The home rule city of Monahans has more extensive planning and enforcement tools than the others which derive their powers from general law. The home rule cities in the Rio Grande Basin 208 area have adopted charters giving them sufficient fiscal and police powers to apply the full measure of water quality controls.

In such a large region it can be expected that there are many utility districts established. The following are all located within the Segment 2311 planning area: Devil's River Soil and Water Conservation District #224, Rio Grande-Pecos Soil and Water Conservation District #237, Red Bluff Power Control District, Pecos County Water Control and Improvement District #1, Toyah-Limpia Soil and Water Conservation District #209 and #231, Middle Concho Soil and Water Conservation District #234, Crane County Water Control and Improvement District #1, Sand Hills Soil and Water Conservation District #241, Upper Pecos Soil and Water Conservation District #213, Grandfalls Drainage

District, High Point Soil and Water Conservation District, #230, Highland Soil and Water Conservation District #210, and Big Bend Soil and Water Conservation District #227. WCID's are governed by Chapter 51 of the Texas Water Code. They are charged with planning to control, store, preserve, and distribute surface waters for irrigation, power, and all other useful purposes. They have the necessary authority to perform these tasks.

2. Intergovernmental Arrangements/Programs. The City of Fort Stockton sends water samples for water quality testing to the State Department of Health Resources Laboratory located in Midland.

The City of Rankin purchases drinking water (well water) from Upton County on a contractual basis.

The City of Crane purchases drinking water from the Crane County WCID #1 on a contractual basis. The city provides all of the financial support for the water district.

The City of Barstow purchases some drinking water from the City of Pecos on a contractual basis.

The City of Monahans (Ward County) draws its drinking water supplies from wells located on the Hogg Ranch, part of which lies in Winkler County. Approximately seventeen years ago the City annexed the entire area of the Hogg Ranch to protect its water supply from contamination resulting from mining activities in the area.

The City of Grandfalls sends water samples for water quality testing to the State Department of Health Resources Laboratory located in Austin.

B. Segment Analysis

Texas Department of Water Resources (TDWR) designated stream Segment 2311 extends from the county

road low water crossing near Pandale to Red Bluff Dam. This segment has been designated by TDWR for contact recreation, non-contact recreation, and propagation of fish and wildlife. Accordingly, the following stream standards have been established:

Chlorides (avg. not to exceed)	7000 mg/l
Sulfates (avg. not to exceed)	3500 mg/l
Total Suspended Solids (avg. not to exceed)	15,000 mg/l
Dissolved Oxygen (not less than)	5.0 mg/l
pH Range	6.5 to 9.0
Fecal coliform (log avg. not to exceed)	200/100 ml
Temperature (not to exceed)	90° F

Review of TDWR water quality data indicates that there may be several water quality problems in the segment. Chlorides and sulfates and total dissolved solids concentrations all exhibit individual high values. Review of discharges to the segment indicates the relatively low level of discharges. Due to these relatively small and well spaced discharges, the problems noted above are not considered a result of these discharges, but rather are believed to be attributable to natural causes.

The drainage area described for Segment 2311 includes a closed basin which comprises approximately 15 percent of the land area of the subbasin. A closed basin is an area from which there is no surface drainage and all surface water either evaporates or percolates to the groundwater supplies. This portion of the subbasin has been denoted as subbasin 2311C.

Land use in the Rio Grande Basin has been segmented into seven categories. Area devoted to each of the categories within Segment 2311 are estimated below:

LAND USE	AREA (SQ. MILES)		
	Closed	NonClosed	Total
Dry Cropland	0	3	3
Irrigated Cropland	0	419	419
Forest Land	0	371	371
Urban Land	21	44	65
Water	1	3	4
Range Land	2567	14180	16747
Barren Land	176	1	177
TOTAL	2765	15021	17786

The major land use in the subbasin is rangeland. This land use category comprises nearly ninety five percent of the total land use within the basin. Subbasin 2311C is almost entirely rangeland with only some small areas of urban and barren land. The remainder of the drainage subbasin of Segment 2311 is similar but also includes some irrigated cropland and some minor amounts of forest land.

Due to the lack of vegetation attributable to the poor climatic conditions and previous practices of overgrazing, the area is no longer intensively used for livestock production and this land use is not expected to present a significant problem so far as non-point source pollution is concerned.

The major crops produced in the area are cotton, feed grains, alfalfa and vegetables. Some cattle, sheep and goats are also raised.

There is approximately 370 square miles of forest land located within the segment drainage basin. All this is located outside the closed portion of the basin. There is presently no silvicultural activities associated with this forestland and none is anticipated.

There are principal deposits of sulfur and gypsum located within this segment drainage basin. There are several operating sulfur mines located in Pecos and Culberson counties. Plate 7(A) shows the location of these deposits.

There have been no violations of water quality standards which can be directly attributed to these mining activities.

Only minor growth in some urban areas is expected in the segment drainage basin during the next twenty five years. Fort Stockton, will grow in size by the year 2000. Although the city will have the second greatest growth in the planning area, it is over thirty miles from the Pecos River. It is not likely that storm runoff would reach the waterway with soil from Fort Stockton.

Pecos is the only other city which is expected to undergo significant urban expansion during the period. The growth has been projected to be less than 700 acres over the planning period, and the impact of construction on the water quality in the Pecos River is not expected to be significant.

Although the Texas Department of Water Resources has previously issued five injection well permits in the segment, there are now none operating. Four of the five wells were never used and the fifth, originally issued for disposal of brines, has been cancelled. There are 22 municipal solid waste disposal sites within the Segment drainage basin and shown on Plate 7(C). There are no permitted industrial solid waste disposal sites. Although these solid waste disposal sites represent potential sources of pollution, there has been no violations of water quality standards within the segment drainage basin attributable to them.

Salinity and salt water intrusion are noticeable problems in the upper portion of this segment drainage basin. Large withdrawals from freshwater aquifers for irrigation threaten to contribute to the salinity problems of the water bearing strata. The Pecos River has a high natural saline content and waters available for irrigation may be further limited in the future. Below Girvin, in Pecos County, water quality of the Pecos improves substantially as runoff and groundwater from the limestone aquifers in Crockett, Terrell, and Val Verde Counties dilute

the high concentration of minerals found in the upstream reaches.

Several areas are shown on Plate 7(C) as septic tank areas. These areas are Imperial, Royalty, Coyanosa, Monahans, Penwell, Mentone, Barstow Fort Davis, and the Balmorhea-Brograd-Saragosa area. Three of these areas are sewerage planning areas. The remainder are believed to be adequately served by septic systems at the present time.

There are several small reservoirs in the segment drainage basin which include Lake Balmorhea and Imperial Reservoir. There are no major hydrologic modifications planned for the basin within the planning period.

C. Alternative Discussion

There are six designated sewerage planning areas located in Segment 2311. These are Fort Davis, Imperial, Balmorhea, Iraan, Sheffield, and Crane. Crane is located within the closed portion of the subbasin. Wastewater collection and treatment needs for each of these communities are discussed below.

1. Balmorhea

a. Technical Alternatives

Balmorhea is located in Reeves County and had an estimated 1975 population of 750. Projected populations for the community are presented below:

Year	Population
1975	750
1983	744
1990	730
2000	700

These persons are expected to occupy approximately 328 acres in the vicinity of Balmorhea and the population density over the planning period is expected to vary between 2 and 4 persons/acre. Because of the population, and because Balmorhea does not have existing wastewater collection and treatment facilities, it has been designated a sewerage planning area. Accordingly, alternative plans are developed below as prescribed by the statewide methodology. These plans assume that the total populated area will be serviced.

The collection system should consist of approximately:

Collection line length	3.0 miles
Inch miles of sewer	26
Number of lift stations	1

The cost for the construction of this sewage collection and transport system is presented in Tables II-D-38 through 40. It is assumed that the collection system will be installed and, for purposes of calculating present worth values, all costs will be incurred in the year 1983.

TABLE II-D-38

BALMORHEA

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 1

Total System Cost		
Collection		$ 377,000
Treatment		$ 346,000
Annual Community Cost		
Capital	$16,000	
O & M	$26,000	
Total	$42,000	
Annual per Capita Cost		
Maximum; based on 700 persons in 2000		$ 60.00
Minimum; based on 744 persons in 1983		$ 56.00
Present Worth	$1,015,000	
Equivalent Annual Cost	$ 89,000	
Year(s) of collection line improvements	1983	
Year(s) of treatment system improvement	1983	

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

TABLE II-D-39

BALMORHEA

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 2

Total System Cost		
Collection		$ 377,000
Treatment		$ 316,000
Annual Community Cost		
Capital	$16,000	
O & M	$20,000	
Total	$36,000	
Annual per Capita Cost		
Maximum; based on 700 persons in 2000		$ 51.00
Minimum; based on 744 persons in 1983		$ 48.00
Present Worth	$ 926,000	
Equivalent Annual Cost	$ 81,000	
Year(s) of collection line improvements	1983	
Year(s) of treatment system improvement	1983	

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

TABLE II-D-40

BALMORHEA

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 3

Total System Cost		
Collection		$377,000
Treatment		$134,000
Annual Community Cost		
Capital	$ 11,000	
O & M	$ 20,000	
Total	$ 31,000	
Annual per Capita Cost		
Maximum; based on 700 persons in 2000		$ 45.00
Minimum; based on 744 persons in 1983		$ 43.00
Present Worth	$744,000	
Equivalent Annual Cost	$ 65,000	
Year(s) of collection line improvements		1983
Year(s) of treatment system improvement		1983

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

Alternative treatment facilities have been considered. Design of each of these alternatives was developed to meet the requirements of Effluent Set 0, since the facility will be a "no discharge" facility. The alternatives considered are described below:

Alternative 1	Alternative 2	Alternative 3
Primary treatment	Primary treatment	Package plant
Disinfection	Stabilization lagoon	(Contact stabili-
Land application	Aerobic digestion	zation)
Aerobic digestion	Truck transport	Truck transport
Truck transport	Landfill	Landfill
Landfill		

Each treatment alternative is planned to handle average wastewater flows of 0.080 MGD and peak flows of 0.211 MGD, the maximum projected requirement through the year 2000. This flow, with treatment to the levels required by the specified effluent set, would result in average daily discharges of approximately 20 lbs. BOD and 20 lbs. TSS. The facility plan assumes that no industrial wasteloads will be discharged to the municipal system. Additional treatment capacity will be required should it be desired to treat industrial wastes.

A summary of the costs for the collection and treatment facilities of alternative 1 is presented in Table II-D-38. Summaries of the costs for alternatives 2 and 3 presented in Tables II-D-39 and 40, repectively. Alternative 2 has been selected as the most appropriate treatment alternative. It is assumed that the treatment facility will be installed and, for purposes of calculating present worth values, all costs will be incurred in the year 1983. Annual community costs are based upon the assumption that all capital costs except land purchases and right-of-way purchases are eligible for federal grant funds under Section 201 of PL 92-500 and that

these funds are made available to the community.

b. Management System

A review of the existing governmental entities capable of providing wastewater collection and treatment facilities to Balmorhea shows that the city is incorporated and clearly has the authority and power to initiate the construction and maintenance of the wastewater collection and treatment facilities discussed above. Further, the City has shown a strong interest in implementing a wastewater collection and treatment facility by making application for a grant under Section 201 of PL 92-500. The City has assumed the management role and is pursuing implementation of Alternative 2 with 100% local funds. The City is designated as the management agency for the area within its corporate limits.

c. Impacts of Alternative Plans

Impacts of the individual processes of each alternative were presented in the introduction to this chapter. Areal requirements for the alternatives considered are as follows:

Alternative	Acres
1	6.3
2	3.0
3	0.5

2. Imperial

a. Technical Alternative

Imperial is an unincorporated community located in Pecos County and had an estimated 1975 population of 650. Projected populations for the community are presented below:

Year	Population
1975	650
1983	660
1990	680
2000	720

These persons are expected to occupy approximately 160 acres in the vicinity of Imperial and the population density over the planning period is expected to vary between 4 and 5 persons/acre. Because of the population, and because Imperial does not have existing wastewater collection and treatment facilities, it has been designated a sewerage planning area. Accordingly, alternative plans are developed below as prescribed by the statewide methodology. These plans assume that the total populated area will be serviced.

The collection system should consist of approximately:

Collection line length	3.5 miles
Inch miles of sewer	30
Number of lift stations	1

The cost for the construction of this sewage collection and transport system is presented in Tables II-D-41 through 43. It is assumed that the collection system will be installed and, for purposes of calculating present worth values, all costs will be incurred in the year 1983.

Alternative treatment facilities have been considered. Design of each of these alternatives was developed to meet the

TABLE II-D-41

IMPERIAL

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 1

Total System Cost		
Collection		$ 424,000
Treatment		$ 346,000
Annual Community Cost		
Capital	$17,000	
O & M	$26,000	
Total	$43,000	
Annual per Capita Cost		
Maximum; based on 660 persons in 1983		$ 66.00
Minimum; based on 720 persons in 2000		$ 60.00
Present Worth	$1,066,000	
Equivalent Annual Cost	$ 93,000	
Year(s) of collection line improvements	1983	
Year(s) of treatment system improvement	1983	

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

TABLE II-D-42

IMPERIAL

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 2

Total System Cost		
Collection		$ 424,000
Treatment		$ 316,000
Annual Community Cost		
Capital	$17,000	
O & M	$21,000	
Total	$37,000	
Annual per Capita Cost		
Maximum; based on 660 persons in 1983		$ 57.00
Minimum; based on 720 persons in 2000		$ 51.00
Present Worth	$ 976,000	
Equivalent Annual Cost	$ 85,000	
Year(s) of collection line improvements	1983	
Year(s) of treatment system improvement	1983	

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

TABLE II-D-43

IMPERIAL

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 3

Total System Cost		
Collection		$ 424,000
Treatment		$ 134,000
Annual Community Cost		
Capital	$ 12,000	
O & M	$ 21,000	
Total	$ 33,000	
Annual per Capita Cost		
Maximum; based on 660 persons in 1983		$ 50.00
Minimum; based on 720 persons in 2000		$ 46.00
Present Worth	$795,000	
Equivalent Annual Cost	$ 69,000	
Year(s) of collection line improvements		1983
Year(s) of treatment system improvement		1983

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

requirements of Effluent Set 0, since the facility will be a "no discharge" facility. The alternatives considered are presented below:

Alternative 1	Alternative 2	Alternative 3
Primary treatment	Primary treatment	Package plant
Disinfection	Stabilization lagoon	(Contact stabili-
Land application	Aerobic digestion	zation)
Aerobic digestion	Truck transport	Truck transport
Truck transport	Landfill	Landfill
Landfill		

Each treatment alternative is planned to handle average wastewater flows of 0.080 MGD and peak flows of 0.211 MGD, the maximum projected requirement through the year 2000. This flow, with treatment to the level required by the specified effluent set, would result in average daily discharges of approximately 20 lbs. BOD and 20 lbs. TSS. The facility plan assumes that no industrial wasteloads will be discharged to the municipal system. Additional treatment capacity will be required should it be desired to treat industrial wastes.

A summary of the costs for the collection and treatment facilities of alternative 1 is presented in Table II-D-41. Summaries of the costs for alternatives 2 and 3 are presented on Tables II-D-42 and 43, respectively. Alternative 2 has been selected as the most appropriate treatment alternative. It is assumed that the treatment facility will be installed and, for purposes of calculating present worth values, all costs will be incurred in the year 1983. Annual community costs are based upon the assumption that all capital costs except land purchases and right-of-way pruchases are eligible for federal grant funds under Section 201 of PL 92-500 and that these funds are made available to the community.

b. Management System

A review of the existing governmental entities capable of providing wastewater collection and treatment facilities to Imperial shows that only Pecos County has all the necessary authority and powers at the present time. However, in view of the limited powers of taxation available to county governments in dealing with wastewater collection and treatment, it is recommended that the community create a special district or incorporate. In either case a confirmation election will be necessary as will a bond election. In this manner an authority with adequate taxing and management powers may be created to effectively manage wastewater treatment in the community.

c. Impacts of Alternative Plans

Impacts of the individual processes of each alternative were presented in the introduction to this chapter. Areal requirements for the alternatives considered are as follows:

Alternative	Acres
1	6.3
2	3.0
3	0.5

3. Crane

a. Technical Alternatives

Crane is incorporated under the general laws of Texas and is located in Crane County. The city is situated in a closed basin portion of the Segment 2311 drainage area. This means that there is no surface water flow from this portion of the basin. Thus surface water leaves this closed basin only after percolating to groundwater supplies or through evaporation. Crane owns and operates a collection and treatment facility. This system consists of a collection system, Imhoff tank, evaporation pond and drying beds.

Several assumptions have been necessary in evaluating the Crane wastewater collection and treatment facilities. These assumptions are:

1) The existing treatment facility is as described above, with no discharge of effluents.
2) The existing treatment facility's average capacity is 0.25 MGD.
3) There are 2000 ft^2 of sludge drying beds.
4) The collection system has one lift station.

The 1975 population of Crane was estimated to be 3,390. The projected populations for the town are presented below:

Year	Population
1975	3390
1983	3220
1990	2990
2000	2740

The existing collection system for Crane has been estimated to consist of the following:

Length of sewer	15.4 miles
Inch miles of sewer	133
Number of lift stations	1 (assumed)

Based on these estimates and the statewide methodology, no expansion of the collection system is indicated. Projected population changes do not indicate the need for an expanded service area.

The existing treatment facilities are questionable. If these facilities are treating sewage of all residents, they are probably inadequate. It is assumed for purposes of cost calculation that the evaporation pond will need to be expanded by two acres and that the sludge drying beds will need to be expanded by 2000 ft^2. These data will be revised when more accurate information is supplied by the City of Crane. Since Crane is located within the closed basin, the requirements of Effluent Set 0 are adequate. Crane does not normally discharge, and therefore no estimate of wasteloads has been prepared. Costs to make these improvements are presented in Table II-D-44. Annual community costs presented are based upon the assumption that all eligible capital costs will receive funding under Section 201 of PL 92-500.

b. Management System

The existing wastewater collection and treatment facilities are owned and operated by the City of Crane. Since incorporated municipalities clearly have the authority to finance, construct, operate, and maintain sewerage facilities, and since the City of Crane is actively involved in these functions, it would be logical for this involvement to be continued and the City is designated as the management agency for the area within its corporate limits. Therefore other alternatives such as county operation and formation of special districts have not been explored. Further, since the City of Crane is not expected to increase

TABLE II-D-44

CRANE

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 1

Total System Cost		
Collection		$ -0-
Treatment		$177,000
Annual Community Cost		
Capital	$ 4,000	
O & M	$11,000	
Total	$15,000	
Annual per Capita Cost		
Maximum; based on 2740 persons in 2000		$ 5.40
Minimum; based on 3220 persons in 1983		$ 4.60
Present Worth	$302,000	
Equivalent Annual Cost	$ 26,000	
Year(s) of collection line improvements	N/A	
Year(s) of treatment system improvement	1983	

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

in population, it is unlikely that significant growth outside the city limits will occur and alternatives available were not studied. Crane may find that a bond election is required prior to initiating construction projects.

c. Impacts of Alternative Plan

The only expansion required of Crane's wastewater treatment facilities to meet future needs is that of the evaporation pond and sludge drying beds. The financial commitments are irretrievable. The minor environmental impacts created during the construction period are temporary in duration. The ultimate effect will be improved maintenance of the water quality in the community. The probability of bypassing will be decreased which will lessen the chances of disease problems, odor problems, and will create a more aesthetic environment overall.

4. Fort Davis

a. Technical Alternatives

Fort Davis is an unincorporated community located in Jeff Davis County. The 1975 estimated population of Fort Davis was 910. Projected populations for this community are presented below:

Year	Population
1975	910
1983	915
1990	840
2000	800

The community is only partially served by a central collection and treatment facility. There are a reported 150 connections to the system accounting for an estimated 525 persons of those presently living in Fort Davis. The remaining population is assumed to be using septic systems, cess pools, and other methods of disposal of liquid wastes.

The existing system is owned and operated by the Fort Davis Water Supply Corporation. The system includes collection lines, a lift station, clarifier, chlorinator, sludge drying beds and an oxidation ditch.

Present and projected waste loads are presented below:

Year	Avg. Flow (MGD)	BOD lb/day	TSS lb/day	NH_3-N lb/day	Phos. lbs/day
Base Year	0.030	27.5	20	4.8	1.2
1983	0.074	93.6	98.6	9.5	4.3
1990	0.068	81.6	84.2	8.6	3.7
2000	0.066	74.3	75.6	8.1	3.4

The existing collection system is composed of approximately:

Length of sewer	6.0 miles
Inch miles of sewer	37.7
Number of lift stations	1

It appears that this system is adequate to handle those persons currently being served but minor expansion will be required to accommodate all residents of the area. Cost of the recommended improvements for the collection system are presented in Table II-D-45.

The existing treatment facilities are permitted to discharge 0.045 MGD. Permit requirements for the plant have been established consistent with Effluent Set 1. The plant has been discharging 0.030 MGD. Projected flows indicate a requirement for 0.075 MGD if all residents are to be served. This requires the addition of a parallel 0.030 MGD treatment facility. This total flow, with treatment to the level required by the specified effluent set, would result in average daily discharges of approximately 10 lbs. BOD and 10 lbs. TSS. Other alternatives would include the abandonment of the existing system and installation of new facilities. This was not seriously considered due to cost. A summary of the costs for the construction and the operation and maintenance of the recommended expansion is presented in Table II-D-45. It is assumed for purposes of calculating present worth values that all costs will be incurred in the year 1983. The annual community costs were based upon the assumption that all eligible capital costs will receive funding under Section 201 of PL 92-500.

b. Management System

Presently the wastewater collection and treatment facilities for Fort Davis are provided by the Fort Davis Water Supply Corporation. This organization is not a political entity and therefore is not entitled to receive grant funds under Section 201 of PL 92-500 for the construction of

TABLE II-D-45

FORT DAVIS

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 1

Total System Cost		
Collection		$273,000
Treatment		$196,000
Annual Community Cost		
Capital	$10,000	
O & M	$17,000	
Total	$28,000	
Annual per Capita Cost		
Maximum; based on 800 persons in 2000		$34.00
Minimum; based on 914 persons in 1983		$30.00
Present Worth	$666,000	
Equivalent Annual Cost	$ 58,000	
Year(s) of collection line improvements	1983	
Year(s) of treatment system improvement	1983	

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

sewerage facilities. However, other federal funding may be obtained from sources such as the Farmers Home Administration. This funding does not provide as large a grant as Section 201. Jeff Davis County concurs on the technical alternative selected for Ft. Davis.

Several management alternatives may be explored for the Fort Davis area. The community of Fort Davis may assume responsibility for its wastewater collection and treatment after incorporation. This would require that residents of the community incorporate under the general laws of Texas. The City would then have full legal authority, after voter approval of a bond issue, to finance, construct, operate and maintain wastewater collection and treatment facilities. It would also become eligible to receive federal grant funds under Section 201 of PL 92-500.

The community may elect to form a special district to perform specific tasks which include the desired role in wastewater collection and treatment.

No matter which alternative is chosen by the local citizens, ownership of the collection and treatment facilities will remain with the Fort Davis Water Supply Corporation until the community takes necessary steps to purchase the facility. Therefore, one final alternative which must be considered is the continuation of the present private system.

c. Impacts of Alternative Plan

The only expansion required of Fort Davis' wastewater treatment facilities to meet future needs is a minor addition to the collection line capacities and a parallel treatment facility. The financial commitments involved in the construction of these components are irretrievable. The minor environmental impacts created during

the construction period are temporary in duration. The ultimate effect will be expansion of the served population and maintenance of water quality in the community. The probability of bypassing will be decreased which will lessen the chances of disease problems, odor problems, and will create a more aesthetic environment overall.

5. Iraan

a. Technical Alternatives

Iraan is incorporated under the general laws of Texas and is located in Pecos County. The City owns and operates a wastewater collection and treatment system which consists of two sewer plants. The estimated 1975 population of Iraan was 1060. The projected populations for the City are presented below:

Year	Population
1975	1060
1983	1075
1990	1090
2000	1250

The existing collection system consists of a collection system, Imhoff tank, oxidation pond, sludge drying beds and area for land application of effluent.

Iraan's collection system has been estimated to consist of the following:

Collection line length	4.5 miles
Inch miles of sewer	41.5
Number of lift stations	1

Some expansion of this system appears warranted to provide adequate service to the entire existing population. With this increase to existing capacity, the collection system should be sufficient to the year 2000 when some additional lines will be needed. Costs of the recommended improvements are presented in Table II-D-46.

The existing treatment facilities in Iraan have not been releasing discharges to local streams. All water is used for irrigation of the local golf course or the grass on adjacent ranch lands. Present and projected influent waste and wastewater flows are presented below:

TABLE II-D-46

IRAAN

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 1

Total System Cost		
Collection		$ 71,000
Treatment		$181,000
Annual Community Cost		
Capital	$ 6,000	
O & M	$ 9,000	
Total	$ 15,000	
Annual per Capita Cost		
Maximum; based on 1250 persons in 2000		$14.00
Minimum; based on 1076 persons in 1983		$12.00
Present Worth	$133,000	
Equivalent Annual Cost	$ 12,000	
Year(s) of collection line improvements	1983	
Year(s) of treatment system improvement	2000	

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

Year	Avg. Flow (MGD)	BOD (lb/day)	TSS (lb/day)	NH_3-N (lb/day)	Phos. lbs/da
Base Year	0.080	113	100	23	6
1983	0.085	115	102	23	6
1990	0.088	117	107	23	6
2000	0.108	144	137	25	8

The maximum required average capacity for the treatment facility is calculated to be 0.108 in the year 2000. This flow, with treatment to the level required by the effluent set specified below, would result in average daily discharges of approximately 25 lbs. BOD and 25 lbs. TSS. The existing plant is permitted to discharge an average 0.09 MGD and the present capacity at the treatment facility appears adequate through the planning year 1990. Expansion after that time may be necessary if the population increases at the projected rate. The necessary expansion would include adding some area to the oxidation ponds and disinfection capacities. The requirements of Effluent Set 0 are adequate.

Per capita costs to improve the sludge treatment facility and costs of operation and maintenance of those facilities are presented in Table II-D-46. In preparing these cost estimates it was assumed that modifications and improvements to the existing collection and treatment system would be completed and paid for in the same year. Expansion of the collection system to new service areas was assumed to be accomplished in the year 2000, the first year of significant population growth. The annual community costs are based upon the assumption that all eligible capital costs will receive funding under Section 201 of PL 92-500.

b. Management Systems

The existing wastewater collection and treatment facilities are owned and ope-

rated by the City of Iraan. Since incorporated municipalities clearly have the authority to construct, operate and maintain sewerage facilities and to finance these facilities and since the city is presently actively involved in these functions, operation by the county or formation of special districts have not been explored and the City of Iraan is designated as the management agency for the area within the corporate limits. Should future development occur outside the existing town limits, the city may provide treatment services by annexing the territory if a majority of the residents of that territory vote for annexation or the residents may form a special district which can contract with the city to provide the desired services.

c. Impacts of Alternative Plan

The only expansion required of Iraan's wastewater treatment facilities to meet future needs is a minor addition to the collection system and possibly some minor expansion of the oxidation pond and disinfection facilities. The financial commitments involved in the construction of these components are irretrievable. The minor environmental impacts created during the construction period are temporary in duration. The ultimate effect will be the expansion of the facility to service all areas and maintenance of water quality in Iraan.

6. Sheffield

a. Technical Alternatives

Sheffield is an unincorporated community located in Pecos County. The 1975 estimated population of Sheffield was 280. Projected populations for the community are presented below:

Year	Population
1975	280
1983	325
1990	350
2000	380

The community is served by a central collection and treatment facility and an estimated 140 persons are connected to the system. The remaining population is assumed to be using septic systems, cess pools, or other methods of wastewater disposal.

The existing system is owned and operated by the Sheffield Water Supply Corporation. The system includes a collection system, and an open lagoon with mechanical aeration. Effluent is used to irrigate adjacent farm and pasturelands.

Present and projected wasteloads are presented below:

Year	Avg. Flow (MGD)	BOD lb/day	TSS lb/day	NH_3-N lb/day	Phos. lb/day
Base year	0.010	17	17	4	1
1983	0.030	49	55	6.3	3
1990	0.033	53	60	6.5	3
2000	0.037	58	65	6.9	3

The existing collection system is composed of approximately:

Length of sewer	2.7 miles
Inch miles of sewer	16.2
Number of lift stations	0

Some minor extension of lines to areas not presently serviced and extension of lines into growth areas appears warranted. This expansion can be accomplished most economically at one time and costs have been prepared on that basis. Costs of the recommended improvements for the collection system are presented in Table II-D-47.

The existing treatment facilities have been granted a "no discharge" permit. Thus, the requirements of Effluent Set 0 are adequate for this facility and no estimate of wasteloads has been prepared. The reported capacity of the system is 0.02 MGD with present flow rates only approaching 50% of this capacity. Projected flows indicate that this capacity is somewhat less than that which will be required by 1983 with all residents connected. Assuming that the existing stabilization lagoon is .66 acres, it should be expanded to approximately 1.66 acres. Primary treatment and disinfection should be added. A summary of the costs for the construction and the operation and maintenance of the expanded system is presented in Table II-D-47.

For purposes of calculating present worth values, it is assumed that all costs will be incurred in the year that the facilities are constructed. Annual community costs are based upon the assumption that all eligible capital costs will receive funding under Section 201 of PL 92-500.

b. Management System

Wastewater collection and treatment services are provided by the Sheffield Water Supply Corporation. This is a non-profit corporation, not a political entity, and therefore is not entitled to receive grant funds under Section 201 of PL 92-500 for the construction of sewerage facilities. However, other federal funding may be obtained from sources such as the Farmers Home Administration. Grants under this

TABLE II-D-47

SHEFFIELD

COLLECTION AND TREATMENT FACILITY

ALTERNATIVE 1

Total System Cost		
Collection		$ 53,000
Treatment		$140,000
Annual Community Cost		
Capital	$ 4,000	
O & M	$ 9,000	
Total	$13,000	
Annual per Capita Cost		
Maximum; based on 324 persons in 1983		$39.00
Minimum; based on 380 persons in 2000		$34.00
Present Worth	$291,000	
Equivalent Annual Cost	$ 25,000	
Year(s) of collection line improvements	1983	
Year(s) of treatment system improvement	1983	

NOTE: Present worth and equivalent annual costs have been calculated assuming a 6% discount rate. No adjustment has been allowed for the effects of inflation.

agency are limited to 50% of the cost of the project, as well as having other limiting requirements.

Several management alternatives may be explored for the Sheffield area. The community may assume responsibility for its wastewater treatment after incorporation. This alternative would require that residents of the community incorporate under the general laws of Texas.

The community may also elect to form a special district to perform specific tasks which include the desired role in wastewater collection and treatment.

Until the community moves to acquire ownership of the treatment facilities, ownership will remain with the Sheffield Water Supply Corporation. Should the community decide not to form a special district or to incorporate, other management alternatives include management by the county or no management agency designation at all. This alternative wastewater management to the non-profit Sheffield Water Supply Corporation and state and federal agencies.

c. Impacts of Alternative Plan

The only expansion required of Sheffield's wastewater treatment facilities to meet future needs is a minor addition to the collection line capacities and stabilization lagoon and the addition of primary treatment and disinfection. The financial commitments involved in the construction of these components are irretrievable. The minor environmental impacts created during the construction period are temporary in duration. The ultimate effect will be expansion of the served population and maintenance of water quality in the community. The probability of bypassing will be decreased which will lessen the chances of disease problems, odor problems, and will create a more aesthetic environment overall.

d. Identification of Other Local Management Entities

There are three facility planning areas in Segment 2311. These areas are Monahans, Pecos, and Alpine. Each has received a grant under Section 201 of PL 92-500 to prepare a facility plan for its service area. Thus these cities have assumed the responsibility for management of wastewater collection and treatment facilities within their respective service area and are designated as management agencies.

Other agencies located within Segment 2311 which have responsibility for management of wastewater collection and treatment facilities include: Kermit, Rankin, Ft. Stockton, Grandfalls, Wicket, Wink and McCamey. These cities are designated as management agencies serving the areas within their respective boundaries.

One other city which has the necessary powers to act as a management agency but does not currently operate facilities or have an immediate recognized need is Pyote.

This area, as defined by its corporate limits, should be recognized as a management agency as soon as a need for treatment facilities has been identified.

XI. Segment 2312

A. Existing Agencies and Programs

1. Local Agencies and/or Governments. Segment 2312 is composed of Loving, Reeves, and Culberson Counties. The authority of county governments in the area of water quality management is limited. Lack of general zoning powers and limited fiscal authority serve to diminish the role that counties may play.

Two water districts are established within this planning area, the Upper Pecos Soil and Water Conservation District #213 and High Point Soil and Water Conservation District #230. WCID's are governed by Chapter 51 of the Texas Water Code. They are charged with planning to control, store, preserve, and distribute surface waters for irrigation, power, and all other useful purposes. They have the necessary authority to perform these tasks.

2. Intergovernmental Arrangements/Programs. To date, there have been no intergovernmental arrangements or programs identified.

B. Segment Analysis

Texas Department of Water Resources (TDWR) designated stream Segment 2311 is Red Bluff Reservoir. This segment has been designated by TDWR for contact recreation, non-contact recreation, and propagation of fish and wildlife. Accordingly, the following standards have been established:

Chlorides (avg. not to exceed)	6000 mg/l
Sulfates (avg. not to exceed)	3500 mg/l
Total Dissolved Solids (avg. not to exceed)	15,000 mg/l
Dissolved Oxygen (not less than)	5.0 mg/l
pH Range	7.0 to 9.0
Fecal Coliform (log avg. not to exceed)	200/100 ml
Temperature (not to exceed)	90° F

Review of TDWR water quality data shows that there have been no violations of water quality standards in this segment. However, the water quality standards established for this segment reflect a high solids content. Sulfates, chlorides, and dissolved solids standards are the highest of any standards in the Rio Grande Basin. These have been established considering the natural quality of the water in the area. There are no existing or projected discharges to the subbasin. However, upstream discharges, located in the State of New Mexico, may significantly affect water quality in this segment and interstate cooperation should be sought.

The segment is a reservoir designated for contact recreation and effluent set 2A is considered the minimum adequate to protect the water quality of this segment. The effluent set 2A limits concentrations of BOD and TSS to 20 mg/l each and the logrithmic average of fecal coliform organisms to 200/100 ml.

Land use in the Rio Grande Basin has been segmented into seven categories. Area devoted to each of the categories within segment 2312 are estimated below:

LAND USE	AREA (SQ. MILES)
Dry Cropland	0
Irrigated Cropland	0
Forest Land	0
Urban Land	0
Water	17
Range Land	1443
Barren Land	0
TOTAL	1460

The only land use found in the subbasin is that of rangeland. Since annual rainfall is extremely low in the area, vegetation for grazing is sparse and therefore grazing is not intensive. Thus, significant nonpoint source pollution from grazing activity is not expected.

There is no forrestland found in the segment drainage basin and therefore no silvicultural activities. The segment drainage basin contains principal deposits of sulfur and gypsum, as shown on Plate 7(A). There is one sulfur mine operating within the basin in Culburson County. There is no other mining activity in the basin although the extensive gypsum and sulfur deposits have a significant natural affect on the quality of water in this segment.

Population in the segment drainage basin is extremely small and not expected to increase by significant numbers. The construction activity which is normally associated with population increases will therefore also be relatively insignificant. The small population increase, coupled with the arid climate, will result in construction activities having a negligible effect on water quality in the segment drainage basin.

The Texas Department of Water Resources has issued four permits for waste disposal injection wells in the segment drainage basin. Two of these permits have been cancelled. Since there are no major or minor aquifers in the vicinity of the injection wells, they are not expected to impact water quality within the drainage basin. There are no solid waste disposal sites permitted within the segment drainage basin.

Since there are no fresh water aquifers in this region, salt water intrusion of ground water supplies is not occurring. The high salt content of the Red Bluff Reservoir are a result of natural drainage from the gypsum ladened formations in the basin, and highly saline waters flowing from New Mexico. There is only one septic tank area, Orla, within the segment drainage basin. If the septic systems are properly maintained, the continued dependence of this area on septic systems should not create water quality problems.

Red Bluff Reservoir is the major Hydrologic feature of this segment. It is used for hydroelectric power generation. The water is too saline to be extensively used for irrigation or for domestic supplies. There are no other hydrologic modifications planned for the area.

C. Alternative Discussion

There are no designated sewerage planning areas within this segment's drainage area. Therefore, there is no discussion of point source alternatives.

D. Identification of Other Local Management Entities

There are no other local management entities in Segment 2312 dealing with wastewater collection and treatment.