REGIONAL WATER AND WASTEWATER FACILITIES PLANNING FOR THE RICHLAND-CHAMBERS RESERVOIR AREA

Texas Water Development Board
Contract No. 8-483-501

May 1988

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Prepared for
The Navarro County Commissioner's Court
and
The Trinity River Authority of Texas

Consultants
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ACKNOWLEDGEMENTS

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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

The planning area of this report is a rural and semirural area of southeastern Navarro County and northeastern Freestone County, currently containing less than 2,500 inhabitants. However, because of its location near newly impounded Richland-Chambers Reservoir, which is expected to be filled in the early 1990s, and along U.S. Highway 287 and Interstate Highway 45, the area is expected to experience substantial growth over the next two to three decades.

The amount and pace of such growth will be associated with a number of factors, some of which are beyond the control of local policy makers and citizens. Among the most critical of the variables influencing growth, however, is the availability and quality of water and sewer utilities. Without major utility system improvements, the population of the area in 2010 is expected to be about 4,525 persons. On the other hand, if high quality water systems are available and sanitary sewer is available to at least the areas of high density development potential, the population in 2010 is expected to reach 8,975 persons and could be well above that level if state and regional economic conditions improve more rapidly than currently anticipated. In addition, a considerable increase in the seasonal population, from 2,275 if no major water and sewer improvements are made, to 6,875 if quality utilities are present, is also expected.

A substantial difference is also anticipated in the type of development if good quality utilities are present. In the absence of adequate water and wastewater services, the lake area is expected to develop in much the same pattern as other lakes across the state and region. Most of the housing will consist of mobile and modular homes and so-called "lake cabins". Little non-residential development, except that associated with lake visitation, will occur. With adequate utility services, however, a much higher quality residential development is expected and high quality, high density residential development is anticipated in certain prime locations on the lake. Resort centers, convention centers and similar development is also made possible by the availability of adequate water and sanitary sewer service.

Currently, there is virtually no sanitary sewer service in the planning area and the water service ranges from near-crisis conditions in Subarea B of the planning area to conditions ranging from poor to adequate in most parts of Subarea A. Even in Subarea A, however, where services are better, there is essentially no service to the areas where growth potential is greatest.

Three alternatives for providing quality water services to the planning area were identified as feasible. Alternative #1 consists of two separate systems, one system supplying the area north of the Richland Creek arm of the lake (Subarea B) and the other system supplying the area south of the Richland Creek arm of the lake (Subarea B). The Subarea A system would include 91,500 linear feet of 6", 8", and 10" water line, five (5) ground storage facilities ranging in volume from 40,000 to 276,000 gallons, two 92) high service pump stations, and a 1.2 million gallons per day water treatment plant, associated intake, pump station and other facilities. The total capital construction cost for the completed system in 1988 dollars is estimated to be $2,474,450. The Subarea B system would include 116,500 linear feet of 6" and 8" water line, three (3) ground storage facilities ranging in volume from 75,000 to 100,000 gallons, two (2) high service pump stations, and a 0.55 million gallon per day water treatment plant, associated intake, pump station and other facilities. The total capital construction cost for the completed system in 1988 dollars is estimated to be $1,692,250. Combined estimated cost of the two systems is $4,166,700. (Detailed information on facilities and costs for Alternative #1 is found in Table VI-5 of the report.)

Alternative #2 consists of three separate systems. One system would supply the peninsula sector of Subarea A, one system would supply the west sector of Subarea A, and one system would supply Subarea B. The peninsula system would include 64,500 linear feet of 6", 8", and 10" water line, two (2) ground storage facilities ranging in volume from 120,000 to 276,000 gallons, and a 0.932 million gallon per day water treatment plant, associated intake, pump station and other facilities. The total capital construction cost for the completed system in 1988 dollars is estimated to be $1,690,600. The west sector system would include 27,000 linear feet of 6" and 8" water line and two (2) ground storage facilities ranging in volume from 40,000 to 130,000 gallons. The total capital construction cost for the completed system in 1988 dollars is estimated to be $309,500. The Subarea B (south sector) system would be identical to that described above for the same area. Combined estimated cost of the three systems is $3,692,350. (Detailed information on facilities and costs for Alternative #2 is found in Table VI-8 of the report.)

Alternative #3 consists of a single delivery system serving the entire planning area. The system would include 214,000 linear feet of 6", 8", 10", and 12" water line, eight (8) ground storage facilities ranging in volume from 40,000 to 276,000 gallons, five (5) high service pump stations, and a 1.735 million gallon per day water treatment plant, associated intake, pump station and associated facilities. The total capital construction cost for

the compelted system is estimated to be $4,456,450. (Detailed information on facilities and costs for Alternative #3 is found in Table VI-11 of the report.)

This report concludes that the most appropriate, effective and efficient means of satisfying the water service needs of the planning area while encouraging orderly development is through a regional approach to water supply and distribution. An arrangement involving a regional water supplier and a small number of subregional water distribution entities is identified as the most appropriate and cost effective approach. Alternative #2 or some variant thereof appears to be the most viable of the options analyzed in detail.

Regarding wastewater service, four alternatives were considered and analyzed, including (1) continued use of individual septic tank systems, (2) individual wastewater plants serving specific areas, (3) use of subregional wastewater plant of plants, and (4) use of a single regional wastewater treatment plant. It was determined that a single regional wastewater treatment plant was not a viable alternative, given distances between areas of existing and/or projected population concentrations and the large number of natural drainage basins in the planning area.

The continued use of septic tanks in those parts of the planning area retaining essentially rural and/or semi-rural density characteristics is anticipated. Navarro County has adopted regulations designed to insure that such systems adequately handle wastewater needs of individual and isolated units. Administration and implementation of these regulations will determine the extent to which septic systems will continue to be sources of problems in an area in which soil conditions are generally not suitable for their extensive use.

Eleven (11) service areas are identified as having or potentially having development densities that appear to be suitable for organized wastewater treatment systems. (See Plate VII-1 for locations.) The estimated construction costs in 1988 dollars range from $120,000 (Service Area 5-III) to $1,000,000 (Service Area 5-I). Total estimated construction cost for all eleven facilities is $3,655,000. (See Table VII-25 for a detailed summary of costs.)

One area is identified as having or potentially having development densities suitable for a subregional wastewater system. The subregion includes Service Areas 5-III, 6-I, and 8-I. Total estimated construction cost for the subregional system is $1,610,000. (See Table VII-28 for a detailed summary of costs.)

A substantial amount of flexibility and cooperation among local governments and water supply and distribution agencies will be required to most effectively and efficiently satisfy the wastewater service needs of the area. The two critical elements is insuring a rational approach to the needs of the area, however, are that the decisions on siting and construction of facilities be made on a regional basis and that a regional entity be responsible for operation of treatment plant facilities.

The conclusions of this report are basically very positive. It does appear feasible to provide the level and quality of water and sanitary sewer services necessary to support the type and quality of development that the residents of the area desire. It will require a substantial level of cooperation among local governments and existing utility providers and will require a substantial investment of local and other resources, as well. However, the efforts of the citizens and leadership of the area to date suggest that the necessary cooperation and commitment to appropriate, planned growth of the area exists and will continue to be present.

INTRODUCTION

I. INTRODUCTION

A. IMPETUS FOR STUDY

The creation of a major body of water in an inland area of Texas virtually always results in major changes in the economy, transportation system, land use patterns, tax base, demographic patterns and even political patterns and relationships of the area. The impoundment of Richland-Chambers Reservoir in eastern Navarro County and northern Freestone County, with its 45,000 acre surface area and 300 miles of shoreline, will significantly affect the Navarro and Freestone County areas, especially the former.

The political leadership and citizens of Navarro County have recognized the potential for change as a result of the lake impoundment and have taken several actions designed to mitigate potential negative impacts associated with the lake's creation, encourage quality development in the area around the lake and protect the integrity of the rural and semi-rural life style currently predominant in the area. These actions include authorization by the Navarro County Commissioner's Court of an Impact Study of the Richland-Chambers Reservoir, completed in September, 1986, and the favorable vote in August, 1986, by Navarro County citizens to allow the county to exercise land use controls (zoning) within the 5,000 foot wide strip surrounding the lake. The county has subsequently developed a zoning ordinance and map, adopted in July, 1987. The zoning work has been coordinated through the Navarro County Planning and Zoning Board established and appointed by the County Commissioner's Court. The county level zoning effort is unique in Texas to Navarro County.

Even though these important actions have been accomplished, it has been recognized by local officials and citizens that other steps must also be taken if high quality growth and development is to be insured and problems experienced in other lake areas in the state are to be avoided. One critical factor in the encouragement of desirable, higher quality development patterns is the provision of high quality water and wastewater services. The presence of such utility services provides a powerful practical tool through which desirable development types and patterns can be encouraged and through which land use regulations can be exercised. On the other hand, the absence of adequate utilities is a strong disincentive to such development and, in contrast, encourages undesirable land use patterns.

The planning area of this report contains six (6) incorporated cities with an additional municipality (Streetman) just beyond the south edge of the planning area. However, none of the communities exceed 400 persons in total population. These communities include Angus, Eureka, Mildred, Mustang and Navarro on the north side of Richland Creek and Richland on the south side of the creek.

Only two (Angus and Mustang) have wastewater treatment facilities (these facilities serve a total of about 40 customers) and none provide water service through the municipality. Water service is available in the area through the M.E.N. Water Supply Corporation (560 connections), Angus Water Supply Corporation (217 connections), Winkler Water Supply Corporation (105 connections), Community Water Company (160 connections in Richland) and private wells. (Streetman's municipal system serves 180 customers.) The absence of any sizeable municipality in the area and absence of a municipal-level water provider has heightened concerns regarding long term and even short term adequacy of utility services in the area.

In this context the Navarro County Commissioner's Court has asked the Trinity River Authority of Texas to sponsor and coordinate the development of this master plan for the provision of water and wastewater services in the planning area. The project is being financially supported equally by Navarro County and a grant from the Texas Water Development Board, Contract No. 8-483-501.

B. OBJECTIVES OF STUDY

The objectives of the study include the following:

°Make population projections for the area for years 1995, 2000, and 2010 under three different scenarios:

Scenario I. No major changes in utility services.

Scenario II. Provision of municipal-level water services to areas of probable higher density development; no additional sewer service facilities.

Scenario III. Provision of both municipal-level water and sanitary sewer facilities to areas of probable higher density development.

°Make land use projections for the same years and under the same scenarios as noted above.

°Inventory existing water and wastewater facilities.

°Analyze water and wastewater facility needs for the same years and under the same scenarios as noted above.

°Develop a water conservation and drought contingency plan.

°Develop water and wastewater service implementation strategies.

C. DESCRIPTION OF PLANNING AREA

The planning area for the study includes two subareas. Subarea A includes the peninsula between Chambers Creek and Richland Creek from the reservoir shoreline westward to a line roughly following Farm-to-Market Highway 709 between Corsicana and Richland Creek and the eastern limits of the City of Corsicana. Subarea B follows the Richland Creek-Tehuacana Creek ridge line from the Richland-Chambers Reservoir damsite westward to Pin Oak Creek and northward along the west boundary of the Pin Oak Creek drainage basin to the intersection with Richland Creek west of Richland. (See Plate I-1).

The planning area is largely within Navarro County although a small part of the eastern end of Subarea B is located in Freestone County. The City of Streetman, located at the southern edge of Subarea B and included in this report for some purposes, is largely within Freestone County.

Municipalities included within the area include Angus, Eureka, Mildred, Mustang, and Navarro in Subarea A and Richland in Subarea B. Plate I-2 identifies the municipal boundaries and their respective extraterritorial jurisdictions (in which they can exercise subdivision regulation authority).

The bulk of Subarea A is within the Mildred Independent School District. The western parts of both Subareas A and B are in the Corsicana ISD. Most of Subarea B is within the Fairfield ISD. Plate I-3 identifies school district boundaries.

Three other governmental jurisdictional issues should be noted. First, the Tarrant County Water Control and Improvement District No. 1 (TCWCID No. 1) is the owner of Richland-Chambers Reservoir. TCWCID No. 1 exercises inspection and licensing controls over private sewage systems within 2,000 feet of the conservation pool level (320 msl) of the lake. Subdivision development within the 2,000 feet area around the lakeshore must receive approval of the TCWCID No. 1 relative to wastewater disposal. The District by policy statement has also directed that any entity purchasing raw

Existing Population & Land Use

JUNE, 198

- ● 20 Persons existing
- □ Commercial
- △ Industrial
- ▣ Public / semi - public

Plate II - 1

2. Current Population Patterns and Densities

Both Subareas A and B are currently rural and semirural areas containing several very small communities with most of the area occupied by farms and ranches. As evident from Plate II-1, the population density in the area is very low. Even within the incorporated areas, development is scattered. Only the Angus-Mustang area and the Navarro community in Subarea A and Richland in Subarea B have any customary municipal density characteristics and even in these communities the total population is very small and densities are low. In fact, two modular/mobile home developments in the Mildred area probably have the highest actual densities in the planning area.

The total current population of the planning area is approximately 2,369 persons, based on a housing count conducted in June, 1987, using the 1980 persons per unit count of 2.5 and the 1980 vacancy rate of 92 percent. Of this total, 1,774 persons (75 percent) live in Subarea A and 595 persons (25 percent) live in Subarea B.

TABLE II-1

POPULATION, FREESTONE AND NAVARRO COUNTY AND SELECTED CITIES

	1930	1940	1950	1960	1970	1980	1987 Est.
Freestone County	22,589	21,138	15,696	12,525	11,116	14,830	16,500
Navarro County	60,507	51,308	39,916	34,423	31,150	35,323	41,865
City of Corsicana	15,202	15,232	19,211	20,344	19,972	21,712	24,050
City of Fairfield		1,047	1,742	1,781	2,074	3,505	4,800
State of Texas	5,824,715	6,414,824	7,711,194	9,579,677	11,198,655	14,288,383	16,682,000

Sources: 1987 estimates are from NCTCOG, 1987 Population Estimates, for Navarrro County and the City of Corsicana, and from HOTCOG, Population Estimates, for Freestone County and the City of Fairfield. All other data are from U. S. Department of Commerce, Bureau of the Census.

Since the boundaries of the planning area do not coincide with census area boundaries a precise comparison of 1980 and 1987 population totals cannot be made. However, based on visual observation and review of 1980-1987 water service connection records, it is clear that a substantial increase in population has occurred in the area. The boundaries of the M.E.N. and Angus Water Supply Corporations virtually coincide with Subarea A of the planning area. The following data illustrate the recent growth in Subarea A as evidenced through numbers of water customers:

Number of Residential Water System Connections

	M.E.N. WSC	Angus WSC	Total
1980	375	150 (est.)	525
1987	545	194	739

These data suggest a very substantial increase in population in the subarea since 1980.

Officials of both systems confirmed in personal interviews in June and July, 1987 that much of the recent growth has occurred in the past 2-3 years, even in the face of adverse economic conditions statewide and extremely adverse local economic conditions in the Corsicana-Navarro County area. Visual observation and interviews with local officials confirm the water connection data. A substantial number of new homes and especially recently located mobile homes and modular units are present in the area.

Of the total population of 1,774 in Subarea A, approximately 1,150 reside within the corporate limits of the five incorporated communities of the area. The estimated population totals are as follows:

City	1987 Population Estimate
Angus	255
Eureka	345
Mildred	300
Mustang	40
Navarro	200
Total	1,140

In Subarea B the data are less reliable since some of the area is served by private wells and private water systems which were not in existence in 1980. All of the Winkler Water Supply Corporation and Community Water Company (Richland) connections are in Subarea B. The following data illustrate the recent growth of these water systems:

Number of Residential Water System Connections

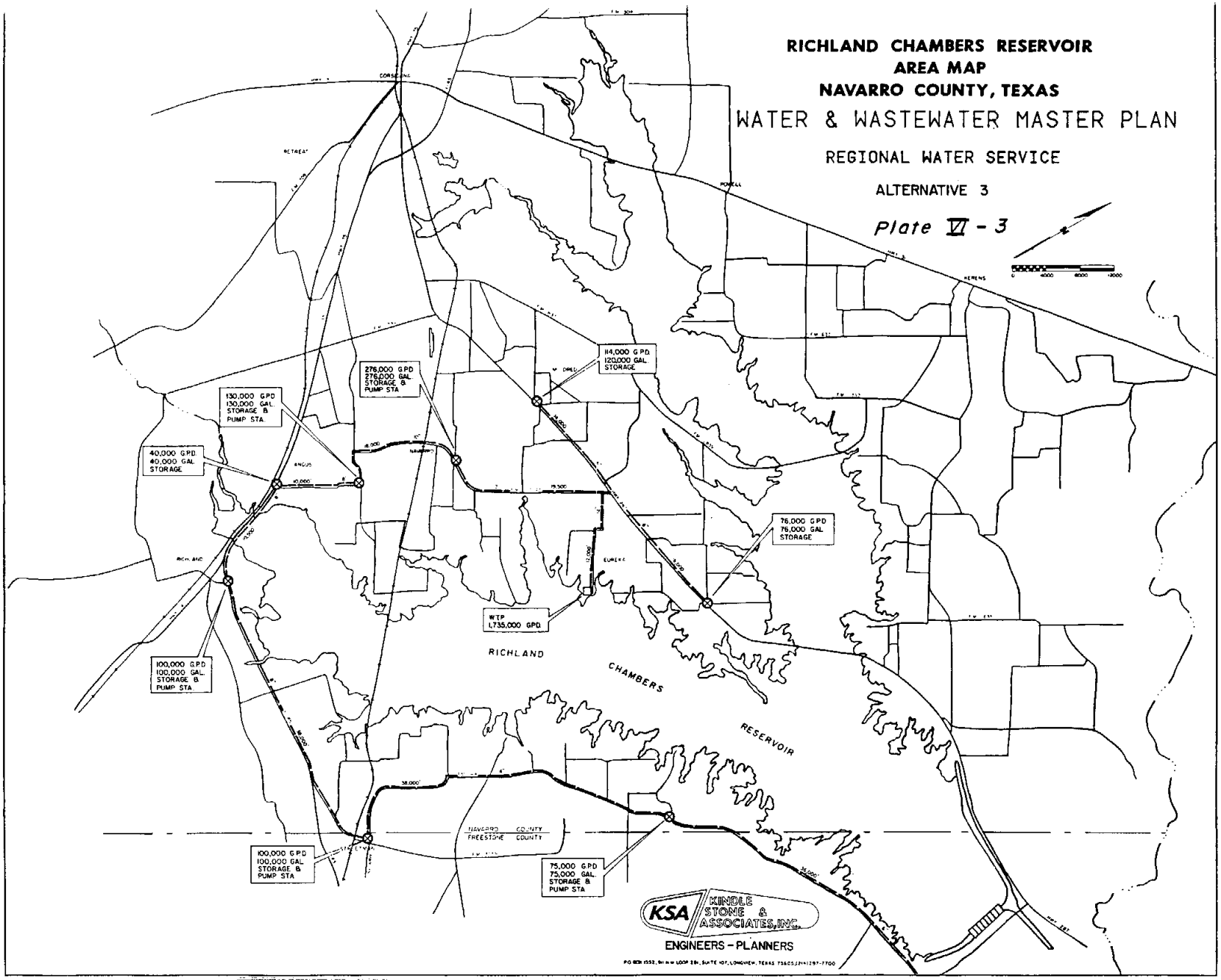
	Winkler WSC	Community Water Company	Total
1980	85	125 (est.)	210
1987	100	145	245

Visual observation suggests that a substantial number of new residential units, especially mobile and modular units, have been constructed or moved into the area since 1980. Unlike the recent growth in Subarea A, in which growth has been scattered throughout the area and not associated with the lake, the recent growth in Subarea B has been largely restricted to lake area subdivisions. Even in areas adjacent to Subarea B, the rural areas have experienced virtually no growth. Some growth has occurred in Streetman over the past 25 years but growth in that community has been insignificant since 1980.

3. Existing Social and Economic Characteristics

The only reliable social and economic data available for the study area are from the 1980 census. As noted earlier, the census tract boundaries include some areas outside the study area. However, the inconsistencies are not so great as to significantly affect the basic patterns evidenced in the data. Given the rural and semi-rural character of the area, it is not surprising that the education levels of residents are relatively low (10.8 years average school years completed), the median age is relatively high (36.4 years) and incomes are relatively low ($5,700 per capita versus $7,200 per capita statewide). These figures are consistent with other rural areas of the state.

Some modification of these patterns may have occurred since 1980. Many of the new residents appear to be younger families with two income households, which would reduce median age levels, increase income levels, and possibly raise education levels.


RICHLAND CHAMBERS RESERVOIR
AREA MAP
NAVARRO COUNTY, TEXAS
WATER & WASTEWATER MASTER PLAN
REGIONAL WATER SERVICE
ALTERNATIVE 3
Plate VI - 3
130,000 G.P.D.
130,000 GAL.
STORAGE & PUMP STA.
276,000 G.P.D.
276,000 GAL.
STORAGE & PUMP STA.
114,000 G.P.D.
120,000 GAL.
STORAGE
40,000 G.P.D.
40,000 GAL.
STORAGE
76,000 G.P.D.
76,000 GAL.
STORAGE
WTP
1,735,000 G.P.D.
100,000 G.P.D.
100,000 GAL.
STORAGE & PUMP STA.
100,000 G.P.D.
100,000 GAL.
STORAGE & PUMP STA.
75,000 G.P.D.
75,000 GAL.
STORAGE & PUMP STA.
RICHLAND
CHAMBERS
RESERVOIR
NAVARRO COUNTY
FREESTONE COUNTY
KSA
KINDLE STONE & ASSOCIATES, INC.
ENGINEERS - PLANNERS

WASTEWATER SYSTEMS NEEDS ANALYSIS

VII. WASTEWATER SYSTEM NEEDS ANALYSIS

Four alternative methods of providing wastewater treatment for the planning area have been evaluated for this study. The wastewater treatment alternatives considered include: 1) continued use of individual septic tank systems; 2) individual wastewater treatment plants serving specific service areas; 3) subregional wastewater treatment plants serving more than one service area; and 4) a single regional wastewater treatment plant serving the entire planning area. Each of the alternatives considered is described in the following paragraphs:

1. Continued Use of Individual Septic Tank Systems.

The alternative of continued use of individual septic tank systems involves an assessment of the soil conditions in the planning area to determine the suitability of the soils for use as an absorption field. The U.S. Department of Agriculture, Soil Conservation Service, in its "Soil Survey of Navarro County, Texas" and "Soil Survey of Freestone County, Texas", describes the entire Subarea A as having severe limitations for use as absorption fields, with soils in the subarea exhibiting very slow permeability characteristics and severe shrink-swell potential. Personnel with the Navarro County Health Department verify the severe limitations of soils in Subarea A. In addition, soils in Subarea B exhibit very slow permeability with significant absorption problems in areas having more than one dwelling unit per gross acre. Soils in the western half of Subarea B exhibit the same severe limitations as soils in Subarea A.

The eastern half of Subarea B, however, is in the Axtell-Konowa soil association with some Lamar, Nimrod, and Patilo soils in the area. The Axtell and Nimrod soils are not suitable for use as absorption fields without major modifications. However, the Konowa, Lamar and Patilo soils are more suitable, with only a slight degree of limitation for use as septic tank absorption fields. Thus, there may be certain limited areas in the eastern half of Subarea B with soil conditions suitable for use as absorption fields for septic tank systems.

Current construction standards adopted by the Texas Department of Health place restrictions on minimum lot sizes for individual residences. One-half acre is required for residences serviced by a public water supply in subdivisions platted after January 1, 1988, and one acre is required for residences serviced by individual water systems in subdivisions platted after January 1, 1988.

In much of the planning area, however, even these minimum areas are probably too small in the absence of special mitigation measures, such as extra line lengths, evapotranspiration beds and other extraordinary measures.

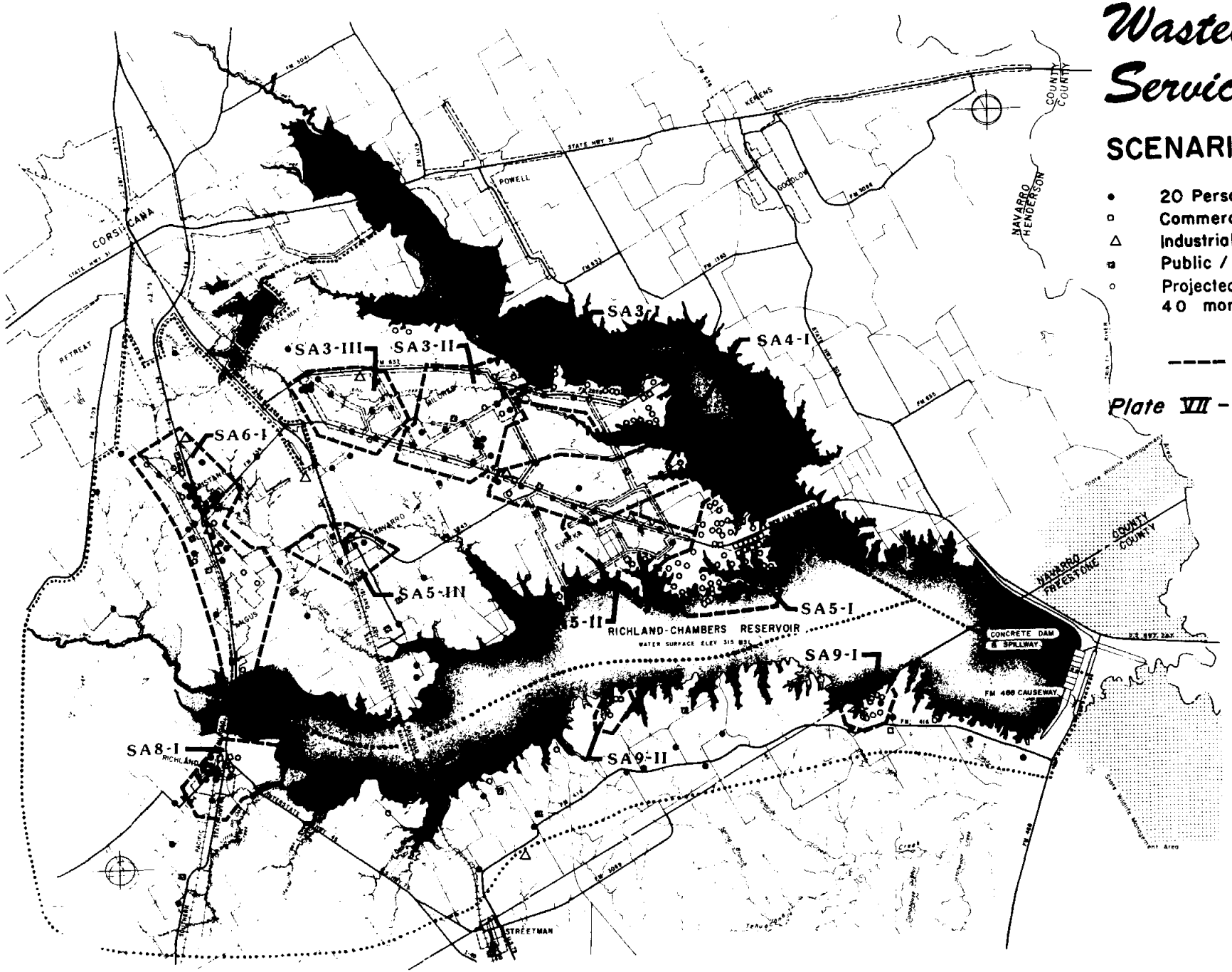
The use of septic tanks may be suitable for areas with very sparse development. However, this alternative is not suitable for the projected concentrated population areas around the lake and would result in limitations on the degree of development that could occur. The general soil characteristics around the lake strongly encourage the use of organized wastewater collection and treatment systems in order to allow appropriate development of the planning area and at the same time protect the quality of water in the lake.

2. Individual Wastewater Plants Serving Specific Areas.

This alternative focuses on the development of individual wastewater plants serving specific areas of existing or projected concentrated populations. The study has identified eleven (11) service areas with concentrated populations that appear to be suitable for the development of organized wastewater treatment systems. These service areas are shown on Plate VII-1. The projected populations for the proposed service areas are shown on Table VII-1 and the projected wastewater flows associated with these service areas are shown on Table VII-2.

The following presents a brief description of the service areas identified in the study, the population to be served in each of the service areas, the treatment capacity required, the probable construction costs, and the probable average monthly operation and maintenance costs per connection. Because of the proximity of the lake, estimated construction costs and probable operation and maintenance (O&M) costs are based on advanced secondary wastewater treatment levels of 10 mg/L BOD and 15 mg/L TSS. Implementation of stricter standards as a result of local, state and/or federal regulations will probably increase the estimated construction and I & M costs. The probable average monthly O&M costs per connection listed for the various service areas include labor, utilities, chemicals, travel, and other incidental costs. The construction costs do not include wastewater collection systems for the areas served.

1. Service Area 3-I. This service area has a 1987 estimated population of approximately 40 persons and a projected population of 1,060 by design year 2010. Table VII-3 gives a summary of projected populations, wastewater flows and average monthly operation and maintenance costs per connection for each design



Wastewater Service Areas

SCENARIO III

:2010

- • 20 Persons existing
- ▫ Commercial
- △ Industrial
- ▪ Public / semi-public
- ○ Projected population increase 40 more persons

---- Proposed Wastewat Service Areas

Plate VII - 1

TABLE VII-1

PROJECTED SERVICE AREA POPULATIONS

Service Area No.	Existing Population 1987	Projected Populations Served 1990	1995	2000	2005	2010
3-I	40	65	140	500	780	1,060
3-II	320	365	440	720	760	800
3-III	280	280	280	280	300	320
4-I	160	190	240	280	320	360
5-I	0	0	420	840	1,460	2,080
5-II	100	115	140	220	260	300
5-III	200	200	220	240	240	240
6-I	340	370	420	620	740	860
8-I	260	290	340	420	420	420
9-I	40	40	160	440	540	640
9-II	0	0	80	200	260	320
TOTAL	1,740	1,915	2,880	4,760	6,080	7,400

TABLE VII-2

PROJECTED SERVICE AREA WASTEWATER FLOWS

Service Area No.	Existing Flow (MGD) 1987	Projected Flows (MGD) 1990	1995	2000	2005	2010
3 - I	0.004	0.0065	0.014	0.050	0.078	0.106
3 - II	0.032	0.0365	0.044	0.072	0.076	0.080
3 - III	0.028	0.0280	0.028	0.028	0.030	0.032
4 - I	0.016	0.0190	0.024	0.028	0.032	0.036
5 - I	0.000	0.0000	0.042	0.084	0.146	0.208
5 - II	0.010	0.0115	0.014	0.022	0.026	0.030
5 - III	0.020	0.0200	0.022	0.024	0.024	0.024
6 - I	0.034	0.0370	0.042	0.062	0.074	0.086
8 - I	0.026	0.0290	0.034	0.042	0.042	0.042
9 - I	0.004	0.0040	0.016	0.044	0.054	0.064
9 - II	0.000	0.0000	0.008	0.020	0.026	0.032
TOTAL	0.174	0.1915	0.288	0.476	0.608	0.740

period listed. Table VII-4 lists the probable construction costs associated with providing the required wastewater treatment facilities for Service Area 3-I.

2. Service Area 3-II. This service area has a current population of approximately 320 persons and a projected population of 800 by design year 2010. Table VII-5 gives a summary of projected populations, wastewater flows, and average monthly operation and maintenance costs per connection for each design period listed.

Table VII-6 lists the probable construction costs associated with providing the required wastewater treatment plant capacity for Service Area 3-II.

3. Service Area 3-III. The current estimated population of this service area is 280 persons with an estimated population of 320 persons by design year 2010. Table VII-7 gives a brief summary of projected populations, wastewater flows, and average monthly operation and maintenance costs per connection for each design period listed. Table VII-8 lists the probable incremental construction costs associated with providing the required wastewater treatment plant capacity for Service Area 3-III.

4. Service Area 4-I. This service area has a current population estimated at 160 persons and a projected population of 360 persons by design year 2010. Table VII-9 gives a brief summary of projected population, wastewater flows, and average monthly operation and maintenance costs per connection for each design period listed. Table VII-10 lists the probable incremental construction costs associated with providing the required wastewater plant capacity for Service Area 4-I.

5. Service Area 5-I. This service area consists of the unincorporated peninsula area which has no current population. The projected population for this area is 2,080 by design year 2010. Table VII-11 gives a summary of projected populations, wastewater flows and average monthly operation and maintenance costs per connection for each design period listed. Table VII-12 lists the probable incremental construction costs associated with providing the required wastewater treatment plant capacity for Service Area 5-I.

6. Service Area 5-II. This service area has a current estimated population of 100 persons and a projected population of 300 persons by design year 2010. Table VII-13 gives a brief summary of projected populations, wastewater flows, and average

TABLE VII-3

PROJECTED WASTEWATER FLOWS AND AVERAGE MONTHLY O&M COSTS FOR SERVICE AREA 3-I

Design Period	Population Served		Projected Flow		Probable Average Monthly O&M Cost Per Connection
	Begin	End	Begin	End	
Existing	40				
1990-1994	65	125	6,500	12,500	$49
1994-1997	125	284	12,500	28,400	$23
1997-2001	284	556	28,400	55,600	$11
2001-2006	556	836	55,600	83,600	$10
2006-2010	836	1,060	83,600	106,000	$8

TABLE VII-4

REQUIRED WASTEWATER TREATMENT PLANT CAPACITY AND PROBABLE INCREMENTAL CONSTRUCTION COSTS FOR SERVICE AREA 3-I

Construction Phase	Begin Operation Year	Plant Capacity (gpd)		Probable Incremental Construction Cost
		Increment	Total	
1	1990	15,000	15,000	$75,000
2	1995	25,000	40,000	$125,000
3	1998	25,000	65,000	$125,000
4	2002	25,000	90,000	$125,000
5	2007	15,000	105,000	$75,000
Total			105,000	$525,000

TABLE VII-5

PROJECTED WASTEWATER FLOWS AND AVERAGE MONTHLY O&M COSTS FOR SERVICE AREA 3-II

Design Period	Population Served		Projected Flow (MGD)		Probable Average Monthly O&M Cost Per Connection
	Begin	End	Begin	End	
Existing	320		0	0	
1990-1994	365	425	36,500	42,500	$12
1994-1997	425	552	42,500	55,200	$10
1997-2010	552	800	55,200	80,000	$10

TABLE VII-6

REQUIRED WASTEWATER TREATMENT PLANT CAPACITY AND PROBABLE INCREMENTAL CONSTRUCTION COST FOR SERVICE AREA 3-II

Construction Phase	Begin Operation Year	Plant Capacity (gpd)		Probable Incremental Construction Cost
		Increment	Total	
1	1990	45,000	45,000	$225,000
2	1995	20,000	65,000	$100,000
3	1998	15,000	80,000	$75,000
Total			80,000	$400,000

TABLE VII-7

PROJECTED WASTEWATER FLOWS AND AVERAGE MONTHLY O&M COSTS FOR SERVICE AREA 3-III

Design Period	Population Served		Projected Flow		Probable Average Monthly O&M Cost Per Connection
	Begin	End	Begin	End	
Existing	280				
1990-2003	280	292	28,000	29,200	$18
2003-2010	292	320	29,200	32,000	$15

TABLE VII-8

REQUIRED WASTEWATER TREATMENT PLANT CAPACITY AND PROBABLE INCREMENTAL CONSTRUCTION COSTS FOR SERVICE AREA 3-III

Construction Phase	Begin Operation Year	Plant Capacity (gpd)		Probable Incremental Construction Cost
		Increment	Total	
1	1990	30,000	30,000	$150,000
2	2004	5,000	35,000	$25,000
Total			35,000	$175,000

TABLE VII-9

PROJECTED WASTEWATER FLOWS AND AVERAGE MONTHLY O&M COSTS FOR SERVICE AREA 4-I

Design Period	Population Served		Projected Flow		Probable Average Monthly O&M Cost Per Connection
	Begin	End	Begin	End	
Existing	160				
1990-1995	190	240	19,000	24,000	$20
1995-2001	240	288	24,000	28,800	$18
2001-2010	288	360	28,800	36,000	$15

TABLE VII-10

REQUIRED WASTEWATER TREATMENT PLANT CAPACITY AND PROBABLE INCREMENTAL CONSTRUCTION COSTS FOR SERVICE AREA 4-I

Construction Phase	Begin Operation Year	Plant Capacity (gpd)		Probable Incremental Construction Cost
		Increment	Total	
1	1990	25,000	25,000	$125,000
2	1996	5,000	30,000	$25,000
3	2002	5,000	35,000	$25,000
Total			35,000	$175,000

TABLE VII-11

PROJECTED WASTEWATER FLOWS AND AVERAGE MONTHLY O&M COSTS FOR SERVICE AREA 5-I

Design Period	Population Served		Projected Flow		Probable Average Monthly O&M Cost Per Connection
	Begin	End	Begin	End	
Existing	0				
1990-1993	50	300	5,000	30,000	$31
1993-1998	300	672	30,000	67,200	$10
1998-2002	672	1,088	67,200	108,000	$8
2002-2005	1,088	1,460	108,800	146,000	$7
2005-2010	1,460	2,080	146,000	208,000	$7

TABLE VII-12

REQUIRED WASTEWATER TREATMENT PLANT CAPACITY AND PROBABLE INCREMENTAL CONSTRUCTION COSTS FOR SERVICE AREA 5-I

Construction Phase	Begin Operation Year	Plant Capacity (gpd)		Probable Incremental Construction Cost
		Increment	Total	
1	1990	40,000	40,000	$200,000
2	1994	40,000	80,000	$200,000
3	1999	40,000	120,000	$200,000
4	2003	40,000	160,000	$200,000
5	2006	40,000	200,000	$200,000
Total			200,000	$1,000,000

monthly operation and maintenance costs per connection for each design period listed. Table VII-14 lists the probable incremental construction costs associated with providing the required wastewater treatment plant capacity for Service Area 5-II.

7. Service Area 5-III. Service Area 5-III consists of the town of Navarro with a current population estimated at 200 persons and a projected population of 240 persons by design year 2010. Table VII-15 gives a summary of projected populations, wastewater flows, and average monthly operation and maintenance costs per connection for each design period listed. Table VII-16 lists the probable incremental construction costs associated with providing the required wastewater treatment plant capacity for Service Area 5-III.

8. Service Area 6-I. Service Area 6-I includes the cities of Angus and Mustang. The current estimated population for this area is 340 persons with a projected population of 860 by design year 2010. Table VII-17 gives a brief summary of projected population, wastewater flows, and average monthly operation and maintenance costs per connection for each design period listed. Table VII-18 lists the probable incremental construction costs associated with providing the required wastewater treatment plant capacity for Service Area 6-I.

9. Service Area 8-I. Service Area 8-I consists of the City of Richland and the lakeshore area east of the city. The current estimated population of this service area is 260 persons with a projected population of 420 by design year 2010. Table VII-19 gives a summary of projected populations, wastewater flows, and average monthly operation and maintenance costs per connection for each design period listed. Table VII-20 lists the probable incremental construction costs associated with providing the required wastewater treatment plant capacity for Service Area 8-I.

10. Service Area 9-I. This service area is in the eastern half of Subarea B just north of Farm to Market Road 416. The estimated current population is 40 persons with a projected population of 640 by design year 2010. Table VII-21 gives a summary of projected populations, wastewater flows, and average monthly operation and maintenance costs per connection for each design period listed. Table VII-22 lists the probable incremental construction costs associated with providing the required wastewater treatment plant capacity for Service Area 9-1.

TABLE VII-13

PROJECTED WASTEWATER FLOWS AND AVERAGE MONTHLY O&M COSTS FOR SERVICE AREA 5-II

Design Period	Population Served		Projected Flow		Probable Average Monthly O&M Cost Per Connection
	Begin	End	Begin	End	
Existing	100				
1990-1994	115	135	11,500	13,500	$32
1994-1998	135	188	13,500	18,800	$32
1998-2005	188	260	18,800	26,000	$19
2005-2010	260	300	26,000	30,000	$18

TABLE VII-14

REQUIRED WASTEWATER TREATMENT PLANT CAPACITY AND PROBABLE INCREMENTAL CONSTRUCTION COSTS FOR SERVICE AREA 5-II

Construction Phase	Begin Operation Year	Plant Capacity (gpd)		Probable Incremental Construction Cost
		Increment	Total	
1	1990	15,000	15,000	$75,000
2	1995	5,000	20,000	$25,000
3	1999	5,000	25,000	$25,000
4	2006	5,000	30,000	$25,000
Total			30,000	$150,000

TABLE VII-15

PROJECTED WASTEWATER FLOWS AND AVERAGE MONTHLY O&M COSTS FOR SERVICE AREA 5-III

	Population Served		Projected Flow		Probable Average Monthly O&M
Design Period	Begin	End	Begin	End	Cost Per Connection
Existing	200				
1990-1992	200	207	20,000	20,700	$18
1992-2010	207	240	20,700	24,000	$19

TABLE VII-16

REQUIRED WASTEWATER TREATMENT PLANT CAPACITY AND PROBABLE INCREMENTAL CONSTRUCTION COSTS FOR SERVICE AREA 5-III

Construction Phase	Begin Operation Year	Plant Capacity (gpd) Increment	Total	Probable Incremental Construction Cost
1	1990	20,000	20,000	$100,000
2	1993	4,000	24,000	$20,000
Total			24,000	$120,000

TABLE VII-17

PROJECTED WASTEWATER FLOWS AND AVERAGE MONTHLY O&M COSTS FOR SERVICE AREA 6-I

Design Period	Population Served Begin	Population Served End	Projected Flow Begin	Projected Flow End	Probable Average Monthly O&M Cost Per Connection
Existing	340				
1990-1992	370	390	37,000	39,000	$13
1992-1996	390	460	39,000	46,000	$11
1996-2000	460	620	46,000	62,000	$10
2000-2004	620	716	68,000	71,600	$10
2004-2010	716	860	71,600	86,000	$9

TABLE VII-18

REQUIRED WASTEWATER TREATMENT PLANT CAPACITY AND PROBABLE INCREMENTAL CONSTRUCTION COSTS FOR SERVICE AREA 6-I

Construction Phase	Begin Operation Year	Plant Capacity (gpd) Increment	Plant Capacity (gpd) Total	Probable Incremental Construction Cost
1	1990	40,000	40,000	$200,000
2	1993	10,000	50,000	$50,000
3	1997	15,000	65,000	$75,000
4	2001	10,000	75,000	$50,000
5	2005	10,000	85,000	$50,000
Total			85,000	$425,000

TABLE VII-19

PROJECTED WASTEWATER FLOWS AND AVERAGE MONTHLY O&M COSTS FOR SERVICE AREA 8-I

Design Period	Population Served		Projected Flow		Probable Average Monthly O&M Cost Per Connection
	Begin	End	Begin	End	
Existing	260				
1990-1994	290	330	29,000	33,000	$14
1994-2010	330	420	33,000	42,000	$12

TABLE VII-20

REQUIRED WASTEWATER TREATMENT PLANT CAPACITY AND PROBABLE INCREMENTAL CONSTRUCTION COSTS FOR SERVICE AREA 8-I

Construction Phase	Begin Operation Year	Plant Capacity (gpd)		Probable Incremental Construction Cost
		Increment	Total	
1	1990	35,000	35,000	$175,000
2	1995	7,000	42,000	$35,000
Total			42,000	$210,000

TABLE VII-21

PROJECTED WASTEWATER FLOWS AND AVERAGE MONTHLY O&M COSTS FOR SERVICE AREA 9-I

Design Period	Population Served Begin	Population Served End	Projected Flow Begin	Projected Flow End	Probable Average Monthly O&M Cost Per Connection
Existing	40				
1990-1993	40	94	4,000	9,400	$61
1993-1997	94	272	9,400	27,200	$25
1997-2002	272	480	27,200	48,000	$12
2002-2010	480	640	48,000	64,000	$10

TABLE VII-22

REQUIRED WASTEWATER TREATMENT PLANT CAPACITY AND PROBABLE INCREMENTAL CONSTRUCTION COSTS FOR SERVICE AREA 9-I

Construction Phase	Begin Operation Year	Plant Capacity (gpd) Increment	Plant Capacity (gpd) Total	Probable Incremental Construction Cost
1	1990	15,000	15,000	$75,000
2	1994	20,000	35,000	$100,000
3	1998	15,000	50,000	$75,000
4	2003	15,000	65,000	$75,000
Total			30,000	$325,000

11. Service Area 9-II. Service Area 9-II is located in the middle of Subarea B and north of FM 416. There is currently no population in this area. However, the projected population for design year 2010 is 320 persons. Table VII-23 gives a brief summary of projected populations, wastewater flows, and average monthly operation and maintenance costs per connection for each design period listed. Table VII-24 lists the probable incremental construction costs associated with providing the required wastewater treatment plant capacity for Service Area 9-II.

A summary of the probable construction costs and the probable project costs is presented in Tables VII-25 and VII-26, respectively. Table VII-25 lists probable construction costs for the various phases of construction to include the initial wastewater treatment plant construction and construction of future expansions for each of the individual service areas listed. Table VII-26 gives the estimated project costs associated with the various phases of construction. The project costs includes the probable construction costs, construction administration and inspection costs and bond sales costs.

3. Subregional Wastewater Treatment Plant. This alternative involves the development of a subregional wastewater treatment plant to serve more than one service service area. In examining the areas of projected population concentration and the proximity of these areas to each other, only one area appears to be a candidate for a subregional wastewater system. This area includes the following service areas shown on Plate VII-1.

1. Service Area 5-III - Navarro

2. Service Area 6-I - Angus and Mustang

3. Service Area 8-I - Richland

The current aggregate population of these service areas is approximately 800 persons with a projected population of 1,520 by design year 2010. Table VII-27 gives a brief summary of projected populations, wastewater flows, and probable average monthly operation and maintenance costs per connection. Table VII-28 lists the probable incremental construction costs associated with providing the required wastewater treatment plant capacity for Service Areas 5-III, 6-I, and 8-I. There may be other areas in the future suited for a subregional wastewater system depending on the location and magnitude of population growth.

TABLE VII-23

PROJECTED WASTEWATER FLOWS AND AVERAGE MONTHLY O&M COSTS FOR SERVICE AREA 9-II

Design Period	Population Served		Projected Flow		Probable Average Monthly O&M Cost Per Connection
	Begin	End	Begin	End	
Existing	0				
1990-1992	8	32	800	3,200	$61
1992-1997	32	128	3,200	12,800	$49
1997-2003	128	236	12,800	23,600	$23
2003-2010	236	320	23,600	32,000	$18

TABLE VII-24

REQUIRED WASTEWATER TREATMENT PLANT CAPACITY AND PROBABLE INCREMENTAL CONSTRUCTION COSTS FOR SERVICE AREA 9-II

Construction Phase	Begin Operation Year	Plant Capacity (gpd)		Probable Incremental Construction Cost
		Increment	Total	
1	1990	5,000	5,000	$25,000
2	1993	10,000	15,000	$50,000
3	1998	10,000	25,000	$50,000
4	2004	5,000	30,000	$25,000
Total			30,000	$150,000

TABLE VII-25

ESTIMATED PLANT CONSTRUCTION COST (1)

Service Area No.	Phase I	Phase II	Phase III	Phase IV	Phase V	Total
3 - I	$75,000	$125,000	$125,000	$125,000	$75,000	$525,000
3 - II	$225,000	$100,000	$75,000			$400,000
3 - III	$150,000	$25,000				$175,000
4 - I	$125,000	$25,000	$25,000			$175,000
5 - I	$200,000	$200,000	$200,000	$200,000	$200,000	$1,000,000
5 - II	$75,000	$25,000	$25,000	$25,000		$150,000
5 - III	$100,000	$20,000				$120,000
6 - I	$200,000	$50,000	$75,000	$50,000	$50,000	$425,000
8 - I	$175,000	$35,000				$210,000
9 - I	$75,000	$100,000	$75,000	$75,000		$325,000
9 - II	$25,000	$50,000	$50,000	$25,000		$150,000
TOTAL	$1,425,000	$755,000	$650,000	$500,000	$325,000	$3,655,000

(1)Includes probable construction cost, engineering cost, and contingency cost.

TABLE VII-26

ESTIMATED PROJECT COST (1)

Service Area No.	Phase I	Phase II	Phase III	Phase IV	Phase V	Total
3 - I	$112,500	$187,500	$187,500	$187,500	$112,500	$787,500
3 - II	$337,500	$150,000	$112,500			$600,000
3 - III	$225,000	$37,500				$262,500
4 - I	$187,500	$37,500	$37,500			$262,500
5 - I	$300,000	$300,000	$300,000	$300,000	$300,000	$1,500,000
5 - II	$112,500	$37,500	$37,500	$37,500		$225,000
5 - III	$150,000	$30,000				$180,000
6 - I	$300,000	$75,000	$112,500	$75,000	$75,000	$637,500
8 - I	$262,500	$52,500				$315,000
9 - I	$112,500	$150,000	$112,500	$112,500		$487,500
9 - II	$37,500	$75,000	$75,000	$37,500		$225,000
TOTAL	$2,137,500	$1,132,500	$975,000	$750,000	$487,500	$5,482,500

(1)Based on probable construction cost times a factor of 1.50 to cover construction administration and inspection costs and bond sales costs.

TABLE VII-27

PROJECTED WASTEWATER FLOWS AND AVERAGE MONTHLY O&M COSTS FOR SERVICE AREAS 5-III, 6-I, 8-I

Design Period	Population Served Begin	Population Served End	Projected Flow Begin	Projected Flow End	Probable Average Monthly O&M Cost Per Connection
Existing	800				
1990-1994	860	952	86,000	95,200	$8
1994-1997	952	1,100	95,200	110,000	$7
1997-2001	1,100	1,304	110,000	130,400	$7
2001-2010	1,304	1,520	130,400	152,000	$7

TABLE VII-28

REQUIRED WASTEWATER TREATMENT PLANT CAPACITY AND PROBABLE INCREMENTAL CONSTRUCTION COSTS FOR SERVICE AREAS 5-III, 6-I, AND 8-I

Construction Phase	Begin Operation Year	Plant Capacity (gpd) Increment	Plant Capacity (gpd) Total	Probable Incremental Construction Cost
Phase 1 Construction of Interceptor Lines				$860,000 (1)
1	1990	100,000	100,000	$500,000
2	1995	20,000	120,000	$100,000
3	1998	15,000	135,000	$75,000
4	2002	15,000	150,000	$75,000
Total			150,000	$1,610,000

(1) Construction of interceptor lines to subregional wastewater treatment plant from Service Areas 5-III, 6-I, and 8-I will occur in Phase 1 construction.

4. Single Regional Wastewater Treatment Plant. This alternative involves development of a single regional wastewater treatment plant for the entire planning area. The total projected population for the planning area in design year 2010 is 8,675 persons with a projected wastewater flow of 0.8675 million gallons per day. The distance between the various service areas with concentrated populations make the development cost prohibitive from the standpoint of developing a wastewater collection and treatment system. One other complicating factor is the planning area around the lake has several natural drainage basins which does not allow the use of gravity wastewater collection lines and requires numerous lift stations and force mains. This increases both the development cost and operation and maintenance cost for the single regional wastewater treatment plant.

The evaluation of the various alternative methods of providing wastewater treatment for the planning area has identified certain alternatives to be more feasible than others. The continued use of individual septic tank systems to serve projected concentrated population areas around the reservoir will not provide adequate protection of the reservoir water quality and will limit the degree of development that can occur. Development of individual wastewater treatment plants to serve specific service areas with concentrated population appears to be cost-effective for several areas, particularly if funding is available for construction of the initial facilities. The development of subregional wastewater treatment plants to serve more than one service area may also be cost-effective for other areas depending on the location and magnitude of future development and the availability of funding for the construction of initial facilities. The area including the communities of Navarro, Angus, Mustang and Richland appears to be a candidate for the alternative to develop a wastewater treatment plant to serve more than one service area. A subregional wastewater treatment plant for this area appears to be cost-effective, provided that funding is available for construction of initial facilities. The development of a single regional wastewater system for the entire planning area is not a feasible alternative due to the scattered population areas and the costs associated with the construction of a collection system.

Local officials and other persons with interest in water quality in the Richland-Chambers Reservoir area should work closely with the Texas Water Commission in their collective efforts to maintain the highest feasible water quality levels. The TWC periodically surveys water quality in major reservoirs and will be able to provide valuable information and technical assistance.

WATER SERVICES IMPLEMENTATION PLAN

VIII. WATER SERVICES IMPLEMENTATION PLAN

A. INTRODUCTION

The water services implementation plan focuses on three separate issues:

1. Water supply alternatives;

2. Water distribution (retail) alternatives; and

3. Recommendations relative to implementation of alternatives.

An evaluation of alternatives will be made, citing advantages and disadvantages of each feasible option. The overriding concern in this section of the report is to provide information and analysis which will give realistic general direction to the efforts of local officials and interested private parties to resolve water supply and water distribution challenges of the planning area for the next two decades.

B. WATER SUPPLY ALTERNATIVES

Several specific water supply implementation options appear to be feasible within the context of existing legal and political relationships and existing and potential water supply facilities.

1. One implementation option is for the City of Corsicana to supply both Subareas A and B. The City of Corsicana currently serves as supplier of treated water to all of Subarea A. Corsicana has rights to enough water in Navarro Mills Reservoir, Lake Halbert and Richland-Chambers Reservoir to serve its existing contractual obligations, projected growth of the City of Corsicana, and the additional projected needs of the planning area through 2010. Corsicana currently takes raw water from Navarro Mills Reservoir and Lake Halbert and is constructing a raw water intake structure in the Jones Branch area of Richland-Chambers Reservoir.

It is clearly possible for the City of Corsicana to be the long term wholesale water supplier to at least Subarea A. Initially, the raw water sources would be Lake Halbert and Navarro Mills Reservoir, with existing treatment plants at each lake. The 1982 Corsicana water needs study estimated that by 1993 raw water would also be needed from Richland-Chambers Reservoir. The raw water from Richland-Chambers would be transported to the Lake Halbert treatment plant. The existing points of delivery would be used regardless of origin of the raw water.

It is technically possible for Corsicana to be the wholesale water supplier to Subarea B as well. This could be done through a subcontract arrangement with the retail water entity serving the Angus-Mustang area (currently Angus Water Supply Corporation) or through a direct major transmission line from Corsicana along I-45 through which retail water suppliers would be served.

The City of Corsicana does not currently have water treatment facilities capable of meeting the needs of the city, its existing customers, and the long term needs of the planning area. In fact, the 1982 water needs study for the City of Corsicana indicated that peak needs in 1987 would match the city's treatment capacity. Population growth rates have been less than projected, however, and the critical date at which peak demand will match treatment capacity is now probably 1989 or 1990.

The primary advantage of utilizing Option 1 is that existing contractual relationships exist between the City of Corsicana and water retailers in Subarea A and similar agreements could possibly be reached with Subarea B retailers. Corsicana's water supply agreement with M.E.N. Water Supply Corporation terminates in 2023 and the agreement with Angus Water Supply Corporation terminates in 2015. No agreements are currently in force with Subarea B retailers. The existing agreements could probably be used as models for other agreements, however.

A second positive aspect of using Corsicana as the area water supplier is that Corsicana has existing water rights which are probably sufficient to meet the area's projected needs for the planning period. Corsicana has water rights at Navarro Mills Reservoir, Lake Halbert and Richland-Chambers Reservoir as follows:

Navarro Mills Reservoir	13,670 acre feet per year (12,173,999 gpd)
Lake Halbert	4,003 acre feet per year (3,565,000 gpd)
Richland-Chambers Reservoir	13,650 acre feet per year (12,155,000 gpd)
Total	31,323 acre feet per year (27,893,000 gpd)

Thus, Corsicana's available water rights total 31,323 acre feet per year, roughly equivalent to 27.9 million gallons per day. Corsicana' existing peak usage is just over 8 million gpd. Corsicana's growth projections indicate an average demand of 17.3 million gpd by 2010, well under the supply available through existing water rights. (The 17.3 million gpd figure includes supply needs in Subarea A.)

The 27.9 million gpd total includes all water available through water rights. The actual safe yield of the surface water supplies available to Corsicana is less than the actual water rights total. The safe yield from the existing supplies appears to be in the 24-25 million gpd range. Furthermore, the 17.3 million gpd figure is an average daily demand estimate. Using a standard peak demand calculation of 1.5 times average demand, the peak demand in 2010 would be 25.8 million gpd, which slightly exceeds the actual safe yield available to Corsicana. On the other hand, the population estimates on which the demand data are based appear to be optimistic given current state, regional and local economic conditions and future economic projections.

Water rights do not translate into actual availability of water, however. One disadvantage of the Corsicana option is that Corsicana's water treatment capacity is in imminent need of expansion. Current plans are to expand the Navarro Mills treatment facility to maximize use of that source of supply and then expand the Lake Halbert facilities to treat water from Richland-Chambers Reservoir. These expansion efforts will be expensive and will be made primarily to serve needs of the City of Corsicana, rather than the needs of the cities and unincorporated areas of the planning area. In effect, the timing of such expansion may not reflect the growth needs of the planning area.

A second disadvantage to the Option 1 arrangement is that the anticipated growth in the planning area, even in Subarea A, is distant from the Corsicana treatment facilities and transmission line points of contact. Corsicana currently supplies water to M.E.N. Water Supply Corporation at the Lake Halbert treatment plant and to Angus Water Supply Corporation at a point near the Corsicana Municipal Airport on FM 739. The anticipated growth centers in the area are adjacent to and near the new lake and along I-45 in the Angus-Mustang and Richland areas. Most of the growth is expected at locations which are eight to fifteen miles from the existing points of delivery. Projected growth centers in Subarea B are from ten to thirty miles from the existing points of delivery and across the Richland Creek arm of the lake. The additional costs associated with transmission of

treated water over these distances must be seriously weighed in any practical examination of water supply options for the area.

A third concern relates to the practical problems of transporting treated water from the north side of the Richland Creek arm of the lake to the south side. Three possibilities include (1) hanging the transmission main from the I-45 bridge crossing, (2) laying the transmission main on or under the lake bed at or near the I-45 bridge crossing (which is a shallow part of the lake) or crossing Richland Creek upstream from the lake. All of these possibilities have serious technical problems associated with them which will add substantially to the initial capital cost of providing water to the south side area (Subarea B).

An additional problem with this option is that the area of most urgent need of reliable, good quality water supply is Subarea B generally and the Winkler area of the subarea in particular. All of the subarea, including Streetman, has serious water supply problems, as detailed earlier in this report. The deficiencies in water quality and/or quantity are so serious that no significant growth in the area can be sustained under existing conditions. From a particular standpoint, the extension of a supply line from the Corsicana system, even if feasible from other financial and technical perspectives, will delay the actual transmission of adequate supplies of potable water longer than development of a new supply source in the subarea.

2. A second implementation option is for Corsicana to supply Subarea A and another regional entity to supply Subarea B. In this option a regional entity would purchase Richland-Chambers Reservoir water from either Corsicana or Tarrant County Water Control and Improvement District No. 1 and construct a treatment plant on the south shore of the Richland Creek arm of the lake. Treated water from this plant would then be distributed to retailing entities.

Option 2 (Corsicana to supply Subarea A and another regional entity to supply Subarea B) eliminates two of the disadvantages of Option 1 (crossing the Richland arm of the lake and delay in supplying water to Subarea B) but is not without problems. Both positive aspects of Option 1 (use of existing contractual relationships and existing water rights) are present for Option 2. Both major problems are also present, however. Corsicana is not positioned in the short term to supply enough treated water to handle substantial short term growth and the Corsicana treatment facilities and contact points are distant from projected growth concentrations.

A major advantage of having a regional entity provide treated water in Subarea B is that a plant and line system could be sited and sized to meet the existing, relatively limited volume needs but constructed to allow expansion at later dates. A better targeting of both present and future needs could be affected.

3. A third implementation option is for a regional entity to supply Subarea A and for the same or even a different regional entity to supply Subarea B. The regional entity or entities would purchase Richland-Chambers Reservoir water from Corsicana and/or TCWCID No. 1 and construct intake structures and water treatment plants on each side of the Richland Creek arm of the lake. Another possibility for the Subarea A supply would be the use of the Corsicana intake structure on the north shore of the Richland arm of the lake.

Option 3 is identical to Option 2 except that a regional entity would serve Subarea A. The regional entity would purchase water from Corsicana and/or TCWCID No. 1 and treat that water at a new facility to be constructed by the entity at or near the intake structure. A major advantage of this option is that the intake and treatment plant facilities would be located in close proximity to projected growth centers, especially in Subarea A, which is likely to experience the earliest and most intense growth. The costs of installing and maintaining long distances of transmission and distribution mains are thereby reduced. Pumping costs are also reduced.

A second advantage of this option is that plant and line systems in both subareas can be sized and sited to meet existing needs and constructed to allow expansion to meet future needs. A major problem in developing a water service plan for the area is the very low population totals and densities currently found in the area. With the existing small number of customers, initial infrastructure construction/installation costs must be minimized while at the same time providing the basic facilities necessary to allow rapid and significant growth, including high density development, in the area. A very difficult balance must be struck. The use of separate facilities within each subarea to allow better targeting of service needs may be the best way to achieve the balance.

One problem with this option is that no entities other than the City of Corsicana and TCWCID No. 1 have water rights in Richland-Chambers Reservoir. Thus, any regional entity would have to purchase water from either or both of the water rights holders. TCWCID No. 1 has indicated an interest in selling raw water to entities serving the planning area but the cost and other important details have not been discussed.

Another problem with this option in Subarea A is that existing distribution system facilities are designed for a system in which the water supply enters the system at the northwest end (at Lake Halbert) rather than southeast end of the system, which is where new facilities would be located under this option. The importance of this consideration is not substantial, however, since the existing facilities are substandard for the most part and will have to be replaced/upgraded in the near future to meet demands of even short term growth. Over the long run, facility location at the east end of the peninsula is rational inasmuch as most growth in the area is expected in that part of the subarea.

4. A fourth implementation option is identical to Option 3 except that the I-45 corridor area (the Angus-Mustang area) would be supplied by Corsicana from its Lake Halbert facility. Thus, the regional entity or entities would supply all of the planning area except the area basically within the existing certificated boundaries of the Angus Water Supply Corporation. The area now served by the Angus Water Supply Corporation would continue to be served through the existing arrangement with the City of Corsicana. One problem with Option 3 is that the Angus-Mustang area is somewhat isolated from the other projected growth centers in Subarea A. The extension of transmission mains to serve the I-45 area would be expensive and duplicative, given the existing linkage with Corsicana. Unlike the remainder of Subarea A, the I-45 corridor area has a linkage with the Corsicana system that even in its current status will support a substantial growth within the Angus-Mustang area. However, a substantial part of the I-45 corridor area is within the jurisdiction of the City of Corsicana and significant growth within the Corsicana part of the area would create need for upgrading the linkage capacity. Again unlike the remainder of the subarea, however, the line distances in the Angus-Mustang area are not so great as to make major upgrading of this line system prohibitively expensive.

5. A fifth implementation option is for a regional entity to supply the entire planning area (from one primary water plant). The regional entity would purchase Richland-Chambers Reservoir water from Corsicana and/or TCWCID No. 1 and construct a water treatment plant, probably on the north shore of the Richland arm of the lake. Another possibility would be the use of the Corsicana intake structure on the north shore of the Richland arm of the lake.

Option 5 is identical to Option 1 except that a regional entity rather than the City of Corsicana would be the water supplier for the entire planning area and the central water plant would be located in the area to be served. The significant advantage of

utilizing a regional entity rather than the City of Corsicana in this arrangement is that no question of divided loyalties would be present. The regional entity would have water supply to the planning area as its only objective, without concern about supply to other, higher priority customers. Also, the facility locations would allow for a less expansion system development.

On the other hand, a regional entity will have to purchase water from Corsicana and/or TCWCID No. 1, build an intake facility (or use the Corsicana facility) and construct a treatment facility or facilities. In addition, all of the technical problems of getting water across the Richland arm of the lake are the same, regardless of which entity supplies the water.

C. WATER DISTRIBUTION ALTERNATIVES

1. Subarea A

Water distribution functions in Subarea A are currently handled by two rural water supply corporations, with most of the subarea being served by M.E.N. Water Supply Corporation (560 customers) and the Angus-Mustang area being served by the Angus Water Supply Corporation (220 customers). None of the five incorporated municipalities in the subarea provide water service.

Given the projected growth and development in the subarea and particularly since the growth is expected at the fringe of and beyond the existing line systems of the two existing water systems, it is clear that major distribution system, pumping, and storage system improvements will be required over the next two decades. The existing distribution systems are even now substandard in several respects, although both have made significant system improvements and expansions in the recent past. It is likely that the distribution systems in the subarea will essentially be reconstructed over the next 10-15 years, although much of the cost of the reconstruction will probably be borne by development interests.

A significant question is what organizational structure will most effectively and efficiently satisfy water distribution needs of the subarea. The following options appear to be available:

- a county distribution system
- municipal distribution systems
- areawide utility district
- existing rural water supply corporations

County officials in both Navarro and Freestone counties have indicated that the counties have no interest and no intention to be involved in water services at any level. Furthermore, a county operated system appears to offer no particular advantages in terms of providing water distribution services.

Similarly, with one notable exception, the municipalities of the subarea have indicated no interest in providing water services. There probably are some advantages to the individual municipalities associated with owning or controlling the water distribution system serving their jurisdictions, particularly in controlling quality of facilities and materials and location of facilities relative to affecting future growth and development patterns of the community. However, judicious use of subdivision regulations, land use plans and zoning controls can provide substantial leverage to the municipalities in controlling and directing the process of physical changes in these communities.

The small size of the municipalities of the subarea and their expressed desire to minimize the role of municipal government would argue against a water service role. Furthermore, the existence of a distribution system which has been developed on a regional rather than municipal basis would make conversion to municipal-based system difficult and expensive.

The notable exception mentioned above is the City of Angus. Unlike the M.E.N. service area, which includes three separate municipalities and a substantial unincorporated area, the Angus Water Supply Corporation serves an area which is roughly within one municipality's corporate limits and extraterritorial jurisdiction. (The City of Mustang is a community of less than 100 persons with a very limited geographical jurisdiction.) The City of Angus is located at a very strategic and advantageous position along I-45 and along the upper north shore of the Richland Creek arm of the lake. A strong argument can be made that the City of Angus should control the water distribution system in the Angus area in order to more effectively give direction to the growth which is likely to occur in its jurisdiction over the next two decades and thereby maximize the community benefit of such growth and protect the community from potential problems associated with rapid development.

The use of an areawide utility district (public entity) fits the existing distribution system framework and the proposed water supply options. However, such an entity would appear to have few advantages over the existing arrangements. In effect, the subarea is being provided with water distribution services by two regional utility districts. The only issue would be whether

water distribution operations would be handled more effectively and/or efficiently by combining those operations into a single entity. A strong argument can be made that the division of the subarea into two systems is arbitrary. Since neither system is tied to any level of local government and since their certificated areas of operation as well as their existing facilities are adjacent, there appears to be no political, geographical or technical rationale for operating two separate systems in the subarea, unless the Angus system were to become a municipal water distribution system.

2. Subarea B

In Subarea B water distribution functions are performed by a private water company (Community Water Company), serving Richland, and the Winkler Water Supply Corporation, which serves most of the scattered population east of Streetman along FM 416 and the south shore of the lake. A private company serves a small subdivision east of Winkler. The City of Streetman, at the south edge of the planning area, is served by a municipal water system. A few private wells are also found in the subarea.

The same basic options for water distribution are available in Subarea B as are present in Subarea A. The option of a county level system has the same problems as noted for Subarea A with the additional complication that Subarea B falls within two county jurisdictions (Navarro and Freestone). Both counties, however, have disavowed any interest in becoming water service providers.

The municipal distribution system option has already been exercised by Streetman. The other municipality in the subarea, Richland, is served by a substandard private system. A strong argument can be made in support of Richland's purchase of those elements of the private facilities which would be of long term value and create a municipal water system for the community.

In the absence of any alternative municipal system, the Winkler Water Supply Corporation is probably the logical water retailer in the unincorporated parts of Subarea B. It would become in effect a regional public water distribution entity. Much of the unincorporated area east of I-45 between the south shore of the lake and Tehaucana Creek is not currently in the certificated area of any water supply/distribution entity. The political and topographical boundaries are such that this area should probably be served by one system, particularly given the potential of another large lake being constructed on Tehaucana Creek and thereby turning the Winkler area into a narrow peninsula between

the two lakes. The Winkler WSC should be encouraged to establish certification for this region.

D. RECOMMENDATIONS

1. Water Supply

After consideration of the possible water supply options, three alternatives were isolated as viable and a detailed study of these three alternatives was conducted.

Alternative #1 provides for a two sector supply system. One sector would include all of Subarea A; Subarea B constitutes the second sector. In the Subarea A sector raw water would be taken from Richland-Chambers Reservoir at the Corsicana intake or another intake in the same general area of the lake. The water would be treated at or near the intake. The treated water would then be distributed by transmission mains to various system points of delivery from which points the water retailing entity would distribute the water to individual customers.

The Subarea B system would function in the same fashion. A raw water intake facility and associated treatment plant would be constructed in the area north of the Winkler community. Treated water would be delivered to one or more points of delivery from which point the water retailing entity would distribute the water to retail customers.

The total estimated construction cost for all facilities included in Alternative #1 is estimated to be $4.166 million.

Alternative #2 is a variation on the first alternative. The only difference between the two is that Alternative #2 divides Subarea A into two areas, with the I-45 corridor (essentially the Angus WSC service area) to be served through a separate system. This system would be supplied by the City of Corsicana through its existing facilities with a major transmission main to parallel I-45. The retailing entities would connect to this main. The total estimated construction cost for all facilities included in Alternative #2 is estimated to be $3.673 million.

Alternative #3 provides water to the entire planning area through one system. This is basically Alternative #1 but replacing the south side intake and treatment plant with a transmission main from the intake and treatment plant on the north shore of the Richland Creek arm extending through Subarea B (or at least to a point at which a retailing entity could tie to the system and distribute water to customers).

The total estimated construction cost for all facilities included in Alternative #3 is estimated to be $4.456 million.

The water supply entity or entities involved in providing service under any of these alternatives should have several qualifications. First, the entity must have a very strong bonding capability. The magnitude of the investment required to implement even the least expensive of the alternatives is such that most public and private sector entities which might otherwise be possible options would probably be unable or unwilling to support the required debt.

Second, the entity or entities should have significant experience in implementing regional water systems. The planning area covers a significant portion of Navarro County and part of Freestone County. The water supply entity or entities will be providing water to several different retail distributors, possibly as many as 10 to 12 different public and/or private distributors. The technical, organizational, financial, and political skills required to create and maintain this type of regional system requires a level of experience and competence not available to most potential water supply entities in the area.

Third, the water supply entity should be a public agency, subject to the constraints and responsibilities of operating in the public sector for public benefit.

Each of these alternatives assumes the utilization of a regional water supply entity or entities in the actual implementation process. Because of the highly sensitive and critically important nature of the activity and the large initial capital investment necessary to initiate the effort, the selection of the entity or entities to be involved in the implementation process is a very important consideration in insuring a successful implementation process.

Only two existing entities would appear to meet the qualifications suggested here and also have serious ties and interests in the area. The Tarrant County Water Control and Improvement District No. 1 (TCWCID No. 1) and the Trinity River Authority of Texas are existing organizations with strong bonding capabilities, proven track records in the water treatment and water supply business, and considerable experience in working with a variety of different types of public and private clients. Both are public entities with significant interest in and responsibility for development and protection of water resources of the Richland-Chambers Reservoir area.

The TCWCID No. 1 has indicated that it currently would be unwilling to be involved in water supply and distribution in the Richland-Chambers area except as a vendor of raw water. While this position could certainly change over time and in particular circumstances, it does suggest that the District has no strong interest in playing an active role as a regional water supply entity.

The Trinity River Authority of Texas (TRA) is a major water supply and distribution entity in several areas within the Trinity River Basin, especially in the Dallas-Fort Worth area and in the Lake Livingston area. The TRA has indicated that it would be willing to play an active role in financing water system facilities and/or serving in a more active role as a water supply entity for all or part of the region, at the request of local officials and/or water system representatives.

A third entity, the City of Corsicana, also has the ability to treat and supply water to at least Subarea A. The potential disadvantages of Corsicana acting as a regional suppy entity have been detailed earlier and include the fact that Corsicana as a municipality has a primary responsibility to its own citizens rather than the residents of the planning area and that Corsicana has facilities in place that do not provide the most economical and efficient service to the planning area. Also, Corsicana may be unwilling or unable to provide the financing to support the development of water system infrastructure, especially in areas well beyond the Corsicana corporate limits and extraterritorial jurisdiction.

2. Water Distribution

In general, the entities responsible for retail water distribution in the planning area can remain essentially the same agencies which currently perform the distribution function. In Subarea A, the M.E.N. WSC is already in place as the water retailer for most of the area and no compelling arguments exist to support change in the M.E.N. role in the area.

Inasmuch as the Angus WSC service area closely conforms to the City of Angus jurisdictional boundaries, it may be appropriate for the City of Angus to become the water distributor for that area, especially if the I-45 corridor becomes a separate sector supplied by the City of Corsicana. The City of Angus already owns and operates a small sewer system. Sewer fee collections would be enhanced if the city also operated the water system. Also, funds to upgrade the system are more easily obtained by cities than by water supply corporations. On the other hand, if

the Angus-Mustang area is supplied as part of a single Subarea A sector, a more efficient delivery system might result from consolidation of the Angus and M.E.N. systems.

In Subarea B the only existing public water distribution entity is the Winkler WSC. In the absence of any alternative municipal systems, Winkler is probably the logical water retailer in the unincorporated parts of Subarea B. If it participates in the regional system the municipal system in Streetman would distribute water in that area. Richland is served by a private company. Given the pivotal role that water supply and distribution plays in a community's development, the City of Richland should give serious consideration to purchase of those elements of the private facilities which would be of long term value and create a municipal water system for the community.

The critical question relative to water distribution is not which entity or agency provides the service but the quality of the service provided. This study suggests that a reliable, quality water supply system can be developed to serve the area. However, if the distribution system consists of undersized, low quality lines, then very little progress has been made toward developing water systems which will adequately serve the population densities and land uses appropriate to the various growth centers in the planning area. In the areas within the jurisdiction of municipalities, which includes much of Subarea A but very little of Subarea B, the municipalities can enforce minimum distribution system standards through their subdivision ordinances. However, the issue of distribution system line sizes and quality should be approached on a system-wide basis. Distribution system officials, staff, and advisers should remind themselves regularly that their systems are eventually going to serve small cities with populations of several thousand persons in each instance.

E. FINANCING OF SYSTEMS

The water system infrastructure outlined in this report will require substantial initial capital expenditures. Several sources are available to water service providers in obtaining capital funding.

Under certain, relatively rigorous, conditions grant funds are available for basic water system improvements from the Texas Water Development Board and the Texas Department of Commerce's Community Development Program. Under both these grant programs the applicant must show a very serious, immediate need for the funds and also demonstrate that the funds required to satisfy the need are either unavailable through other sources or would impose

unreasonable financial burdens on the water service provider and its customers, if provided from other sources. Loan funds are available to support water systems in the planning area from several sources, primarily the Texas Water Development Board, the Farmer's Home Administration and the private market. The TWDB and FmHA funds are available at interest rates which are below private market rates and on terms which are usually more satisfactory to the applicant, with the exact rates and terms varying to some extent with the particular circumstances and needs of the applicant.

Another important source of loan funds for water providers in the area is the Trinity River Authority of Texas. The TRA is actually a conduit for obtaining funds rather than the actual source of funds, inasmuch as it acts on behalf of the local entity in securing funds from whatever source or sources that seem to be most appropriate to meet the particular financial needs of the local entity. The Authority is often able to combine bond issues of several entities to secure more favorable rates and terms for the local entity and thereby further augment the advantage accruing to its experience and expertise in financing of water and wastewater system improvements.

Subarea B and particularly the area now largely served by the Winkler Water Supply Corporation may be eligible for grant assistance through the Texas Community Development Program and/or the Texas Water Development Board grant programs. Water supply in the area is severely deficient and apparently will require a major capital investment in a surface water intake and treatment facility, given the absence of reliable ground water. Similarly, storage and pumping facilities in the area are also inadequate to provide service to even existing customers. The water system needs of the area, particularly the water supply needs, are so serious and the expense of resolving the problems so substantial that the possibility of securing grant assistance or a combination of grant and loan assistance should be explored.

Another possible option in providing financing of water service facilities in the area or certain parts of the planning area is through use of special districts. Municipal utility districts and special utility districts are devices used by private development interests to finance infrastructural improvements where such improvements are not otherwise available and cannot or will not be provided by existing service providers. Under the special district arrangement, the district is formed and sells bonds on the private market, with the debt being paid by the owners of property within the district and users of the utility system. Recent legislation has made creation of such districts a more

viable option for developers, especially in contexts such as prevail in much of the planning area where local governmental jurisdictions are relatively limited and water services are generally substandard.

The use of special districts has been discouraged in this report for several reasons. They essentially constitute another local government to provide services which can be provided by other existing entities or by genuinely regional entities which should be able to provide services on a more efficient and effective basis. Use of special districts also encourages fragmentation of utility services and utility service areas, another result which has been analyzed and is viewed as not in the best interest of the existing and future residents of the planning area.

Another in the lengthy list of reasons for approaching water service on a regional basis within the planning area is the advantage a regional entity or entities will have in securing the financing necessary to develop the system needed to serve an area with such high growth potential. Both of the public agencies with the greatest likelihood of being approached as sources of funds, the TWDB and FmHA, have strongly expressed policy preferences for regional systems, rather than smaller, localized systems. Furthermore, the regional or at least subregional system will have a greater customer base or potential customer base to support loan repayment.

WASTEWATER SERVICES IMPLEMENTATION PLAN

IX. WASTEWATER SERVICES IMPLEMENTATION PLAN

Provision of sanitary sewer services is critical to appropriate development of several parts of the planning area, especially the east end of Subarea A near the U.S. 287 and FM 2853 bridge crossings and along I-45 in the Richland and Angus-Mustang areas. In Subarea B, along the south shore of the Richland Creek arm of the lake, the absence of sanitary sewer might well bring development efforts to a virtual halt, given the water supply problems in the area and the TCWCID No. 1 policy on providing water only where sanitary sewer is available.

At the same time the economical development of sanitary sewer systems in lake areas is very difficult, for two basic reasons. First, development in lake areas tends to be scattered, although the densities in particular locations can be relatively high. The cost of tying together these scattered development sites into a single system is usually significant. Second, lake areas will have numerous drainage basins, making extensive use of gravity line systems impossible. Lake area sanitary sewer systems therefore tend to be expensive to install and operate and difficult to develop on a regional basis.

An effective wastewater treatment program can be implemented for the planning area in a number of ways. Considering the possible potential development patterns and wastewater treatment alternatives available, an implementation program to treat wastewater is proposed as follows:

1. Continued use of individual septic tank system for sparsely populated areas.

The critical issues in use of septic tank systems are soil conditions, installation procedures and maintenance. As noted earlier in Section VI of this study, soil conditions for septic system usage in all parts of the planning area, excepting a relatively small area in the east end of Subarea B (roughly the area located in Freestone County), is very poorly suited for septic system usage. Thus, installation and maintenance standards becomes even more critical.

The only way to insure satisfactory installation of septic systems is through a systematic and thorough inspection process. Unfortunately, the legal framework for such inspection in the planning area is designed to insure that the inspection process is fragmented and ineffective. Septic system design standards and inspection functions are the jurisdiction of Tarrant County Water Control and Improvement District No. 1 within 2,000 feet of

the lakeshore. Septic system design standards and inspection functions are within the jurisdiction of municipalities for the areas within municipal corporate limits and the extraterritorial jurisdiction of the municipality, if the municipality chooses to exercise such regulatory authority. (The six municipalities in the planning area either do not exercise such authority or have delegated their regulatory authority to Navarro County through adoption of the county's septic tank regulations and use of the county's inspection services.) In all unincorporated areas which are not within a municipality's ETJ and are not within 2,000 feet of the lakeshore, the counties (Navarro and Freestone) have jurisdiction. Since Freestone County does not have septic system regulations, Texas Health Department regulations prevail. However, in the absence of an inspection/enforcement agency, the regulations are essentially irrelevant. In this environment of fragmented and overlapping jurisdictions the chances are likely that septic system design standards will be inadequately enforced and inspections conducted on an irregular and haphazard basis.

It is recommended that the Navarro County Planning and Zoning Commission be given responsibility for subdivision regulation enforcement in the area, including septic system design and inspection. The various cities should adopt the same standards. The Commission should in turn utilize the Corsicana-Navarro County Health Department for septic system inspection services. It is recommended that Freestone county adopt and enforce septic system design standards and inspection procedures.

A minimum lot size of one (1) acre should be required for all development utilizing individual septic tank systems.

2. Development of individual wastewater treatment systems for areas projected to have concentrated development.

Wastewater treatment systems will be necessary in those parts of the planning area where any significant development occurs due to the soil conditions around the reservoir (generally unsuitable for extensive septic system usage) and the proximity of the water supply lake.

One alternative in developing wastewater treatment systems would involve the individual municipalities being responsible for the operation and maintenance of individual wastewater treatment plants constructed by developers. Disadvantages of this approach include: the communities ability to pay for qualified personnel to manage, supervise, and operate and maintain the wastewater treatment plants; testing and reporting required by law is time

consuming and expensive for the community to administer; collection of billings for wastewater treatment services is an administrative function requiring time and personnel and may not be economically feasible for the individual communities.

Another alternative would be the creation of municipal utility districts to meet the needs of individual developments or a combination of adjacent development areas. The same disadvantages as noted in the prior discussion of municipally operated systems would be present for MUD operated systems. In addition, the creation of special districts simply adds additional governmental entities to an area which, if anything, already has too many such entities.

A more practical approach to the effective implementation of individual waterwater treatment plants may be to have a regional entity that would be responsible for operating and maintaining all the individual wastewater treatment plants. Some of the advantages and benefits of this approach include the following:

(1) The regional entity would have the ability to pay for qualified and skilled personnel with the expertise to operate and maintain all of the individual wastewater treatment plants under one management system which requires fewer personnel than operating the same number of wastewater treatment plants separately.

(2) A regional entity would have the technical expertise and administrative experience to operate a testing program for all the wastewater treatment plants in compliance with State standards.

(3) The regional entity would have the ability to standardize the design of wastewater treatment plants and maintain a consistent maintenance program as well as standardization of plant equipment and spare parts applicable to all of the wastewater treatment plants.

(4) A continuous training program provided by the regional entity would keep personnel familiar with the proper operation and maintenance of the individual wastewater treatment plants and associated equipment.

(5) A regional entity would be familiar with the administrative responsibilities associated with the operation of wastewater treatment systems including permitting of such facilities and meeting state and federal regulations.

(6) The regional entity would have the ability to provide planning and direction for the development of individual wastewater treatment systems for the entire planning area. The regional entity would also coordinate the areawide planning and coordination effort with the various cities, communities, the Tarrant County Water Control and Improvement District No. 1, Navarro County Planning and Zoning Board, Navarro and Freestone County personnel, Texas Water Commission, Texas Department of Health, private developers as well as others.

(7) The regional entity would have the management and technical expertise to provide planning to develop sub-regional wastewater treatment plants by combining individual wastewater treatment systems as development within the planning area warranted.

At a practical level the process would operate in the following manner. The individual developer desiring to develop with residential and/or commercial densities requiring sanitary sewer would construct a wastewater collection system and treatment plant. The collection system and treatment plant would be constructed to meet the standards of the regional entity which will operate the individual plants. The regional entity would be responsible for insuring that the design of the collection system and treatment plant is compatible with ultimate incorporation of the individual developments system into a larger subregional or even regional system. The subregional or regional system's development would be contingent, of course, on the presence of enough wastewater usage to justify such a system.

It is recommended that the collection line systems, once constructed to standards acceptable to the regional waste-water treatment system operator, be dedicated to the relevant water distribution entities. The water systems would be responsible for collection of wastewater and transportation of the wastewater to the treatment plant(s) and would in turn bill the individual customers for the wastewater collection and treatment service. As a practical matter, sewer bill collection usually can be accomplished on an effective and efficient manner only by discontinuing water service for failure to pay the sewer bill. Thus, it is recommended that the entities responsible for water distribution also be responsible for sewer collection and billing in their respective jurisdictions.

3. Development of subregional wastewater treatment system to serve more than one service area.

A subregional treatment plant may be cost effective depending upon whether funding is available to construct initial facilities. Other subregional wastewater treatment plants could become cost effective depending upon the actual location and magnitude of future developments.

4. Development of single regional wastewater treatment plant to serve the entire planning area.

Due to the costs associated with the construction of a collection system to serve scattered population areas, the alternative involving use of a single regional wastewater treatment system to serve the entire planning area is not feasible.

APPENDIX A

WATER CONSERVATION AND DROUGHT CONTINGENCY PLAN

WATER CONSERVATION AND DROUGHT CONTINGENCY PLAN

A. WATER CONSERVATION

1. Social Context of Plan

The social, political and land use context in which this plan will be developed and implemented is of major importance in identifying which conservation measures are likely to be most effective. The planning area is currently and is expected to remain a basically residential area. Commercial and especially industrial water users will constitute only a small portion of total usage. Furthermore, a significant percentage of the residential users will be seasonal rather than permanent residents of the area.

The planning area contains numerous political jurisdictions, none of which are currently involved and only a few of which are expected to be directly involved in the provision of water and/or wastewater services. The entities which are currently and are expected to be responsible for water supply and water distribution functions in the area do not have the legal authority to enforce most water conservation regulatory measures. Special districts, river authorities and rural water supply corporations do not have authority to develop and enforce building codes, landscaping regulations, subdivision regulations and other measures commonly utilized to achieve water conservation goals. Thus, an effective water conservation plan for the area must include cooperation not only among several water supply and distribution entities but also among several local governments, including at least six municipalities and two county governments.

2. Alternative Water Conservation Measures

Water conservation measures generally fall into one or more of the following broad categories:

- Consumer education
- Conservation-oriented water rate structures
- Water-conserving plumbing fixtures and appliances
- Water-conserving landscaping techniques
- Water recycling techniques
- Supply system conservation measures

Consumer education includes measures such as inclusion of conservation-oriented messages in water billings on a regular basis, distribution of information brochures through public

locations such as churches, schools, city halls and commercial locations, and distribution of information to school administrators and teachers and encouragement of conservation-related classroom activities and home checks. Consumer education is an attractive option in the Richland-Chambers Reservoir area because of its "voluntary" characteristics and the absence of any overall regulatory authority or agency in the area.

The actual impact of consumer education programs in the absence of other conservation measures or an actual water availability crisis is not likely to be substantial, however, based on the limited information available regarding experiences of other areas. The impact of consumer education efforts is particularly constrained in the Richland-Chambers Reservoir context since a major feature of the water use pattern in the area will be peak use resulting from seasonal residency and visitation. Seasonal residents and visitors will not be greatly affected by local consumer education efforts.

Conservation-oriented water rates can be powerful tools for encouraging water conservation. Since basic water use requirements for households are known, a graduated rate structure can be developed which will produce price disincentives at water levels which exceed basic needs. Graduated rate structures will primarily impact the moderate income, cost sensitive permanent residents, however. For the minimum level user and the higher income and seasonal resident users, even highly graduated rates will have little conservaton impact.

The combination of consumer education and conservation oriented water rate structures maximizes the effect of both alternatives. The water customer reads and understands the conservation message in brochures distributed with the water bill if it is quite clear that the two items are closely related to each other. Since a large proportion of the permanent resident population of the area is expected to be younger families and retirees on fixed incomes, the combination consumer education-graduated rate structure approach should be relatively effective.

Because so much of the development of the area is anticipated, rather than existing, water conservation through use of subdivision regulations, zoning, and building codes is a particular attractive and potentially effective alternative. Through land development and land use regulations, the clearing of natural vegetation can be reduced and water-conserving landscaping techniques (especially on commercial and industrial properties) can be encouraged. Building and plumbing code provisions can be utilized to encourage use of water-conserving, high-efficiency

plumbing fixtures and appliances (such as dishwashers and toilets).

Jurisdictional boundary problems will limit the extent to which these measures, especially land use and building code regulations, can be utilized, however. The most effective of these types of regulations relative to water conservation (building and plumbing codes) can only be exercised by municipalities. The actual acreage included within incorporated municipalities in the planning area is quite small. In Subarea A, approximately 15 percent of the area is within the incorporated limits of Angus, Eureka, Mildred, Mustang and Navarro. In Subarea B, Richland occupies less than 2 percent of the total area. Furthermore, most of the growth in the area is expected to be outside the corporate limits of existing municipalities. Thus, the impact of building and plumbing codes and similar regulations will be relatively limited.

Similarly, zoning regulations are also limited to areas within the corporate limits. Zoning regulations can be utilized to encourage types of development which are more or less intensive in terms of water use and development patterns which utilize native vegetation rather than vegetation which requires extensive irrigation. However, the extent to which zoning-related regulations can be effectively used to achieve water conservation goals is very limited.

The use of subdivision regulations to encourage water conservation has more potential in the area since all of the area falls within the potential subdivision regulatory jurisdiction of either a municipality or county. Subdivision regulation can be utilized to require water-conserving landscaping features, encourage subdivision design features which reduce surface water runoff and require retention of natural vegetation and especially existing trees. Native plant landscaping can play an important role in water conservation efforts in the planning area since the major water availability problem in the area is expected to be related to peak usage during the summer when seasonal residency and visitation is highest and outdoor watering will be greatest. Between 35-50 percent of water usage in Texas cities in summer months is for landscapes. Reducing the peak usage requirement results in less capital investment in water production and distribution facilities and less cost to consumers.

The major problem with the use of subdivision regulations in encouraging water conservation in the area is the jurisdictional fragmentation associated with having six municipalities, each with its own regulations, and two counties (one of which has no subdivision regulations of any substance).

Supply system conservation measures include universal metering and leak detection measures. The existing water retailers in the planning area utilize universal metering. The Angus Water Supply Corporation and the M.E.N. Water Supply Corporation also utilize a leak detection program in which total metered usage is compared to total supply as measured by the master meter at the point of connection with the Corsicana supply system. A significant difference in the metered usage and metered supply totals results in a systematic monitoring of the line system to determine the point(s) of loss. Similarly, daily readings at the supply meter are monitored. Unexplained increases result in line monitoring. The Community Water Company and Winkler Water Supply Corporation have similar although somewhat less systematic water use monitoring systems.

Recycling techniques are not applicable in current circumstances in the planning area. However, development within the area will probably include golf course(s) and/or other green areas which require irrigation. Reuse of treated wastewater in irrigation of such areas should be considered. Currently, reuse of wastewater at both the Mildred ISD and the City of Mustang wastewater plants is occurring. At Mildred ISD, treated effluent is used during certain times of year on open yard and playing field areas. At Mustang, treated effluent is used for agricultural irrigation purposes.

It should be noted, however, that most of the planning area is and probably will continue to be for some lengthy period outside the legal jurisdiction of municipal governmental entities. Furthermore, none of the local governments in the area (except Streetman, at the edge of Subarea B) act as water supply and/or distribution agents. Where the water supply and distribution entities are not local governments, the legal authority to make and enforce retrofit requirements, plumbing fixture and conservation device requirements, landscaping requirements, recycling and reuse requirements, and other standard features of a conservation program is not readily available.

At the same time, private water companies and water supply corporations can actively work with developers, builders and plumbers to insure that the need for conservation and effective conservation techniques and devices are recognized.

3. Water Conservation Plan and Implementation

Probably the easiest and one of the most effective available implementation strategies is the combination of consumer education and graduated water usage rates. Consumer education would

include information on the advantages to the user of conserving water, the means by which water (and money) can be conserved, and advice on installing water saving devices. To maximize the impact, the effect of the graduated rate schedule should also be identified.

This option is an attractive one for the planning area because all or virtually all water users can be contacted with the same information and can even be affected in similar ways with involvement of a relatively small number of entities. Through cooperation of a small number of water distribution agencies, school districts, local governments and other public entities, the entire planning area could receive the same or at least similar consumer education information. Similarly, cooperation of water distributing agencies could easily produce a similar rate structure, even though actual rates would vary from one system to another.

Probably the next most effective means of encouraging conservation is through provisions of subdivision ordinances. Provisions which discourage removal of trees and natural vegetation, encourage subdivision design which reduces runoff and encourage efficient landscape irrigation systems should be adopted as part of the subdivision standards of the area.

The major problem with use of subdivision regulations in the planning area is the jurisdictional fragmentation noted earlier. For the standards to have maximum impact all six municipalities as well as the two counties having jurisdiction in the area must have similar, if not identical, regulations.

Third, the municipalities of the area should adopt water conserving plumbing codes, especially for indoor water use. In addition to customary water conservation benefits, a strong argument for such codes is their wastewater impact. Since virtually all water customers are now using septic tank systems in soil conditions in which such systems are inappropriate, reduced water usage obviously has beneficial impact relative to wastewater disposal and potential pollution problems. Even when sanitary sewer systems are available, use of water conserving fixtures and devices would allow smaller sizing of collection and treatment facilities. Unless municipal boundaries are greatly expanded, however, the impact of plumbing and building codes, even if adopted and vigorously enforced by all municipalities, will be very limited.

Fourth, supply system conservation measures should be continued and expanded. Universal metering should be continued to insure that all water flows are recorded. Leak detection activities, especially in terms of educating consumers regarding the effect of leaks on individual utility bills, should be expanded under the direction of the water retailing entities.

Water reuse has considerable potential use in the area. Whenever possible, planning for development of areas such as parks, golf courses and other green areas which require or benefit from irrigation should be accomplished so that recycling/reuse of treated wastewater can be undertaken. The existing reuse of treated effluent should be encouraged and continued as greater use is made of existing facilities.

A critical element in effective implementation of any water conservation plan in the planning area is coordination, given the large number of affected and participating entities. The only readily available agent to achieve the necessary coordination is the Navarro County Planning and Zoning Commission. The Commission will take a central and positive positions in developing and promoting water-conserving subdivision and zoning regulations. The Commission is responsible for implementing the county subdivision standards, which affect all unincorporated areas, and the county zoning regulations, which affect unincorporated areas within 5,000 feet of the lake shore. Because of the central role of the Commission in the platting and subdivision development process, and because elected officials of the incorporated cities within the planning area are members of the Commission, it is in a unique position to coordinate water conservation efforts. The Commission will development and distribute model conservation plans to other relevant local entities. Examples of drought contingency and water conservaton plans for a non-municipal, regional water supply system (the La Porte Area Water Authority) and a municipal water supply and distribution system (the City of Harlingen Waterworks System) are attached as Appendices B and C, respectively. The Texas Water Development Board can also provide technical assistance in the development of the model plan. The Texas Water Development Board can provide technical assistance in the development of the model plan.

B. DROUGHT AND WATER EMERGENCY CONTINGENCY PLAN

1. Threshold Conditions

"Threshold or trigger conditions" signaling the start of an emergency period will vary within the planning area, depending on the water supply, water treatment, storage and booster pumping

capacities of the individual systems. Because the planning area contains and is expected to continue to contain several different water supply sources and several different water distribution systems, a single set of threshold conditions would not be appropriate.

Most water used in the planning area in the future is likely to come from Richland-Chambers Reservoir through water rights owned by the City of Corsicana and/or Tarrant County Water Control and Improvement District No. 1. As the manager of the lake, TCWCID No. 1 is primarily responsible for establishing and implementing policies regarding threshold conditions for the lake. TCWCID No. 1 has prepared a "Conservation and Drought Contingency Plan", dated July, 1987, which identifies mild, moderate and severe drought conditions as well as an emergency mode of operation for the entire TCWCID No. 1 system, including Richland-Chambers Reservoir. The City of Corsicana has an informal plan which also identifies threshold conditions relative to available supply in Navarro Mills Reservoir and Lake Halbert.

The treatment, storage and pumping capacities of a system are as critical as actual raw water supply in assuring water service to customers. The City of Corsicana and/or one or more regional entities will probably have water treatment responsibilities for the area. Corsicana has an informal plan which identifies threshold conditions for its water treatment system facilities.

Storage and pumping functions are and will be the responsibility of the water distribution entities, which will be subregional water supply corporations (as in the existing conditions) and/or municipalities. Except in a very informal and ad hoc form, none of the existing water distribution entities have established threshold or trigger conditions for their storage and pumping facilities.

All entities involved in water supply, treatment, storage and pumping should establish criteria and/or conditions defining as clearly and carefully as possible what constitutes mild, moderate and severe emergency conditions. These threshold or trigger conditions should be established in formal, written policy and revised as changes in facilities and water demand occur.

The following outline identifies examples of affected entities and types of trigger conditions relevant to each set of entities.

Entity Establishing Conditions	Entity Affected By Conditions	Type of Trigger Conditions
TCWCID No. 1	City of Corsicana Other raw water customers	Raw water sales contract contains specific lake levels and water sale volumes

City of Corsicana Regional water supply entity or entities	Local retail water suppliers	Treated water sales contract contains treatment capacity limits; specific drought conditions identified; raw water sales contract trigger conditions passed on to retail water suppliers
Local retail water suppliers	Water customers	Trigger conditions passed on from raw water and treated water suppliers; system storage and distribution limits identified; special conditions identified

2. Drought Contingency Measures

Since the ultimate responsibility for reducing consumption rests with the water user, the water distribution entity (probably municipality, water supply corporation or special district) must develop specific measures for dealing with the varying levels of water emergency conditions, based on information provided to the water distribution entity by the water supplier and/or water treatment entity as well as its own assessment of conditions. Mild condition measures would be primarily educational, explaining through mailings to customers and news media that a condition requiring action is present and voluntary reductions in water use are necessary. Moderate condition measures would include voluntary actions but would in addition include mandatory measures such as surcharges and excessive use fees. Severe condition measures would include all measures noted under mild and moderate conditions but would also include curtailment of water to non-residential users and prohibition of all outdoor water use. Any measures which curtail water usage involuntarily must be carefully reviewed relative to legal implications. When undertaken by a non-municipal water distribution entity, such measures must be even more carefully considered. Non-municipal entities probably need to include in their water service agreements with retail customers the explicit measures which may be undertaken (such as water cut-off in case of outdoor watering) by the water distributor during severe emergency conditions.

Each water supply and distribution entity must develop specific measures applicable to its individual situation. Each retail

distributor will have different storage capacities, pumping capacities, transmission and distribution line sizes and other system characteristics which will affect its ability to handle water emergency and even drought conditions. Thus, each entity will need to develop its own specific contingency measures and plans in terms of its own strengths and weaknesses.

3. Implementation

Implementation of any drought or emergency contingency plan is complicated by the number of entities involved in the water supply, treatment and distribution process. Ultimately, however, the distribution entities are responsible for insuring that equitable rules are established and enforced, even during emergency conditions, and that all feasible measures are taken to maintain sufficient water for essential health and safety uses. (Water supply corporations and special districts will need to be particularly careful regarding use of involuntary emergency measures because of their quasi-public legal status.) Coordination among water supply, water treatment and water distribution entities for each system is critical.

Insofar as possible, each water distribution entity should have a written policy, explicitly detailing criteria and conditions under which particular actions will be taken. This policy should include descriptions of conditions under which the drought or emergency contingency plan will be activated, the actions to be taken during the emergency and penalties to be incurred as a result of non-compliance with emergency measures.

APPENDIX B

LA PORTE WATER AUTHORITY
DROUGHT CONTINGENCY PLAN
WATER CONSERVATION PLAN

LA PORTE AREA WATER AUTHORITY

DROUGHT CONTINGENCY PLAN
WATER CONSERVATION PLAN

(DRAFT)
(Revised 3-10-87)

DRAFT
REVISED 3/10/87

I. INTRODUCTION

A. PURPOSE

A Water Conservation Plan and a Drought Contingency Plan are required as a part of an application submitted by a political subdivision to the Texas Water Development Board for financial assistance from the Development Fund or the Water Loan Assistance Fund. Furthermore, a successful application is required to have a program in place before loan funds can be released. The origin of these requirements is action taken by the 69th Texas Legislature in 1985. Conservation requirements were established by a House Bill (HB) 2 and House Joint Resolution (HJR) 6. On November 5, 1985, Texas voters approved an Amendment to the Texas Constitution that provided for the implementation of HB-2. Water used in the residential and commercial sector involves the day to day activities of all cities of the State and includes water used for bathing, cooking, toilet flushing, fire protection, lawn watering, swimming pools, laundry, dish washing, car washing and sanitation.

Since the early 1960's per capita water usage in the State has increased about four (4) gallons per person, per decade. More important, per capita water use during droughts is usually about one-third greater than during periods of average precipitation.

The objective of a conservation program is to reduce the quantity required for each water using activity, in so far as is practical to the implementation of efficient water use practices. A Drought Contingency Program provides procedures for voluntary and mandatory actions to be put into effect to temporarily reduce the demand placed upon a water supply system during a water shortage emergency. Drought Contingency Procedures include conservation, but may also include prohibition of certain uses. Both programs are tools that water purveyors should have available to operate effectively in all situations.

The purpose of this report is to present the data collected, alternatives, and elements selected for the La Porte Area Water Authority Water Conservation/Drought Contingency Plan and to provide procedures and information for the implementation of the plan.

B. PLANNING

In 1981 the State of Texas created the La Porte Area Water Authority for the purpose, among others, of acquiring, treating, and delivering water to member water districts and industries throughout Southeast Harris County. The Authority has the right to serve any utility within a thirty (30) mile radius of the Authority's boundry. The present area within the Authority's boudary encompasses approximately 20,600 acres. A mandate by the Harris Galveston Coastal Subsidence District to convert to surface water by the year 1990 has resulted in the study of the surface water problem by the Authority. Various alternatives have been investigated, and it has been concluded that the most cost effective method to provide an adequate supply of treated surface water to Southeast Harris County is to buy capacity at the new Southeast Water Purification Plant, and construct transmission and distribution mains to identified customers. Customers included are the cities of La Porte, Morgan's Point, Shoreacres, and the Bayshore Municipal Utility District.

II. WATER CONSERVATION PLAN

A. INTRODUCTION

The purpose of a Water Conservation Plan is to reduce the quantity required for each water using activity, insofar as is practical, through the implementation of efficient water use practices. Many communities throughout the United States have used conservation measures to successfully cope with various water and wastewater problems. Reduction in water use of as much as 25% or more have been achieved, but the normal range is from 5 to 15%. As a result of reduced water use, wastewater flows have also been reduced by 5 to 10%.

Nine (9) principal water conservation methods to be considered in preparing a water conservation are as follows:

1. Education and Information;
2. Plumbing codes for new construction;
3. Retrofit programs;
4. Conservation oriented water rate structures.

5. Universal metering and meter repair and replacement;

6. Water conserving landscaping;

7. Leak detection and repair;

8. Recycling and reuse;

9. Means of implementation and enforcement.

B. UTILITY EVALUATION

1. POPULATION OF SERVICE AREA (number):

a.	La Porte:	23,270	
b.	Morgan's Point:	423	
c.	Shoreacres:	1,260	
d.	Bayshore MUD	2,900	
e.	TOTAL		27,853

2. AREA OF SERVICE AREA (square miles):

a.	La Porte	22.0	
b.	Morgan's Point	2.0	
c.	Shoreacres	1.5	
d.	Bayshore MUD	1.5	
e.	TOTAL		27.0

3. NUMBER/TYPE OF CONNECTIONS: (1986)

		(Res)	(Comm)	(Ind)
a.	La Porte	6,652	402	4
b.	Morgan's Point	121	14	0
c.	Shoreacres	476	2	0
d.	Bayshore MUD	675	10	0
e.	TOTAL	7,924	428	4

4. NET NEW CONNECTIONS PER YEAR: (1986)

a.	La Porte	120	10	1
b.	Morgan's Point	1	1	0
c.	Shoreacres	6	0	0
d.	Bayshore MUD	41	0	0
e.	TOTAL	168	11	1

5. WATER USE INFORMATION:

a. Water Production for last year; (gal/yr):(1986)

1.	La Porte	1,003,123,000
2.	Morgan's Point	35,141,900
3.	Shoreacres	66,809,000
4.	Bayshore MUD	94,000,000
5.	TOTAL	1,199,073,900

b. Average Water Production-2 yrs-(gal/yr):(1985-86)

1.	La Porte	1,006,876,500
2.	Morgan's Point	36,747,850
3.	Shoreacres	70,316,500
4.	Bayshore MUD	100,000,000
5.	TOTAL	1,213,940,850

c. Average Monthly Water Production-2 yrs-(gal/mo): (1985-86)

1.	La Porte	83,906,375
2.	Morgan's Point	3,062,320
3.	Shoreacres	5,859,710
4.	Bayshore MUD	8,333,333
5.	TOTAL	101,161,738

d. Estimated Monthly Water Sales by User Category: (1,000 gallons) (1986)

1. LA PORTE

	Residential	Commercial-Institutional	Industrial	Total
January	62,979	11,278	3,072	77,329
February	43,236	7,898	2,109	53,243
March	65,150	11,639	3,178	79,967
April	52,700	9,514	2,571	64,785
May	63,830	11,414	3,114	78,358
June	71,497	12,723	3,488	87,708
July	69,035	12,302	3,368	84,705
August	55,314	9,960	2,698	67,972
September	57,614	10,353	2,811	70,778
October	104,786	18,406	5,112	128,304
November	47,991	8,710	2,341	59,042
December	38,719	7,127	1,889	47,735
Total	732,851	131,324	35,751	899,926

2. MORGAN'S POINT

	Residential	Commercial-Institutional	Industrial	Total
January	1,162.8	1,279.2	--	2,442.0
February	835.4	947.4	--	1,782.8
March	997.3	840.6	--	1,837.9
April	1,497.0	864.6	--	2,361.6
May	1,044.8	1,488.7	--	2,533.5
June	1,014.1	1,451.8	--	2,465.9
July	1,773.3	1,723.4	--	3,496.7
August	2,179.4	1,141.0	--	3,320.4
September	1,198.5	1,647.3	--	2,845.8
October	951.1	975.0	--	1,926.1
November	952.5	1,030.6	--	1,983.1
December	968.8	908.1	--	1,876.9
Total	14,575.0	14,297.7	--	28,872.7

3. SHOREACRES

	Residential	Commercial-Institutional	Industrial	Total
January	2,537.0	399.3	--	2,936.3
February	4,131.8	1,187.8	--	5,319.6
March	3,310.8	235.2	--	3,546.0
April	3,629.7	270.0	--	3,899.7
May	3,238.9	477.4	--	3,716.3
June	8,272.9	572.2	--	8,845.1
July	4,551.9	717.4	--	5,269.3
August	6,803.6	721.4	--	7,525.0
September	3,584.2	509.9	--	4,094.1
October	2,773.3	339.6	--	3,112.9
November	2,832.2	317.0	--	3,149.2
December	2,819.4	407.7	--	3,227.1
Total	48,485.7	6,154.9	--	54,640.6

4. BAYSHORE MUD

	Residential	Commercial-Institutional	Industrial	Total
January	6,300	700	--	7,000
February	6,300	700	--	7,000
March	7,200	800	--	8,000
April	8,100	900	--	9,000
May	8,100	900	--	9,000
June	8,100	900	--	9,000
July	13,500	1,500	--	15,000
August	11,700	1,300	--	13,000
September	8,100	900	--	9,000
October	5,400	600	--	6,000
November	6,300	700	--	7,000
December	7,200	800	--	8,000
Total	96,300	10,700	--	107,000

5. TOTAL

	Residential	Commercial-Institutional	Industrial	Total
January	72,978.8	13,656.5	3,072.0	89,707.3
February	52,503.2	10,733.2	2,109.0	67,345.4
March	76,658.1	13,514.8	3,178.0	93,350.9
April	65,926.7	11,548.6	2,571.0	80,046.3
May	76,213.7	14,280.1	3,114.0	93,607.8
June	88,884.0	15,647.0	3,488.0	108,019.0
July	88,860.2	16,242.8	3,368.0	108,471.0
August	75,997.0	13,122.4	2,698.0	91,817.4
September	70,496.7	13,410.2	2,811.0	86,717.9
October	113,910.4	20,320.6	5,112.0	139,343.0
November	58,075.7	10,757.6	2,341.0	71,174.3
December	49,707.2	9,242.8	1,889.0	60,839.0
Total	892,211.7	162,476.6	35,751.0	1,090,439.3

e. Average Daily Water Use: (GPD): (1986)

1.	La Porte	2,748,282
2.	Morgan's Point	96,280
3.	Shoreacres	149,700
4.	Bayshore MUD	250,000
5.	Total	3,244,262

f. Peak Daily Use: (GPD): (1986)

1.	La Porte	3,663,833
2.	Morgan's Point	109,729
3.	Shoreacres	181,186
4.	Bayshore MUD	340,854
5.	Total	4,295,602

g. Peak to Average Use Ratio: (1986)

1.	La Porte	1.33
2.	Morgan's Point	1.14
3.	Shoreacres	1.21
4.	Bayshore MUD	1.36
5.	Total	1.32

h. Unaccounted for Water: (% of water production): (1986)

1.	La Porte	10.3%
2.	Morgan's Point	18.0%
3.	Shoreacres	18.0%
4.	Bayshore MUD	4.0%
5.	Total	9.1%

6. WASTEWATER INFORMATION

a. Percent of Water Customers Served By Your Wastewater Treatment System: (1986)

1.	La Porte	99.9%
2.	Morgan's Point	99.0%
3.	Shoreacres	0.0%
4.	Bayshore MUD	0.0%
5.	Total	85.9%

b. Percent of Water Customers Served by Septic Tank:

1.	La Porte	0.1%
2.	Morgan's Point	1.0%
3.	Shoreacres	0.0%
4.	Bayshore MUD	0.0%
5.	Total	0.1%

c. Percent of Water Customers Served by Another Wastewater Treatment System:

1.	La Porte	0.0%
2.	Morgan's Point	0.0%
3.	Shoreacres	100.0%
4.	Bayshore MUD	100.0%
5.	Total	13.9%

d. Percent of Total Potable Water Sales to the Three (3) Categories Described in 6a, 6b, and 6c:

1.	La Porte	99.9%
2.	Morgan's Point	99.0%
3.	Shoreacres	0.0%
4.	Bayshore MUD	0.0%
5.	Total	85.9%

1.	La Porte	0.1%
2.	Morgan's Point	1.0%
3.	Shoreacres	0.0%
4.	Bayshore MUD	0.0%
5.	Total	0.1%

1.	La Porte	0.0%
2.	Morgan's Point	0.0%
3.	Shoreacres	100.0%
4.	Bayshore MUD	100.0%
5.	Total	13.9%

e. Average Daily Volume of Wastewater Treated (gal): (1986)

1.	La Porte	2,596,000
2.	Morgan's Point	74,000
3.	Shoreacres	187,824
4.	Bayshore MUD	419,000
5.	Total	3,276,824

f. Peak Daily Wastewater Volumes (gal): (1986)

1.	La Porte	6,092,000
2.	Morgan's Point	180,000
3.	Shoreacres	352,163
4.	Bayshore MUD	1,304,000
5.	Total	7,928,163

g. Estimated Percent of Wastewater Flow to Treatment Plant Originating From the Following Categories:

1. Residential:

a.	La Porte	85.0%
b.	Morgan's Point	60.0%
c.	Shoreacres	80.0%
d.	Bayshore MUD	80.0%
e.	Total	83.5%

2. Industrial:

a.	La Porte	5.0%
b.	Morgan's Point	0.0%
c.	Shoreacres	0.0%
d.	Bayshore MUD	0.0%
e.	Total	3.9%

3. Commercial/Institutional:

a.	La Porte	4.0%
b.	Morgan's Point	30.0%
c.	Shoreacres	10.0%
d.	Bayshore MUD	10.0%
e.	Total	5.7%

4. Stormwater:

a.	La Porte	6.0%
b.	Morgan's Point	10.0%
c.	Shoreacres	10.0%
d.	Bayshore MUD	10.0%
e.	Total	6.9%

SAFE ANNUAL YIELD OF WATER SUPPLY (gal):

1. Existing Groundwater Supply:

a.	La Porte	2,688,444,000
b.	Morgan's Point	155,577,600
c.	Shoreacres	373,176,000
d.	Bayshore MUD	262,800,000
e.	Total	3,479,997,600

2. Proposed Surface Water Supply:

a.	La Porte	1,277,500,000
b.	Morgan's Point	65,700,000
c.	Shoreacres	73,000,000
d.	Bayshore MUD	116,800,000
e.	Total	1,533,000,000

PEAK DAILY DESIGN CAPACITY (GPD):

1. Existing Groundwater Supply:

a.	La Porte	8,064,000
b.	Morgan's Point	864,000
c.	Shoreacres	3,600,000
d.	Bayshore MUD	720,000
e.	Total	13,248,000

2. Proposed Surface Water Supply:

a.	La Porte	4,375,000
b.	Morgan's Point	225,000
c.	Shoreacres	250,000
d.	Bayshore MUD	400,000
e.	Total	5,250,000

MAJOR HIGH-VOLUME CUSTOMERS: (gal/yr): (1986)

1. LA PORTE

Independent Tank Cleaning Service	11,541,100
Harbor Bay Apartments	11,985,000
Forest View Mobile Home Park	6,053,100
PPG Industries	16,916,000

2. MORGAN'S POINT

Port of Houston Authority	11,747,800
Sealand Corporation	1,665,000
Reliance Electric	2,180,400

3. SHOREACRES:

Houston Yacht Club	6,154,900

4. BAYSHORE MUD

Bayshore Elementary	689,800
Bayou Villa Apartments	4,442,600

POPULATION AND WATER USE PROJECTIONS

1. LA PORTE

1987	2.7	MGD	23,270 (Pop)
1994	3.5	MGD	29,661 (Pop)
2000	4.9	MGD	41,525 (Pop)

2. MORGAN'S POINT

1987	0.096	MGD	423 (Pop)
1994	0.180	MGD	500 (Pop)
2000	0.180	MGD	500 (Pop)

3. SHOREACRES

1987	0.150	MGD	1,260 (Pop)
1994	0.220	MGD	1,864 (Pop)
2000	0.240	MGD	2,034 (Pop)

4. BAYSHORE MUD

1987	0.250	MGD	2,900 (Pop)
1994	0.320	MGD	3,720 (Pop)
2000	0.350	MGD	4,070 (Pop)

5. TOTAL

1987	3.240	MGD	27,853 (Pop)
1994	4.220	MGD	35,745 (Pop)
2000	5.670	MGD	48,129 (Pop)

PERCENT OF METERED WATER CONNECTION:

	RESIDENTIAL	COMMERCIAL	INDUSTRIAL
La Porte	100%	99.9%	100%
Morgan's Point	100%	99.9%	N/A
Shoreacres	100%	99.9%	N/A
Bayshore MUD	100%	99.9%	N/A
Total	100%	99.9%	100%

WATER/WASTEWATER RATE STRUCTURE

1. LA PORTE: INCREASING BLOCK - PER MONTH

a. Water:

1. Residential:

Minimum (2,000 gallons)	$	5.00
Additional 8,000 gallons - exceeding 2,000		1.50/1,000 gal
Additional 15,000 gallons - exceeding 10,000		1.65/1,000 gal
Additional 1,000 gallons - exceeding 25,000		1.90/1,000 gal

2. Commercial/Industrial:

Minimum (2,000 gal)		
5/8" - 3/4" meter	$	6.73
1" meter		9.23
1 1/2"		16.36
2" meter		26.34
3" meter		54.87
4" meter		94.81
6" meter		208.92
8" meter		368.67

Additional volume for commercial customers is the same as residential above.

b. Wastewater:

1. Residential:

Minimum (2,000 gallons - of metered water)	$	8.58
Additional 1,000 gallons, based on 95% of water volume		1.78

NOTE: Maximum residential wastewater charge based on 95% of average water bill during the months of December, January, and February.

2. Commercial:

Minimum (2,000 gallons - of metered water)

5/8" - 3/4" meter	$	15.18
1" meter		23.08
1 1/2" meter		45.63
2" meter		77.21
3" meter		167.43
4" meter or larger		293.74
Additional 1,000 gallons based on 85% of water volume		1.78/1,000 gal

2. MORGAN'S POINT: DECREASING RATE:

a. Water:

1. Residential:

Minimum (2,000 gallons)	$	4.00
Next 3,000		.85/1,000 gal
Next 5,000		.60/1,000 gal
Next 40,000		.50/1,000 gal
Next 50,000		.40/1,000 gal

2. Commercial:

Commercial water is charged two times the residential rate.

b. Wastewater:

1. Residential and Commercial:

First 20,000 gallons	$	4.00
Each additional 10,000 gallons		2.00

3. SHOREACRES

a. Water:

1. Residential:

Minimum (3,000 gallons)	$	7.00
Each Additional 1,000 gallons		1.50

2. Commercial:

Minimum (3,000 gallons)	$	12.00
Each additional 1,000 gallons		1.75

b. Wastewater:

Residential and Commercial (flat)	$ 13.50

4. BAYSHORE MUNICIPAL UTILITY DISTRICT:

a. Water:

Minimum (2,000 gallons)	$ 3.30
Each additional 1,000	1.50

b. Wastewater:

Minimum	$ 4.00
Plus 35% of net water bill	

AVERAGE ANNUAL REVENUES FROM WATER/WASTEWATER RATES:

1.	La Porte	$ 3,088,657
2.	Morgan's Point	39,307
3.	Shoreacres	160,531
4.	Bayshore MUD	324,000
5.	Total	$ 3,612,495

AVERAGE ANNUAL REVENUES FROM NON-RATE SOURCES:

1.	La Porte	$ 121,244
2.	Morgan's Point	-0-
3.	Shoreacres	14,371
4.	Bayshore MUD	24,000
5.	Total	$ 159,615

AVERAGE ANNUAL FIXED COSTS:

1.	La Porte	$ 1,119,612
2.	Morgan's Point	44,617
3.	Shoreacres	73,218
4.	Bayshore MUD	212,000
5.	Total	$ 1,449,447

AVERAGE ANNUAL VARIABLE COSTS:

1.	La Porte	$ 942,224
2.	Morgan's Point	54,655
3.	Shoreacres	50,877
4.	Bayshore MUD	131,000
5.	Total	$ 1,178,756

COPIES OF APPLICABLE LOCAL REGULATIONS:

1. LA PORTE:

   a. 1985 Standard Plumbing Code with Appendix J, Ordinance No. 1532.

   b. Water/Wastewater Rate Ordinance, No. 1465.

   c. Industrial Waste Ordinance, No. 1221, 1357.

2. MORGAN'S POINT:

   a. 1985 Standard Plumbing Code with Appendix J, Ordinance No. 241, City of Morgan's Point.

   b. Water/Wastewater Rate Ordinance, No. 169, amended by Ordinance No. 227.

3. SHOREACRES:

   a. "Minimum Plumbing Standards, Requirements, and Specifications", Ordinance No. 87-3 City of Shoreacres.

   b. Water/Wastewater Rate Ordinance, No. 85-7.

4. BAYSHORE MUD:

   a. "Minimum Plumbing Standards and Plumbing Permits" Resolution No. 230, Bayshore MUD.

   b. Water/Wastewater Rate Resolution, No. 216, amended by Resolution No. 221.

COPIES OF APPLICABLE STATE, FEDERAL, OR OTHER REGULATIONS:

1. LA PORTE:

   H.B. NO. 1311, 67th Legislature, State of Texas, creation of the La Porte Area Water Authority.

2. As a public supplier of water, the cities of La Porte, Morgan's Point, Shoreacres, and Bayshore Municipal Utility District must abide by the rules of a public water supply under the following agencies:

   a. Texas Water Commission
   b. Texas Department of Health
   c. Environmental Protection Agency

SPECIAL INFORMATION:

The Texas Water Development Board requires a Water Conservation/Drought Contingncy Plan prior to purchase of bonds for improvements to a water supply and distribution system.

PUBLIC PARTICIPATION: PUBLIC AT LARGE:

1. LA PORTE:

   a. The City of La Porte holds regular City Council meetings on the first and third Monday of each month. The meetings are open to the public, and citizens are free to speak on any subject during the portion of the meeting designated for this purpose.

   b. The La Porte Area Water Authority holds Board meetins as needed to conduct Authority business. The meetings are open to the public, and citizens are free to speak to the Authority at these meetings.

2. MORGAN'S POINT:

The City of Morgan's Point holds regular City Council meetings on the second Wednesday of every month. The meetings are open to the public, and citizens are free to speak.

3. SHOREACRES:

The City of Shoreacres holds regular City council meetings on the second and fourth Monday of every month. The meetings are open to the public, and citizens are free to speak.

4. BAYSHORE MUNICIPAL DISTRICT:

Bayshore Municipality District holds regular Board meetings on the second Wednesday of every month. The meetings are open to the Public, and citizens are free to speak.

PUBLIC PARTICIPATION - SPECIAL INTEREST GROUPS

1. LA PORTE:

   a. La Porte-Bayshore Chamber of Commerce
   b. Homeowner's Associations
   c. Various civic and religious organizations

2. MORGAN'S POINT:

a. La Porte-Bayshore Chamber of Commerce
b. Port of Houston Authority
c. Various civic and religious organizations

3. SHOREACRES:

a. La Porte-Bayshore Chamber of Commerce
b. Houston Yacht Club
c. Various civic and religious organizations

4. BAYSHORE MUD:

a. La Porte-Bayshore Chamber of Commerce
b. Homeowner's Associations
c. Various civic and religious organizations

D. SYSTEM AUDIT/PROBLEMS

1. System Audit:

a. Average, seasonal, peak use patterns.

Figures 1 through 5 best illustrates average, seasonal, and peak use patterns. Figures 1 through 4 are for individual entities, with Figure 5 representing the total Authority. These figures indicate that the La Porte Area Water Authority follows most cities in having higher average water use in the summer months from lawn watering. The peak to average use ratio (average daily summer use divided by average annual daily use) is 1.32 for the Authority. This ratio is relatively low because of the very humid climate and high average rainfall the area receives.

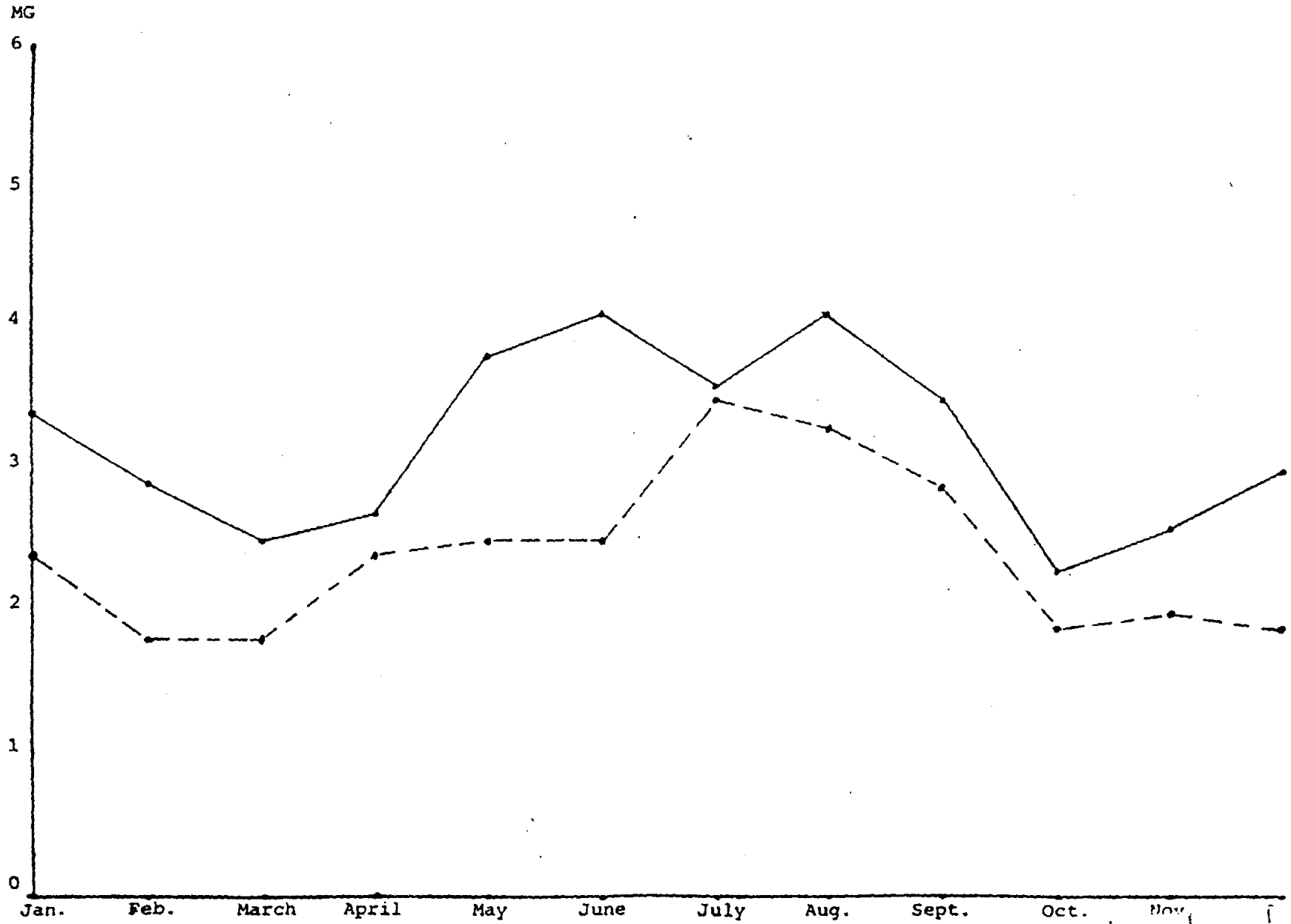
b. Unaccounted water volumes and likely causes.

Figures 1 through 5 illustrates the relationship between water production and sales for each individual entity and the Authority as a whole. The difference between production and sales can typically be attributed to all or some of the following:

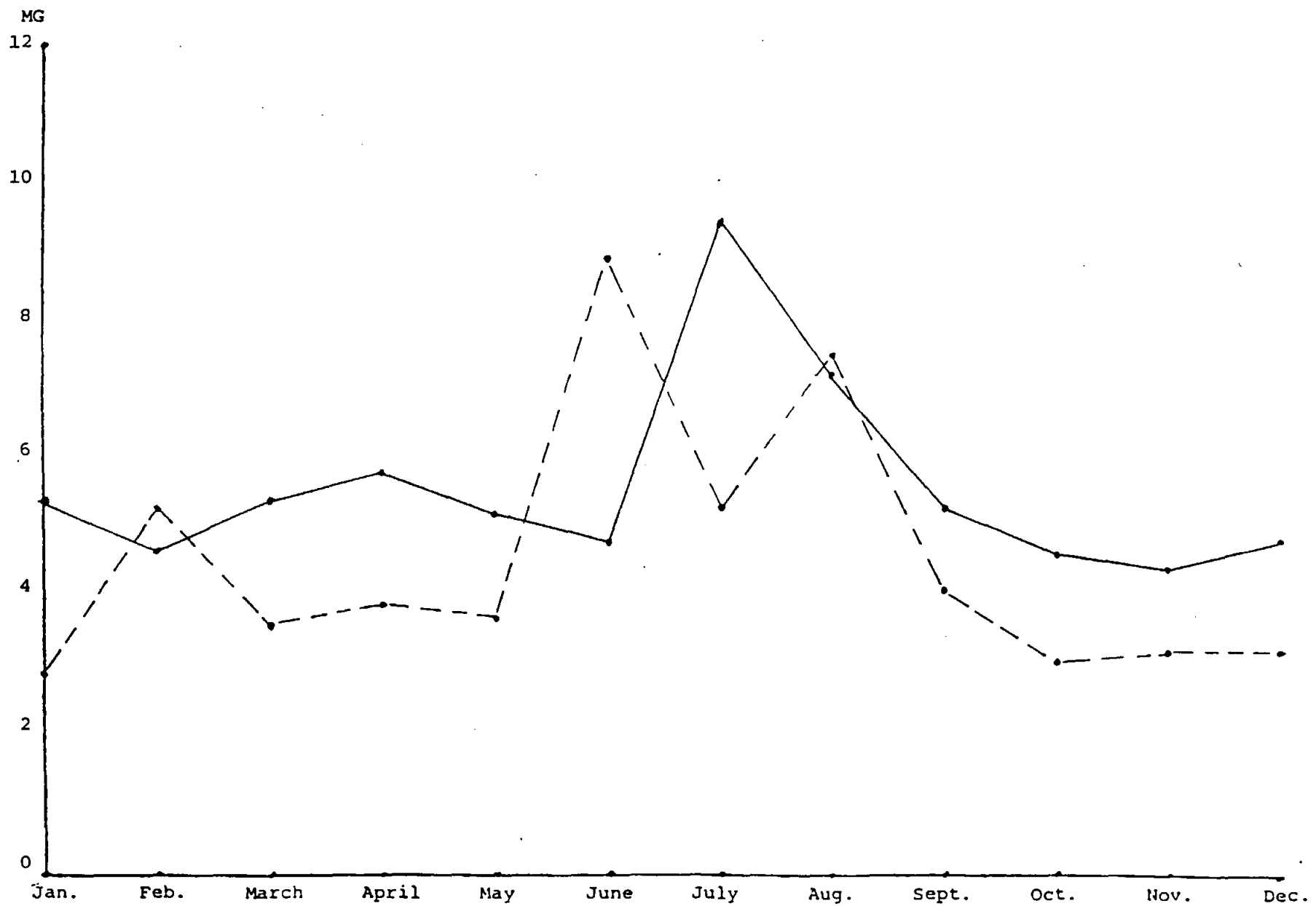
1. Flushing of water mains
2. Fire fighting
3. Inaccurate metering
4. System leaks
5. Unauthorized water use
6. Unmetered water sales

The time difference between water production and water sales in Figure 1 is the result of the City of La Porte's cycle billing, and problems with meter reading. The difference between water production and sales for the Authority from January 1, 1986 to December 31, 1986 is approximately 108,634,600 gallons, or 9.1% of total water production.

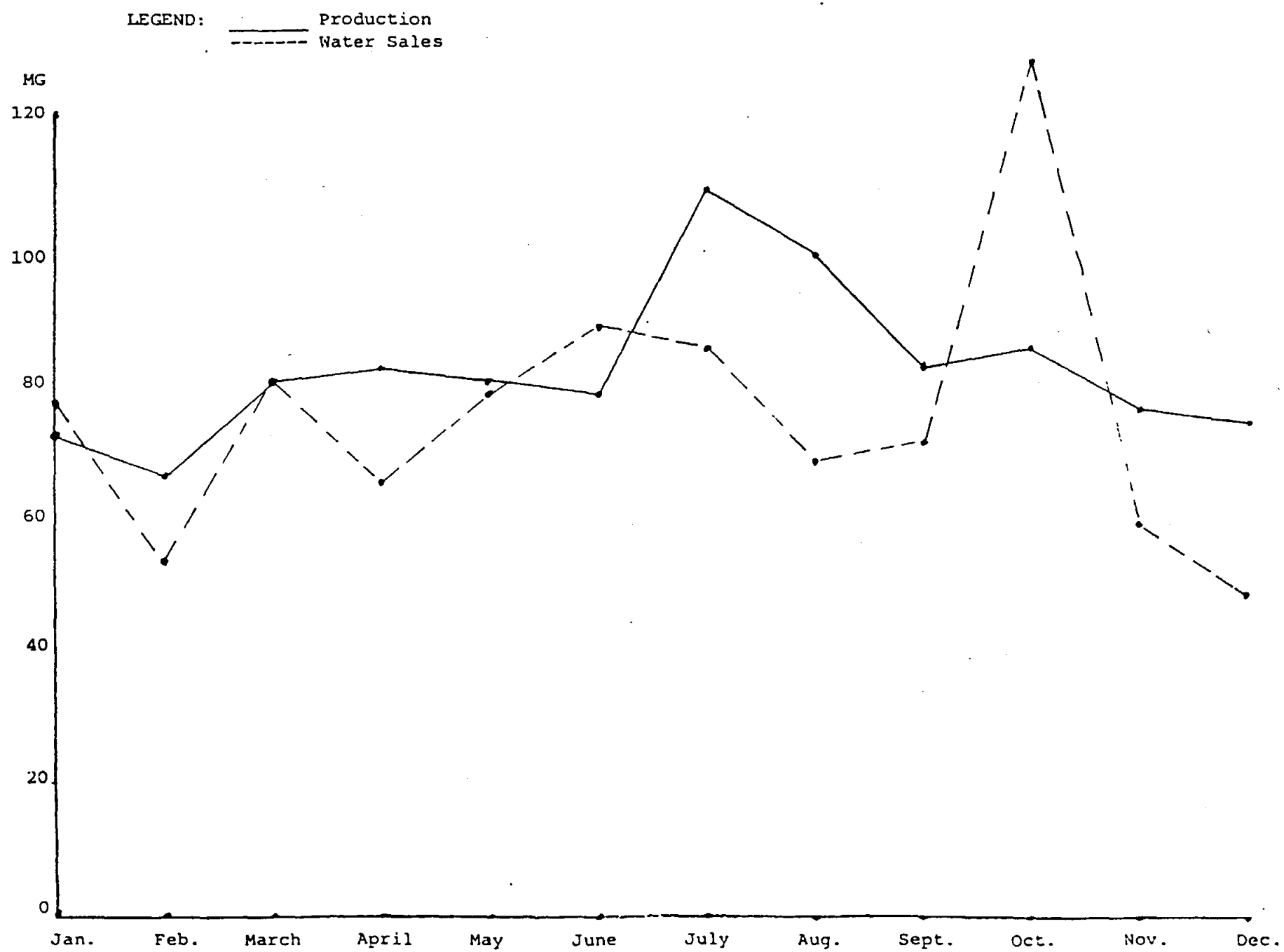
CITY OF MORGAN'S POINT - 1986 PRODUCTION AND WATER SALES



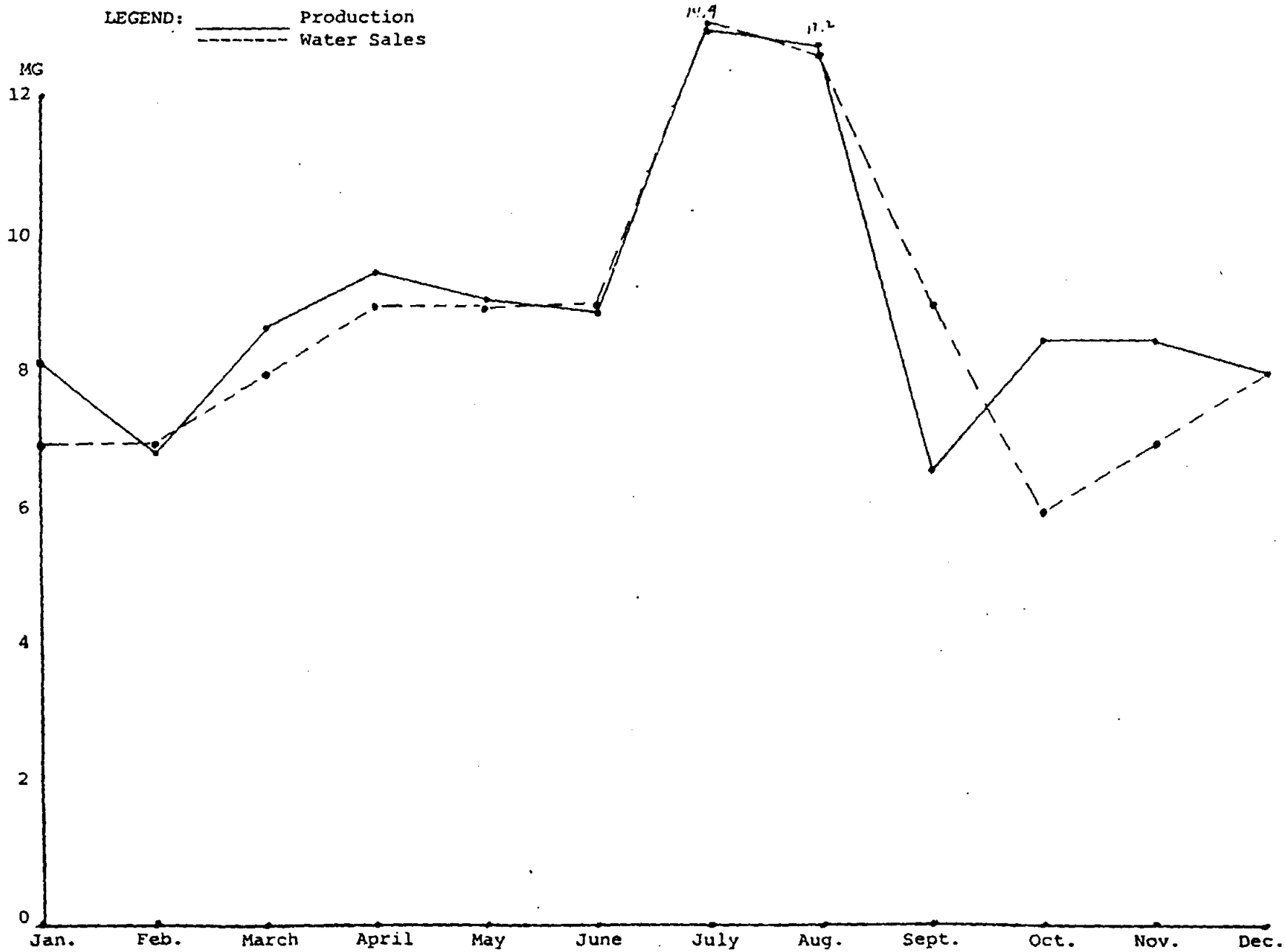
CITY OF SHOREACRES - 1986 PRODUCTION AND WATER SALES

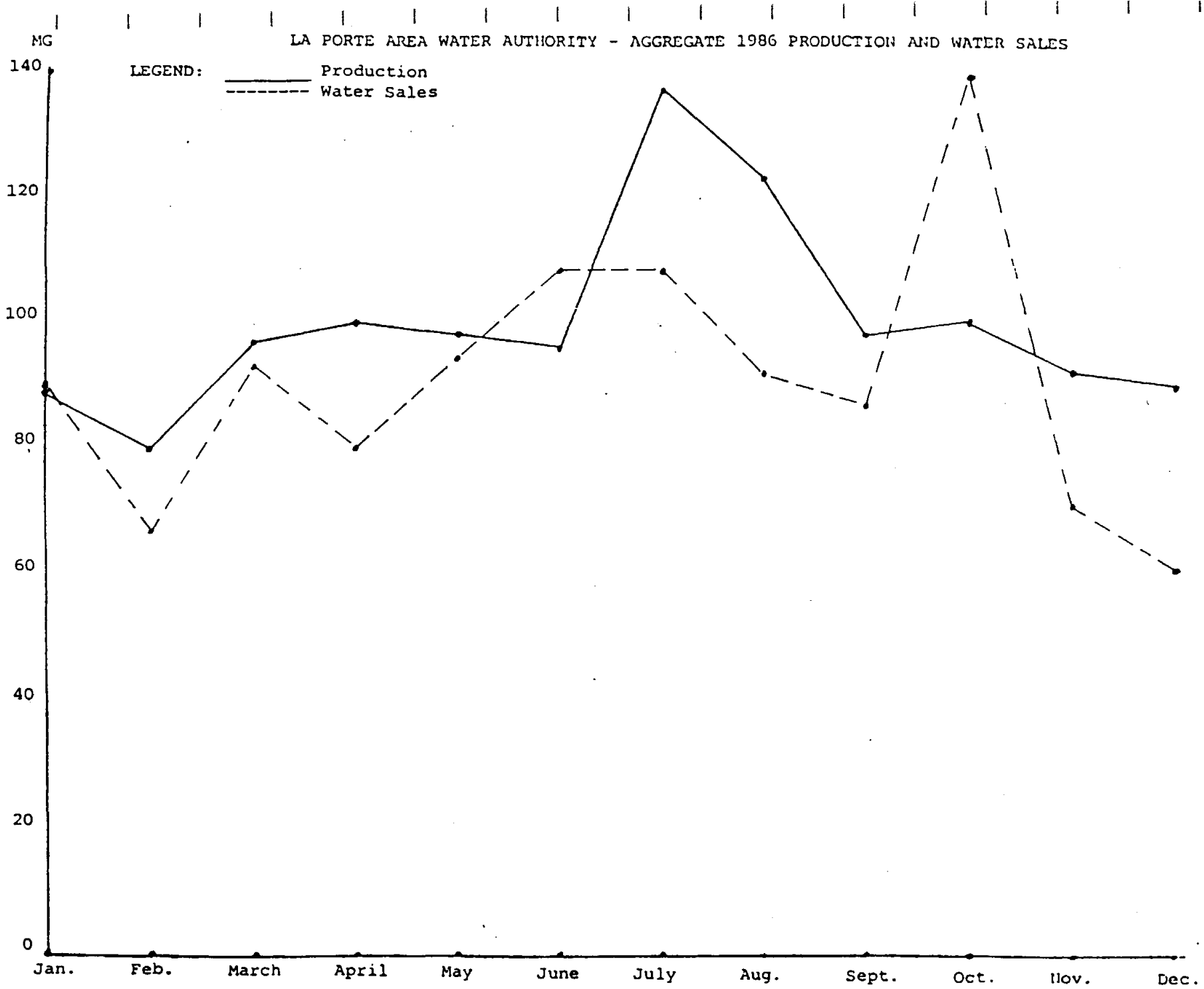


CITY OF LA PORTE - 1986 PRODUCTION AND WATER SALES



BAYSHORE MUNICIPAL UTILITY DISTRICT - 1986 PRODUCTION AND WATER SALES




LA PORTE AREA WATER AUTHORITY - AGGREGATE 1986 PRODUCTION AND WATER SALES
MG
LEGEND:
Production
Water Sales
140
120
100
80
60
40
20
0
Jan.
Feb.
March
April
May
June
July
Aug.
Sept.
Oct.
Nov.
Dec.

c. Adequacy of treatment, storage, and distribution system.

The cities of La Porte, Morgan's Point, Shoreacres, and Bayshore Municipal Utility District presently obtain all water from groundwater sources. The only treatment is chlorination. The water is tested on a regular basis in accordance with EPA and Texas Department of Health regulations. Because of the mandate by the Harris-Galveston Coastal Subsidence District for cities in the Gulf Coast Area to convert to 90% surface water by the year 1990, the La Porte Area Water Authority was formed to obtain surface water supplies within the timetable. After extensive study, the La Porte Area Water Authority has concluded that the most cost effective means to supply its customers with surface water is to purchase capacity at the new Southeast Water Purification Plant, currently under construction, and to build transmission and distribution mains to supply customers.

The cities of Morgan's Point and Shoreacres currently have adequate storage and distribution systems. The Texas Department of Health has advised the City of La Porte that additional elevated storage is required to meet the department's "Minimum Water Quantity Requirements for Public Water Systems.". This problem was address in the city's recent bond election, an additional elevated storage tank is planned for the future. Bayshore Municipal Utility District, in order to adequately mix and store the proposed surface water, will need to construct a ground storage facility and associated pumping in the near future.

d. Limit of existing supply/potential new sources.

It is apparent from the systems audit , that all four (4) entities are very capable of providing water to their customers from groundwater sources. In addition, the distribution and transmission systems are adequate, with the exception of the above mentioned problems.

With the conversion to surface water, the adequacy of groundwater supplies to meet peak load demands in any drought contingencies that might occur are apparent. However, due to the constraints imposed by the Harris-Galveston Subsidence District on groundwater withdrawal, these sources will only be used to supply peak demand in possible drought contingencies.

e. Wastewater collection and treatment system.

Currently, only the cities of La Porte and Morgan's Point treat their own wastewater. The City of Shoreacres and Bayshore Municipal Utility District pump their wastewater flows to a regional wastewater facility owned by the Gulf Coast Waste Disposal Authority.

The City of La Porte, under its current bond program, is constructing approximately six (6) miles of relief sewer, and increasing the capacity at its main wastewater treatment facility. These improvements are designed to meet the city's needs to the year 2000.

2. System Problems:

The La Porte Area Water Authority currently has no serious water supply problems. The storage and distribution systems for each entity are adequate, with the exception of Bayshore Municipal Utility District, to supply surface water to its customers through the Authority from the Southeast Water Purification Plant. As previously discussed, Bayshore Municipal Utility District will be required to construct a ground storage tank with associated pumping facilities for adequate mixing and storage requirements.

E. ALTERNATIVES:

Water conservation methods are typically divided into two (2) categories, Demand Management Methods and Supply Management Methods. Demand Management Methods deal with water use on the downstream side of a customer meter. Demand management provides for education or incentives to reduce the water use by the consumer. This method of conservation generally results in a decrease in water revenues because less water is purchased from the City.

Supply Management Methods deals with the utility's water system upstream of the customer's meter. The goal of supply mangement is to improve efficiency and reduce waste within the production, treatment, and distribution system. Supply management usually results in decreased costs to the utility as water losses in the system are reduced.

1. DEMAND MANAGEMENT ALTERNATIVES

a. Education and Information:

The most readily available and lowest cost method of promoting water conservation is to inform water users about ways to save water inside homes and other buildings, in landscaping and lawn uses, and in recreational uses. An effective education and information program can be easily and inexpensively administered by the La Porte Area Water Authority. Materials available from the American Water Works Association, Texas Water Development Fund, and other like associations can easily be made available to the four (4) entities involved with the Water Authority for distribution to their customers, through hand outs, mail outs, and other sources. All four (4) entities have adopted the Bayshore Sun as their official newspaper. This publication can be used to print articles concerning water conservation. The use of various radio stations in the area, together with public and cable television systems, can also be utilized for this purpose.

b. Plumbing Codes:

Water saving plumbing codes for new construction and for replacement of plumbing in existing structures may be adopted. The standards recommended by the Texas Water Development Fund represent readily available technologies and do no involve additional costs when compared with "standard" fixtures. Water conserving plumbing codes can be specially tailored to be adopted by each individual entity, in addition to the Standard Plumbing Code 1985 edition with Appendix J.

The cities of La Porte and Morgan's Point utilize standard codes whenever possible, however, the other entities utilize individual ordinances codifying their requirements.

c. Retrofit Programs:

The Authority should make information available through its education program for plumbers and customers to use when purchasing and installing plumbing fixtures, lawn watering equipment, or water using appliances. Information regarding retrofit devices such as low-flow shower heads or toilet damns that reduce water use by replacing or modifying existing fixtures or appliances should also be provided.

d. Water Rate Structures:

A water conservation oriented rate structure usually takes the form of an increasing block rate, although continuously increasing rate structures, peak or seasonal load rates, excess use fees, and other rate forms can be used. The increasing block rate structure is the most commonly used water conservation rate structure. Separate rate structures are usually used for commercial, institutional, and industrial customers.

The City of La Porte is the only entity within the La Porte Area Water Authority currently using an increasing block rate structure. The other entities are utilizing various forms of flat rate. Current rate structures encourage water conservation in La Porte only. However, it is expected that the other entities will follow a conservation oriented increasing block rate structure as the cost for purchasing and transporting water become more readily apparent.

e. Water Conserving Landscaping:

In order to reduce the demands placed on a water system by landscape watering, the city or utility should consider methods that either encourage, by education and information, or require, by code or ordinance, water conserving landscaping by residential customers and commercial establishments engaged in the sale or installation of landscape plants or watering equipment. Because the La Porte Area Water Authority is located on the Gulf Coast, it has a very high annual average rainfall. The need for outdoor watering is not as high as for arrid climates. Agricultural land in the area is not irrigated. Although not made a specific section of the Conservation Plan, water conserving landscaping information will be made available through the Information/Education Section.

2. SUPPLY MANAGEMENT ALTERNATIVES

a. Universal Meeting:

All public water supply utilities should master meter their water source. In addition, all users, including the utility itself, should be metered. A regularly scheduled maintenance program of meter repair and replacement also needs to be established to ensure that proper metering is taking place. Metering and meter repair and replacement, can be used in conjunction with other programs such as leak detection and repair and, thereby, save significant quantities of water. Nearly all sales by the various entities in the La Porte Area Water Authority are metered, with the exception of a few utility owned facilities. Currently, only the City of La Porte has a regular meter repair replacement program. However, production meters are tested yearly by all entities.

b. Leak Detection and Repair:

A continuous leak detection, location, and repair program can be an important part of a water conservation plan. An annual water accounting or audit should be part of the program. Sources of unaccounted for water, once located, should be immediately corrected. Utility employees for the various entities periodically check for leaks when reading meters and when driving around the city during regular maintenance. Major leaks are usually quickly detected by either city employees or customers and are repaired immediately. Soil in the area is generally clay and, therefore, leaks show up at the gound surface quite readily. Leak detection technology is also available in the form of electronic sonic devices.

c. Recycling and Reuse:

A city or utility should evaluate the potential of recycling and reuse because these methods may be used to increase water supplies in the utility's service area. Reuse can be especially important where the use of treated effluent from an industry or a municipal system or agricultural return flows replace an existing use that currently requires fresh water from a city's or utility's supply. Recycling of in-plant process or cooling water can reduce the amount of fresh water required by many industrial operations. Currently, only the City of La Porte has a water reuse program. Because of its size and daily flows, the reuse of treated effluent for processed water has proven quite economical for the City of La Porte, with an estimated one million gallons per month being used for this purpose. In addition, the City of La Porte is presently constructing a municipal golf course. The use of treated effluent for irrigation for this facility is planned.

As previously stated, the City of Shoreacres and Bayshore Municipal Utility District currently send their wastewater flows to a regional treatment facility, therefore, the reuse of treated effluent is not possible. Because of the small capacity and the limited resources available to the City of Morgan's Point, reuse of wastewater is not possible.

F. PLAN DESCRIPTION

Based on the evaluation of alternatives available to the La Porte Area Water Authority for conserving water, the following elements have been selected as those best suited to the needs of the Authority for water conservation:

Demand Management

Public education and information
Water conserving plumbing code for new construction
Retrofit programs
Water rate structures

Supply Management

Universal metering
Meter repair and replacement
Leak detection and repair
Recycling/reuse

The goal of this water conservation plan is a reduction of 5% in the consumption of water per connection to the system.

1. PUBLIC EDUCATION AND INFORMATION

A program of public education and information to promote water conservation by the public will be instituted. The program will include the following:

Distribution of educational materials to all customers will be made six (6) during the first year of the program and two (2) times per year thereafter. The semi-annual distribution will be timed to correspond with the peak summer and winter demand periods. The initial pamphlet will explain the purpose of the Conservation and Drought Contingency Plan, and will coincide with a published article in the Bayshore Sun on the same subject. Thereafter, educational materials will present various water conserving methods, including plumbing fixtures and devices available for retrofit or addition, water conserving methods in landscaping and irrigation, and good water use practices to conserve water.

Regular Articles will be published in the Bayshore Sun at times corresponding to the distribution mentioned above, and more often as conditions warrant. As mentioned in 1a on page 21, the Bayshore Sun is the official newspaper for all four (4) entities.

The program will cover the water saving methods listed in Appendix A "Water Saving Methods". The Authority will put special emphasis on the need to insulate pipes to prevent freezing in cold weather,retrofitting of plumbing fixtures and devices, and landscaping conservation methods. The energy savings associated with a water conservation program will also be emphasized.

Assistance in obtaining publications and materials for the program will be obtained from:

Texas Water Development Board
American Water Works Association
American Public Works Association

During the first year of the program, individual pamphlets and flyers will be developed, tailored to the specialized needs and goals of the Authority.

2. WATER CONSERVING PLUMBING CODE

The entities comprising the La Porte Area Water Authority will adopt appropriate plumbing codes for new construction and for replacement of plumbing in existing structures, and will be water conserving by nature. The City of Shoreacres and Bayshore Municipal Utility District will adopt individual code amendments and additions by ordinance or resolution. The cities of La Porte and Morgan's Point will adopt the Southern Building Code International, 1985 Edition of the Standard Plumbing Code with Appendix J.

3. RETROFIT PROGRAMS

The La Porte Area Water Authority will make information available through its education program for plumbers and customers to use when purchasing and installing plumbing fixtures, lawn watering equipment, or water using appliances. Information regarding retrofit devices such as low-flow shower heads or toilet dams that reduce water use by replacing or modifying existing fixtures or appliances will also be provided. When the Authority begins to produce revenue, kits containing retrofit devices can be budgeted and made available to member entities for distribution to customers.

4. UNIVERSAL METERING

The entities comprising the La Porte Area Water Authority currently meter all water sales from its system, with the exception of a few public uses. It is anticipated that all water users will be metered within six (6) months. In addition, in response to requirements by the Harris-Galveston Coastal Subsidence District, all wells are currently metered at the well head. The future purchase of surface water from the City of Houston's Southeast Water Purification Plant will also be metered at the plant, and each individual customer of the La Porte Area Water Authority will also be metered.

The program of universal metering will continue and is made a part of the Water Conservation Plan.

5. WATER RATE STRUCTURES

At the present time the City of La Porte is the only entity within the La Porte Area Water Authority that utilizes a conservation oriented rate structure, i.e. increasing block rate. In order to meet the requirements set out by the Texas Water Development Fund for conservation oriented rate structures, the cities of Shoreacres and Morgan's Point, and Bayshore Municipal Utility District will implement conservation oriented water rate structures as soon as possible. However, because of time constraints and the uncertainty of the final cost to provide surface water to all customers, it is anticipated that the conservation oriented water rate structure will be implemented at such time as the final costs for water improvements are known. Timetable for converting to conservation oriented rate structures is one (1) year from the date of this Plan.

6. METER REPAIR AND REPLACEMENT

The City of La Porte currently owns and operates equipment for meter testing. Currently, the cities Shoreacres and Morgan's Point, and Bayshore Municipal Utility District have no formal meter repair and replacement program. Because of the small size of these three (3) utilities, it is anticipated that meter testing and repair will be performed by an outside service, or through interlocal agreements with the City of La Porte. The current meter repair and testing program in place at the City of La Porte has been and will continue to be as follows:

1. Production meters - test once a year
2. Meters larger than four inch - test once a year
3. Meters larger than one inch - test every 5 years
4. Meters smaller than one inch - test every 10 years

This schedule will be adopted by all customers of the Authority.

In addition, the Authority, through its individual customers, will verify that each meter in the system is properly sized for the average volume of water being used in accordance with the manufacturers specification for the meter.

7. LEAK DETECTION AND REPAIR

The entities comprising the La Porte Area Water Authority currently have leak detection programs which will be maintained. The program includes:

a. Monthly water use accounting by the Billing Department which identifies high water used after the service meters indicate leaks,

b. Visual inspection by utility employees who keep a constant watch out for abnormal conditions indicating leaks,

c. An adequate maintenance staff which is available to repair any leaks.

d. When funds become available, the Authority and/or each entity will purchase leak detection equipment, and incorporate this device as a regular part of the leak detection program.

8. RECYCLING/REUSE

As previously noted, the City of La Porte is the only entity within the La Porte Area Water Authority with the capability of reuse and recycling of treated effluent. Current use includes the recycling of approximate one million gallons per month at the Main La Porte Wastewater Treatment Plant used in process water, i.e., washdown, irrigation. In addition, the La Porte Municipal Golf Course, currently under construction, has applied to the Texas Department of Water Resources for a permit to utilize approximately 1.85 acre-feet per acre per year of treated effluent for irrigational purposes. That will vary of course during seasonal and various weathers. No recycling or reuse is anticipated by Morgan's Point, Shoreacres, or Bayshore Municipal Utility District.

G. IMPLEMENTATION/ENFORCEMENT

The General Manager of the La Porte Area Water Authority will act as the Administrator of the Water Conservation Program. The Administrator will oversee the execution and implementation of all elements of the program. He will also be responsible to oversee the keeping of adequate records for program verification. Each entity will be responsible for furnishing all information needed and requested by the Authority.

In addition to the above, the Administrator will be responsible for the submission of an annual report to the Texas Water Development Board on the Water Conservation Plan. The report will include the following elements:

1. Progress made in the implementation of the program
2. Response to the program by the public
3. Quantitative effectiveness of the program

The program will be enforced through adoption of the Water Conservation Plan by ordinance of the City Council of the cities of La Porte, Morgan's Point and Shoreacres, and by Resolution by the Board of Directors of the Bayshore Municipal Utility District. In addition, the entities of the La Porte Area Water Authority will adopt a water conserving plumbing code. The adopting ordinances and resolution for the plan are found in Appendix B. The appropriate plumbing codes are found in Appendix C.

Each entity will provide certified copies of all ordinances and resolutions concerning water rates, plumbing codes, and other regulatory documents necessary for the administration of this plan, including all updates.

III. DROUGHT CONTINGENCY PLAN

A. INTRODUCTION

Drought, or a number of other uncontrollable circumstances, can disrupt the normal availability of community or utility water supplies. Even though a city may have an adequate water supply, the supply could become contaminated, or a disaster could destroy the supply. During drought periods, consumer demand is often significantly higher than normal. Some older systems, or systems serving rapidly growing areas, may not have the capacity to meet higher than average demands without system failure or other unwanted consequences. System treatment, storage, or distribution failures can also present a city or utility with an emergency demand management situation.

It is important to distinguish drought contingency planning from water conservation planning. While water conservation involves implementing permanent water use efficiency or reuse practices, drought contingency plans establish temporary methods or techniques designed to be used only as long as an emergency exists.
An effective drought contingency plan will need to include the following six elements:

1. Trigger conditions signaling the start of an emergency period;

2. Drought contingency measures;

3. Information and education;

4. Initiation procedures;

5. Termination notification actions; and

6. Means of implementation.

B. SYSTEM CONSTRAINTS

The La Porte Area Water Authority is composed of four (4) entities - the cities of La Porte, Morgan's Point, Shoreacres, and Bayshore Municipal Utility District. The Authority is purchasing production capacity from the City of Houston's Southeast Water Purification Plant. In addition, the Authority is purchasing pumping capacity, or peaking capacity, at 1.25 times the production capacity. Listed below is the production and pumping capacity for each entity, together with total capacity.

CUSTOMER	PRODUCTION CAPACITY (MGD)	PUMPING CAPACITY (MGD)
La Porte	3.50	4.375
Morgan's Point	0.18	0.225
Shoreacres	0.20	0.250
Bayshore MUD	0.32	0.400
TOTAL	4.20	5.250

In addition, each entity has the ability to supply its entire water supply through groundwater production from wells, and is currently doing so. After 1990, the Harris-Galveston Coastal Subsidence District has decreed that no more than ten per cent (10%) of each entity's yearly water production be produced from groundwater. Although additional pumping capacity is planned for peak purposes, it is anticipated that groundwater production will be utilized for peaking purposes whenever possible.

Temporary reductions or disruptions in surface water supply can be offset by increased groundwater withdrawals. Careful planning and monitoring of groundwater withdrawal will be necessary to avoid exceeding the yearly ten percent (10%) limit above.

Long-term reductions or disruptions in surface water supply would require special permission from the Subsidence District to exceed allowable groundwater withdrawal. It is anticipated that conservation measures would be required by the District to allow increased groundwater withdrawal.

C. TRIGGER CONDITIONS

The La Porte Area Water Authority is the contracting party with the City of Houston's Southeast Water Purification Plant. For the purposes of this plan, trigger conditions will be based on the Authority as one system, rather than individual triggers for each entity. Production amounts are based on a seven (7) day average daily demand.

1. Mild Conditions:

   a. Surface water demand approaching 4,200,000 gallons/day (80% of the pumping capacity owned by the Authority at the Southeast Water Purification Plant).

or,

b. Production at the Southeast Water Purification Plant reduced to a point such that the aggregate surface water demand of the Authority is 80% of the reduced pumping capacity.

2. Moderate Conditions

a. Surface water demand approaching 4,725,000 gallons/day (90% of the pumping capacity owned by the Authority at the Southeast Water Purification Plant).

or,

b. Production at the Southeast Water Purification Plant reduced to a point such that the aggregate surface water demand of the Authority is 90% of the reduced pumping capacity.

3. Severe Conditions

a. Surface water demand approaching 5,250,000 gallons/day (100% of the pumping capacity owned by the Authority at the Southeast Water Purification Plant).

or,

b. Production at the Southeast Water Purification Plant reduced to a point such that the aggregate surface water demand of the Authority is 100% of the reduced pumping capacity.

4. Critical Conditions

a. Surface water demand exceeds 5,250,000 gallons/day.

or,

b. Production at the Southeast Water Purification Plant reduced to a point such that the aggregate surface water demand of the Authority exceeds the reduced production, including complete failure of the plant to produce any water.

D. EMERGENCY MANAGEMENT PROGRAM

The following actions shall be taken by the City when trigger conditions are reached:

1. Mild Conditions

   a. Inform the public through the news media that a trigger condition has been reached, and that they should look for ways to voluntarily reduce water use. Specific steps which can be taken will be provided thru the news media.

   b. Notify major commercial water users of the situation and request voluntary water use reductions.

   c. Publicize a voluntary lawn watering schedule.

   d. During winter months request water users to insulate pipes rather than running water to prevent freezing.

2. Moderate Conditions

   a. Continue implementation of all relevant actions in preceding phase.

   b. Car washing, window washing, pavement washing prohibited except when a bucket is used.

   c. The following mandatory lawn watering schedule shall be implemented.

      Customers with even numbered street addresses may water on odd numbered days of the month. Customers with odd numbered street addresses may water on even days of the month. Watering shall occur only between the hours of 6-10 a.m. and 8-10 p.m.

d. The following public water uses, not essential for public health or safety, are prohibited:

1. street washing
2. water hydrant flushing
3. filling pools
4. athletic field watering

3. Severe Conditions

a. Continue implementation of all relevant actions in preceding phase;

b. All outdoor water use is prohibited. Such use includes, but is not limited to the following: lawn watering, car washing, pavement washing;

c. Implement a user surcharge for excessive water use, as follows:

5/8" meter - over 5,000 gal/month	200%
1-1 1/2" meter-over 10,000 gal/month	200%
2" and larger - over 15,000 gal/month	200%
2" and larger - over 20,000 gal/month	300%

4. Critical Conditions

a. Continue implementation of all relevant actions in preceding phase.

b. Petition the Harris-Galveston Coastal Subsidence District for appropriate increase in allowable groundwater withdrawal.

c. Ration or terminate water service to selected portions of the system according to the following order:

1. Industrial/institutional users
2. Commercial users
3. Residential users
4. Public Health and safety facilities

E. INFORMATION/EDUCATION

As a component of the Information/Education section in the Water Conservation Plan, the purpose and effect of the Drought Contingency Plan will be communicated to the public through articles in the Bayshore Sun, supplemented by pamphlets distributed at the same time.

When trigger conditions appear to be approaching, the public will be notified through publication of articles in the Bayshore Sun, with information on water conserving methods.

When trigger conditions have passed, the bayshore Sun will publish notification that drought contingency measures are abated for that condition, and if applicable, will outline measures necessary for the reduced condition.

Throughout the period of a trigger condition, regular articles will appear to explain and educate the public on the purpose, cause, and methods of conservation for that condition.

F. IMPLEMENTATION/ENFORCEMENT

It will be the responsibility of the La Porte Area Water Authority General Manager to monitor, through the various utility departments, the status of the water supply and distribution systems. When a trigger condition is reached, the General Manager will notify each entity through it's chief executive officer, to begin implementation of the Drought Contingency Plan.

The General Manager will continue to monitor the water emergency until it is determined that the trigger condition no longer exists. When this takes place, the General Manager will notify each entity of such, and the Drought Condition Abatement procedures will be implemented.

G. UPDATE OF TRIGGER CONDITIONS

Once a year, the Authority will examine the production requirements and ability to maintain these requirements to determine if trigger conditions need to be reestablished. Consideration should be given to each entity's usage in relation to the aggregate usage, and any anticipated increase in production at the Southeast Water Purification Plant.

APPENDIX A

Water Saving Methods That Can Be Practiced By The Individiual Water User

Appendix A

Water Saving Methods that can be
practiced by the individual water user

In-home water use accounts for an average of 65 percent of total residential use, while the remaining 35 percent is used for exterior residential purposes such as lawn watering and car washing. Average residential in-home water use data indicate that about 40 percent is used for toilet flushing, 35 percent for bathing, 11 percent for kitchen uses, and 14 percent for clothes washing. Water saving methods that can be practiced by the individual water user are listed below.

In the bathroom, customers should be encouraged to:

1. Take a shower instead of filling the tub and taking a bath. Showers usually use less water than tub baths.
2. Install a low-flow shower head which restricts the quantity of flow at 60 psi to no more than 3.0 gallons per minute.
3. Take short showers and install a cutoff valve or turn the water off while soaping and back on again only to rinse.
4. Not use hot water when cold will do. Water and energy can be saved by washing hands with soap and cold water; hot water should only be added when hands are especially dirty.
5. Reduce the level of the water being used in a bath tub

by one or two inches if a shower is not available.

6. Turn water off when brushing teeth until it it time to rinse.
7. Not let the water run when washing hands. Instead, hands should be wet, and water should be turned off while soaping and scrubbing and turned on again to rinse. A cutoff valve may also be installed on the faucet.
8. Shampoo hair in the shower. Shampooing in the shower takes only a little more water than is used to shampoo hair during a bath and much less than shampooing and bathing separately.
9. Hold hot water in the basin when shaving instead of letting the faucet continue to run.
10. Test toilets for leaks. To test for a leak, a few drops of food coloring can be added to the water in the tank. The toilet should not be flushed. The customer can then watch to see if the coloring appears in the bowl within a few minutes. If it does, the fixture needs adjustment or repair.
11. Use a toilet tank displacement device. A one-gallon plastic milk bottle can be filled with stones or with water, recapped, and placed in the toilet tank. This will reduce the amount of water in the tank but still provide enough for flushing. (Bricks which some people use for this purpose are not recommended since they crumble eventually and could damage the working

mechanism, necessitating a call to the plumber). Displacement devices should never be used with new low-volume flush toilets.

12. Install faucet aerators to reduce water consumption.
13. Never use the toilet to dispose of cleansing tissues, cigarette butts, or other trash. This can waste a great deal of water and also plances an unnecessary load on the sewage treatment plant or septic tank.
14. Install a new low-volume fush toilet that uses 3.5 gallons or less per flush when building a new home or remodeling a bathroom.

In the kitchen, customers should be encouraged to:

1. Use a pan of water (Or place a stopper in the sink) for rinshing pots and pans and cooking implements when cooking rather than turning on the water faucet each time a rinse is needed.
2. Never run the dishwasher without a full load. In addition to saving water, expensive detergent will last longer and a significant energy saving will appear on the utility bill.
3. use the sink disposal sparingly, and never use it for just a few scraps.
4. Keep a container of drinking water in the refrigerator. Running water from the tap until it is cool is wasteful. Better still, both water and energy can be saved by keeping cold water in a picnic jug on a kitchen counter to avoid opening the refrigerator door frequently.

5. Use a small pan of cold water when cleaning vegetables rather than letting the faucet run.
6. Use only a little water in the pot and put a lid on it for cooking most food. Not only does this method save water, but food is more nutritious since vitamins and minerals are not poured down the drain with the extra cooking water.
7. Use a pan of water for rinsing when hand washing dishes rather than a running faucet.
8. Always keep water conservation in mind, and think of other ways to save in the kitcher. Small kitchen savings from not making too much coffee or letting ice cubes melt in a sink can add up in a year's time.

In the laundry, customers should be encouraged to:

1. Wash only a full load when using an automatic washing machine (32 to 59 gallons are required per load).
2. Use the lowest water level setting on the washing machine for light loads whenever possible.
3. Use cold water as often as possible to save energy and to conserve the hot water for uses which cold water cannot serve. (This is also better for clothing made of today's systhetic fabrics.)

For appliances and plumbing, the customer should be encouraged to:

1. Check water requirements of various models and brands when considering purchasing any new appliance that uses water. Some use less water than others.

2. Check all water line connections and faucets for leaks. If the cost of water is $1.00 per 1,000 gallons, one could be paying a large bill for water that simply goes down the drain because of leakage. A slow drip can waste as much as 170 gallons of water EACH DAY, or 5,000 gallons per month, and can add as much as $10.00 per month to the water bill.
3. Learn to replace faucet washers so that drips can be corrected promptly. It is easy to do, costs very little, and can represent a substantial amount saved in plumbing and water bills.
4. Check for water leakage that the customer may be entirely unaware of, such as a leak between the water meter and the house. To check, all indoor and outdoor faucets should be turned off, and the water meter should be checked. If it continues to run or turn, a leak probably exists and needs to be located.
5. Insulate all hot water pipes to avoid the delays (and wasted water) experienced while waiting for the water to "run hot."
6. Be sure the hot water heater thermostat is not set too high. Extremely hot settings waste water and energy because the water often has to be cooled with cold water before it can be used.
7. Use a moisture meter to determine when house plants need water. More plants die from over-watering than from being too dry.

For out-of-door use, customers should be encouraged to:

1. Water lawns early in the morning during the hotter summer months. Much of the water used on the lawn can simply evaporate between the sprinkler and the grass.
2. Use a sprinkler that produces large drops of water, rather than a fine mist, to avoid evaporation.
3. Turn soaker hoses so the holes are on the bottom to avoid evaporation.
4. Water slowly for better absorption, and never water on windy days.
5. Forget about watering the street or walks or driveways. They will never grow a thing.
6. Condition the soil with compost before planting grass or flower beds so that water will soak in rather than run off.
7. Fertilize lawns at least twice a year for root stimulation. Grass with a good root system makes better use of less water.
8. Learn to know when grass needs watering. If it has turned a dull grey-green or if footprints remain visible, it is time to water.
9. Not water too frequently. Too much water can overload the soil so that air cannot get to the roots and can encourage plant diseases.
10. Not over-water. Soil can absorb only so much moisture and the rest simply runs off. A timer will help, and either a kitcher timer or an alarm clock will do. An

inch and one-half of water applied once a week will keep most Texas grasses alive and healthy.

11. Operate automatic sprinkler systems ony when the demand on the town's water supply is lowest. Set the system to operate between four and six a.m.
12. Not scalp lawns when mowing during hot weather. Taller grass holds moisture better. Rather, grass should be cut fairly often, so that only 1/2 to 3/4 inch is trimmed off. A better looking lawn will result.
13. Use a watering can or hand water with the hose in small areas of the lawn that need more frequent watering (those near walks or driveways or in especailly hot, sunny spots.)
14. Learn what types of grass, shrubbery, and plants do best in the area and in which parts of the lawn, and then plant accordingly. If one has a heavily shaded yard, no amount of water will make roses bloom. In especially dry sections of the state, attractive arrangements of plants that are adapted to arid or semi-arid climates should be chosen.
15. Consider decorating areas of the lawn with rocks, gravel, wood chips, or other materials now available that require no water at all.
16. Not "sweep" walks and driveways with the hose. Use a broom or rake instead.
17. Use a bucket of soapy water and use the hose only for rinsing when washing the car.

ORDINANCE NO. 1532

AN ORDINANCE AMENDING CHAPTERS 8 AND 22-1/2 OF THE CODE OF ORDINANCES OF THE CITY OF LA PORTE, BY ADOPTING THE NEW AND MOST RECENT ADDITIONS OF THE SOUTHERN STANDARD BUILDING CODE, 1985 EDITION, AND APPENDICES, THE SOUTHERN STANDARD PLUMBING CODE, 1985 EDITION, AND APPENDICES, THE SOUTHERN STANDARD GAS CODE, 1985 EDITION, AND APPENDICES, THE SOUTHERN STANDARD MECHANICAL CODE, 1985 EDITION, AND APPENDICES; BY REQUIRING A $5,000.00 BOND TO BE PRESCRIBED BY THE BUILDING INSPECTOR IN THE INSTANCE OF MOVING OF BUILDINGS, GENERAL AND BUILDING CONTRACTING WORK, PLUMBING WORK, AND MECHANICAL WORK; BY AMENDING TERMS UNDER WHICH THE SOUTHERN STANDARD BUILDING CODE IS TO BE ADOPTED BY THE CITY BY ALTERING REQUIREMENTS FOR INSTALLATION AND CONSTRUCTION OF FIRE DETECTION SYSTEMS; BY AMENDING TERMS UNDER WHICH THE SOUTHERN STANDARD BUILDING CODE IS TO BE ADOPTED BY THE CITY BY ALTERING REQUIREMENTS FOR INSTALLATION OF WOOD SHINGLES; PROVIDING THAT GENERAL AND MECHANICAL CONTRACTORS AND PLUMBING CONTRACTORS ATTEMPTING TO PERFORM WORK IN THE CITY OF LA PORTE CARRY WORKERS' COMPENSATION INSURANCE, PUBLIC LIABILITY INSURANCE IN CERTAIN SPECIFIED AMOUNTS, AND PROPERTY DAMAGE INSURANCE IN CERTAIN SPECIFIED AMOUNTS; PROVIDING THAT ANY PERSON VIOLATING THE TERMS OF THIS ORDINANCE SHALL BE DEEMED GUILTY OF MISDEMEANOR AND UPON CONVICTION SHALL BE FINED IN ANY SUM NOT MORE THAN TWO HUNDRED DOLLARS ($200.00); CONTAINING A REPEALING CLAUSE; CONTAINING A SEVERABILITY CLAUSE; FINDING COMPLIANCE WITH THE OPEN MEETINGS LAW; AND PROVIDING AN EFFECTIVE DATE HEREOF.

BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF LA PORTE:

Section 1. Section 8-13 of the Code of Ordinances of the City of La Porte is hereby amended, to hereafter read as follows, to-wit:

"Section 8-13. Adopted
The Southern Standard Building Code, 1985 Edition, and appendices as adopted by the Southern Building Code Congress International, a copy of which is on file in the office of the City Secretary of the City of La Porte, Harris County, Texas, is hereby adopted and designated as the Building Code of the City of La Porte, incorporated by reference in this article, and made a part hereof, as fully as if copied at length herein."

Section 2. Section 8-26 of the Code of Ordinances of the City of La Porte is hereby amended, to hereafter read as follows, to-wit:

"Section 8-26. Adopted.
The Southern Plumbing Code, 1985 Edition, and appendices, as adopted by the Southern Building Code Congress International, a copy of which is on file in the office of the City Secretary of the City of La Porte, Harris County, Texas, is hereby adopted and designated as the Plumbing Code of the City of La Porte, incorporated by reference in this article, and made a part hereof, as fully as if copied at length herein."

Section 3. Section 8-49 of the Code of Ordinances of the City of La Porte is hereby amended, to hereafter read as follows, to-wit:

"Section 8-49. Adopted.
The Southern Standard Gas Code, 1985 Edition, and appendices as adopted by the Southern Building Code Congress International, a copy of which is on file in the office of the City Secretary of the City of La Porte, Harris County, Texas, is hereby adopted and designated as the Gas Code of the City of La Porte, incorporated by reference in this article, and made a part hereof, as fully as if copied at length herein."

Section 4. Section 8-66 of the Code of Ordinances of the City of La Porte is hereby amended, to hereafter read as follows, to-wit:

"Section 8-66. Adopted.
The Southern Standard Hechanical Code, 1985 Edition, andappendices as adopted by the Southern Building Code Congress International, a copy of which is on file in the office of the City Secretary of the City of La Porte, Harris County, Texas, is hereby adopted and designated as the Hechanical Code of the City of La Porte, incorporated by reference in this article, and made a part hereof, as fully as if copied at length herein."

Section 5. Section 8-20 of the Code of Ordinances of the City of La Porte is hereby amended, to hereafter read as follows, to-wit:

"Section 8-20. General and Building Contractors - Bond.
The Building Inspector is instructed to prescribe the amount of Five Thousand Dollars ($5,000.00) as the requirement for bonds executed in accordance with the Southern Standard Building Code, Section A103.5, provisions concerning Contractors license.

Section 6. Section 8-28 of the Code of Ordinances of the City of La Porte is hereby amended, to hereafter areas as follows, to-wit:

"Section 8-28. Plumbing Work - Bond. The Building Inspector is instructed to prescribe the amount of Five Thousand Dollars ($5,000.00) as the requirement for bonds executed in accordance with the Southern Standard Plumbing Code, Section A103.5, Contractors license.

Section 7. Section 8-67 of the Code of Ordinance of the City of La Porte is hereby amended, to hereafter read as follows, to-wit:

"Section 8-67. Mechanical Work - Bond. The Building Inspector is instructed to prescribe the amount of Five Thousand Dollars ($5,000.00) as the requirement for bonds executed in accordance with the Southern Standard Mechanical Code, Section A103.5 provisions concerning Contractor license.

Section 8. Section 8-16 of the Code of Ordinances of the City of La Porte is hereby amended, to hereafter read as follows, to-wit:

"Section 8-16. Standard Building Code Amended. The Standard Building Code, heretofore adopted by the City Council of the City of La Porte, be, and the same is hereby amended to read as follows, to-wit:

Section 903.2.2. Fire Detection Systems. Every newly constructed dwelling, and every newly constructed dwelling unit within an apartment house, condominium, townhouse, and every guest room in a hotel or motel, and every basement or cellar within such dwellings, shall be provided with an Underwriters Laboratories, Inc., approved smoke detector, which may be either 120-volt A.C., or battery operated.

Detector shall be mounted on the ceiling or wall at a point centerlly located in the corridor or area giving access to rooms used for sleeping purposes. In an efficiency dwelling unit, the detector shall be centrally located on the ceiling of the main room. Where sleeping rooms are of an upper level, the detector shall be placed in the center of the ceiling directly above the stairway. All detectors shall be located within twelve (12) inches of the ceiling. Care shall be exercised to insure that the installation will not interfere with the operating characteristics of the detector. When activated, the detector shall provide an audible alarm."

Section 9. A new section is hereby added to Chapter 8, Article 2, of the Code of Ordinances of the City of La Porte, said section being numbered 8-17, which is to hereafter read as follows, to-wit:

"Section 706.6.1 Outside the Fire District, buildings three stories or less in height or 9000 sq. feet (for allowable area increases, see 402.3, for horizontal separation modifications) in area located not less than 6 feet from the property line may be roofed with U.L. Listed Fire Retardant Treated wood shingles or shakes or No. 1 and No. 2 U.L. Listed Fire Retardant Treated Southern Yellow Pine taper saw or shakes.

Section 10. Section 8-21 of the Code of Ordinances of the City of La Porte is hereby amended, to hereafter read as follows, to-wit:

"Section 8-21. General and Building Contractors - Liability Insurance. No permit shall be issued for any general or building contracting work, as said work is defined within the Southern Standard Building Code, 1985 Edition, until the general or building contractor or his employer shall have arranged to carry the following insurance:

(a) Workers' Compensation insurance on each and every one of his employees as required and in accordance with the provisions of the Workers' Compensation Act of the State of Texas;

(b) Public liability insurance to the extent of $50,000.00 for any one accident, and $100,000.00 for any one person; and

(c) Property damage insurance to the extent of $10,000.00 for any one accident, and $100,000.00 in the aggregate.

Such insurance shall be written by an accredited company under the supervision of the Board of Insurance Commissioners of the State of Texas.

Evidence of compliance with the above insurance requirements shall be considered as having been met when the policy, a copy thereof, or a Certificate of Insurance has been filed with and approved by the Chief Building Official of the City of La Porte. Such policy shall include an endorsement thereon that the Chief Building Official will be notified at least ten (10) days in advance in the event of the policy or policies being cancelled or expiring before the expiration date of the license."

Section 11. A new section is hereby added to Chapter 8, Article 2, of the Code of Ordinances of the City of La Porte, said section being numbered 8-22, which is to hereafter read as follows, to-wit:

"Section 8-22. Southern Standard Plumbing & Mechanical Contractors - Liability Insurance. No permit shall be issued for any plumbing contract work, as said work is defined within the Southern Standard Building Code, 1985 Edition, until the plumbing contractor or his employer shall have arranged to carry the following insurance:

(a) Workers' Compensation insurance on each and every one of his employees as required and in accordance with the provisions of the Workers' Compensation Act of the State of Texas;

(b) Public Liability insurance to the extent of $50,000.00 for any one accident, and $100,000.00 for any one person; and

(c) Property damage insurance to the extent of $10,000.00 for any one accident, and $100,000.00 in the aggregate.

Such insurance shall be written by an accredited company under the supervision of the Board of Insurance Commissioners of the State of Texas.

Evidence of compliance with the above insurance requirements shall be considered as having been met when the policy, a copy thereof, or a Certificate of Insurance has been filed with and approved by the Chief Building Official of the City of La Porte. Such policy shall include an endorsement thereon that the Chief Building Official will be notified at least ten (10) days in advance in the event of the policy or policies being cancelled or expiring before the expiration date of the license."

Section 12. If any section, sentence, phrase, clause, or any part of any section, sentence, phrase, or clause, of this ordinance shall, for any reason, be held invalid, such invalidity shall not affect the remaining portions of the Ordinance, and it is hereby declared to be the intention of this CIty Council to have passed each section, sentence, phrase or clause, or part thereof, irrespective of of the fact that any other sction, sentence, phrase or clause, or part thereof, may be declared invalid.

Section 13. Any person, as defined in Section 1.02 (27), Texas Penal Code, who shall violate any provision of this ordinance, shall be deemed guilty of a misdemeanor and up conviction shall be punished by a fine not to exceed Two Hundred Dollars ($200.00). Each day any violation of this ordinance shall continue shall constitute a separate violation.

Section 14. The City Council officially finds, determines, recites and declares that a sufficient written notice of the date, hour, place and subject of this meeting of the City Council was posted at a place convenient to the public at the City Hall of the City for the time required by law preceding this meeting, as required by the Open Meetings Law, Article 6252-17, Texas Revised Civil

Statutes Annotated; and that this meeting has been open to the public as required by law at all times during which this ordinance and the subject matter thereof has been discussed, considered and formally acted upon. The City Council further ratifies, approves and confirms such written notice and the contents and posting thereof.

Section 15. This Ordinance shall be effective fourteen (14) days after its passage and approval. The City Secretary shall give notice of the passage of this ordinance by causing the caption hereof to be published in the official newspaper in the City of La Porte at least twice within ten (10) days after the passage of this ordinance.

PASSED AND APPROVED THIS THE 9th day of March, 1987

City of La Porte

By Norman J Malone
Norman Malone, Mayor

ATTEST:

Cherie Black
CITY SECRETARY

APPROVED:

ASST. CITY ATTORNEY

THE STATE OF TEXAS)
COUNTY OF HARRIS)
BAYSHORE MUNICIPAL UTILITY DISTRICT)

I hereby certify that the attached and foregoing is a true and correct copy of Resolution 235, passed and approved by the Board of Supervisors of the Bayshore Municipal Utility District at a called meeting of the Board held on the 13th day of May, 1987, at which meeting a majority of the Board present voted in favor of the resolution. I further certify that said meeting was properly posted according to law, prior to the date of the meeting.

To certify which, witness my hand and SEAL OF OFFICE, this 13th day of May, 1987.

Harold R. Kaufman
Secretary
Bayshore Municipal Utility District

RESOLUTION #235

WHEREAS, due to the possible limited raw water supply resources available to the Bayshore Municipal Utility District in the future; and,

WHEREAS, the Bayshore Municipal Utility District is making every effort to meet the needs of supplying potable water to all of its customers; and,

WHEREAS, due to the requirements of Harris-Galveston Coastal Subsidence District for surface water; and,

WHEREAS, it is necessary to conserve the use of potable water in the Bayshore Municipal Utility District; and

WHEREAS, emergencies may develop requiring that Bayshore Municipal Utility District enforce ordinances for customers to utilize water saving devices in new and retrofitted construction.

NOW, THEREFORE, BE IT RESOLVED by the Board of Supervisors of the Bayshore Municipal Utility District, Resolution #230 is hereby amended, to hereafter read as follows, to-wit:

Plumbing Specifications

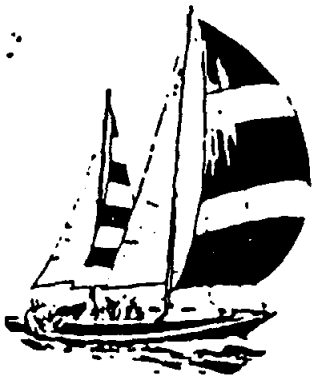
Tank-type toilets will use less than 3.5 gallons/flush;
Flush-valve toilets will use less than 3.0 gallons/flush;
Tank-type urinals will use less than 3.0 gallons/flush;
Flush-valve urinals will use less than 1.0 gallons/flush;
Lavatory and kitchen faucets will use less than 2.75 GPM;
Shower heads will use less than 3.0 GPM;
Swimming pools must have recirculating filtration equipment;
All hot water lines must be insulated;

PASSED BY THE BOARD OF SUPERVISORS OF THE BAYSHORE MUNICIPAL UTILITY DISTRICT, on this 13th day of May, 1987.

Clark Morris, President

Harold R. Kaufman

Harold Kaufman, Secretary



CITY OF SHOREACRES

401 SHOREACRES BOULEVARD
SHOREACRES, TEXAS 77571
(713) 471-2246

"A COMMUNITY OF BEAUTIFUL HOMES ON GALVESTON BAY"
HOME OF THE HOUSTON YACHT CLUB

MAYOR
Bill Haiflich

CITY SECRETARY
Cindy Logan

I hereby certify that the attached and foregoing is a true and correct copy of Ordinance 87-3, passed and approved by the City Council of the City of Shoreacres at a regular meeting of Council held on the 9th day of March, 1987, at which meeting a majority of the Council present voted in favor of the Ordinance.

I further certify that said meeting was properly posted according to law prior to the date of the meeting.

To certify which, witness my hand and seal of office, this the 10th day of March, 1987.

Cindy Logan

Cindy Logan, City Secretary

ORDINANCE NO. 87-3

AN ORDINANCE ESTABLISHING PLUMBING REQUIREMENTS, STANDARDS AND SPECIFICATIONS WITHIN THE CITY TO AID AND ASSIST WITH WATER CONSERVATION.

BE IT REMEMBERED THAT THE CITY COUNCIL OF THE CITY OF SHORFACRES, TEXAS, CONSIDERED THE FOLLOWING PREMISES PRIOR TO ENACTMENT OF THIS ORDINANCE:

THAT, due to the limited ground water withdrawal and restrictions invoked upon the City by the Harris-Galveston Coastal Subsidence District; and

THAT, due to the expense involved in conversion to surface water and the supply thereof in lieu of ground water; and

THAT, due to the requirements of the Texas Water Development Fund in securing financing for the surface water development project through the La Porte Area Water Authority, it is necessary that a water conservation plan be adopted by the City; and

THAT, the City Council has determined there is an urgent public need of an emergency nature to enact such a Water Conservation Plumbing Ordinance; and NOW THEREFORE:

BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF SHOREACRES, TEXAS:

That the City hereby adopts the following plumbing requirements, standards and specifications deemed necessary to conserve fresh water resources in the City.

Section A: All new construction and/or repairs or reconstruction involving plumbing renovation within the City limits of the City of Shoreacres or any authorized user outside the City limits will meet the following plumbing specifications:

The following maximum flow rates and/or water usage standards shall apply for fixtures in any new building or structure or portions thereof, and additions to existing buildings that provide facilities or shelter for public assembly, educational, business, mercantile, institutional, residential occupancy, also hotels, motels, condominiums, day care centers, nursing homes and apartments.

1. Tank type water closets shall be required to be of a design that provides a maximum flush not to exceed three and one-half gallons (3.5 gallons).

2. Shower heads shall have a maximum flow not to exceed 3 GPM at pressure ranges from 20 to 80 psi.

3. Laundry and kitchen faucets shall be equipped with flow controllers, aerators or spray taps which result in a maximum delivery not to exceed 2.75 gpm (125gpm) at pressure ranges from 20 to 80 psi where both hot and cold water supply are in full open position.

4. Flushometer type water closets shall adequately flush and clean fixtures, and shall discharge not more than three (3) gallons per flush.

5. Tank type urinals shall have a maximum flush not to exceed three (3) gallons per flush.

6. Flushometer type urinals shall adequately flush and clean fixtures, and shall discharge not more than one (1) gallon per flush.

7. Lavatory faucets for public facilities shall be equipped with self closing valves that limit delivery of hot water to a maximum of .25 gpm and delivery of cold water to a maximum of 1.75 gpm for a maximum combined delivery of 2 gpm.

8. Lavatories in restrooms of public facilities shall:

a. Be equipped with outlet devices which limit flow of hot water to a maximum of 0.5 gpm.

b. Be equipped with devices which limit the outlet temperature to a maximum of 110F.

9. All hot water lines shall be insulated.

10. Swimming pools - new pools must have recirculating filtration equipment.

Section B. The above standards and specifications shall not apply to hospitals, laboratories, and any other application where health and safety are dependent upon particular water flow rates. The building official shall determine whether application requires exception from these standards.

Section C. Fixture flow performance requirements shall be rated by data furnished by the equipment supplier or certified under a nationally recognized certification program or rating procedure.

Section D. New service taps shall be limited to those customers in compliance with this plumbing Ordinance.

Section E. Non compliance with this Ordinance shall subject any non-complying users with a penalty and fine of not less than $10.00 per day nor more than $200.00 per day for each day of non-compliance and/or disconnection or discontinuance of water and sewage services to such users by the City.

PASSED AND APPROVED THIS THE 9th DAY OF March, 1987.

Bill Hailich
Mayor

ATTEST:

Cindy Logan, City Secretary

APPENDIX C

HARLINGEN WATER SYSTEM WATER CONSERVATION PLAN

CITY OF HARLINGEN
WATERWORKS SYSTEM

WATER CONSERVATION PLAN

REVISED AUGUST 3, 1987
AND ADOPTED AUGUST 5, 1987

Prepared by:

KINDLE, STONE & ASSOCIATES, INC.
Engineers - Planners
P.O. Box 2544, 1222 E. Tyler, Suite B
Harlingen, Texas 78551
(512) 423-7409

TABLE OF CONTENTS

INTRODUCTION

The City of Harlingen Waterworks System (system) is owned by the City of Harlingen (city). As provided in the Charter of the City, the Board of Utility Trustees has the managing control and operation of the City's waterworks and sewer system. The City commission must approve final budgets and rates. The Utility Trustees are appointed by the City Commission.

The Harlingen Waterworks System serves a approximately 53-square mile area incorporating not only Harlingen but also the Stuart Place area southwest of the City, the City of Combes, the Town of Palm Valley, the City of Primera, East Rio Hondo Water Supply Corporation, and Military Highway Water Supply Corporation. Each customer city directly uses the Harlingen distribution system pressure for their customers.

Over the past several years, the area has experienced moderate growth and the System has exceeded the capacity of their treatment and storage facilities. Continuing growth and demand, Harlingen must insure that it's users conserve this resource to the maximum amount achievable.

It is the goal of the City and the System to enact a plan to achieve a 10% reduction in water usage per person upon implementation of this plan. Achieving this goal would, in effect, increase the capacity of the water and wastewater facilities.

UTILITY EVALUATION

A. Population of Service Area (Certificated) 53,500 (No.)

B. Area of Service Area (Certificated) 53 (sq. mi)

C. Number and Type of Connections

in Service Area 11,762(Res)2,125(Comm.) 17 (Ind.) 5 (Wholesale)

D. Rate of New Connection

Additions per Year 235 (Res) 32 (Comm.) 1 (Ind.) 0 (Wholesale)

E. Water Use Information

(1) Average Water Production for the last 2 years 3,600 (mgal/year)

(2) Average Monthly Water Production for last 2 years 295,000,000 (gal/mo.)

(3) Monthly Water Sales by user category for fiscal year ending September, 1986 (1000 gal.)

	Resid.	Comm.	Ind.	Wholesale
October 1985	114,723	74,280	9,082	27,016
November	105,094	72,586	10,307	24,133
December	104,425	70,098	8,464	24,785
January 1986	97,456	72,617	8,979	23,090
February	111,535	74,153	9,533	26,710
March	121,545	72,759	8,095	27,244
April	175,266	87,312	8,468	33,734
May	168,114	83,052	8,281	31,482

	Resid.	Comm.	Ind.	Wholesale
June	129,916	78,345	9,818	25,281
July	133,290	80,198	8,485	31,290
August	210,427	101,187	9,558	39,805
September	144,261	78,094	8,486	28,900

(4) Peak Daily Use 19,000,000 (gpd)

(5) Peak to average Use Ratio = Avg. Daily Summer use divided by average annual daily use)

17.1 MGD/10.7 = 1.60

F. Safe Annual Yield of Water Supply 5,560 (mgal)

G. Peak Daily Capacity of System 13,000,000 (gpd)

H. Major High Volume Customers

	Quantity (gal./year)
(1) Valley Baptist Medical Center	57,378,000
(2) Bonita Park	51,122,000
(3) Hygeia Milk Co.	29,228,000
(4) Paradise Park	27,413,000
(5) Los Vecinos Homes	23,544,000
(6) S. Eastern Public Service	22,105,000
(7) Harlingen St. TB Hospital	18,797,000
(8) Gorges Meats Inc.	14,987,000
(9) Har-Tex Cattle Co.	13,062,000
(10) Texas Linen Service	12,342,000

I. Population and Water Use Projections

Year	Daily Avg. MGD	Daily Max (MGD)	Population Potential
1990	12.6	22.0	60,000
2000	17.0	29.8	68,000
2005	19.8	34.7	76,000

J. Percent of Connections in system metered

Residential - 100%

Commercial - 100%

Industrial - 100%

K. Water Rate Structure -

Existing Rate Structure

Residential (Standard)
$5.00 Min. For 3000 Gals
$0.60 Per 1000 Gals 4000 To 30000
$0.80 Per 1000 Gals Above 30000

Residential (Sprinkler)
$10.00 Min. For 15000
$0.70 Per 1000 Gals 16000 - 30000
$0.80 Per 1000 Gals Above 30000

Commercial
$10.00 Min. For 3000 Gals.
$0.60 Per 1000 Gals 4000 To 30000
$0.80 Per 1000 Gals Above 30000

Wholesale
$0.85 Per 1000 Gals
$100.00 Base Charge

L. Average annual Revenues from Water Sales $ 3,002,000

M. Average Annual Revenue from Non Rate Derived Sources $ 700,000

N. Average Annual Cost of Operation $ 3,068,000

O. Applicable Local Regulations

There are no local regulations that are applicable to the City of Harlingen in regards to water usage supply or distribution. Cameron County governs over construction that falls out of the boundaries of the city Harlingen.

P. Applicable State, Federal or Other Regulations

As a public water supply, The City of Harlingen must abide by the rules of the following agencies:

(1) Texas Water Commission

(2) Texas Department of Health

(3) Environmental Protection Agency

PUBLIC INVOLVEMENT

A. Public at Large:

The Harlingen Waterworks System holds regular board meetings once each month. The City commission meets two times each month on the first and third Wednesdays. These meetings are open to the public and anyone is free to speak to the board and commission. At these meetings, they hear the concerns of the public which help their decision making process.

B. Special Interest Groups:

The Harlingen Waterworks System has formulated a Capital Improvement Committee with representatives from the community. The purpose of this committee is to bring forth the needs of the community and to achieve the maximum benefit of capital improvements to the residents of the city.

WATER CONSERVATION PLAN

I. EDUCATION AND INFORMATION

The City of Harlingen Waterworks System will promote water conservation by informing the public of ways to conserve water. The following methods will be used to inform water users, including wholesale customers.

- o Distribution of educational materials to all customers will be made four times during the first year of the program and twice per year thereafter. The semi-annual distribution will be timed to correspond with the peak summer and winter demand periods.
- o Regular Articles will be published in the local paper at times corresponding to the distribution mentioned above and more often if conditions warrant.
- o New Customers will receive general conservation information when applying for service.

Information as presented in Appendix C will be the basis for public education as well as pre-printed brochures available from:

Texas Water Development Board
P.O. Box 13231, Capital Station
Austin, TX 78711-3231

and as listed in Appendix A.

II. PLUMBING CODES:

The City of Harlingen has adopted Appendix J of the 1985 version of the Southern Standard Building Code which adopts water saving plumbing requirements. In addition this code is amended to include the requirement to install of recirculation equipment on all new swimming pools. This ordinance is included as Appendix E of this report.

III. RETROFIT PROGRAM:

Customers in existing buildings which do not have water saving devices should be encouraged to replace their old plumbing fixtures. The advertising program will help inform them of the advantages of installing water saving devices. The proposed excess rate structure mentioned below should encourage them to be conservative in their water use.

Customers will be informed of water saving kits available to aid in their water conservation efforts.

IV. WATER RATE STRUCTURES:

A water rate structure which encourages water conservation will be implemented. The rate structure will include a step rate structure with excess use fees. Because of the large variety of water users in the

distribution system, an excess use standard has been set up only for residential type. In addition, the sprinkler rate currently in use will be eliminated.

When a customer applies for a tap, the excess use limit is identified based on the guidelines set forth in the ordinance. The excess use limit is incorporated into the billing computer which computes the excess fee on the bill. A preliminary rate analysis is provided in Appendix B. It is proposed that the new rate structure will be in effect by October 1, 1987.

V. METERING:

The System currently meters 100% of the water used. The System has a policy of testing all meters which appear to have abnormally high or low. water usage. Incorporated into the Water Conservation Plan, the System will set up the following meter testing schedule:

1. Production meters - test once a year
2. Meters larger than 1" - test once a year
3. Meters 1" and smaller - test every ten years.

The Harlingen Waterworks System has a computer which handles all of their billing. The computer easily identifies any high or low rate users, and keeps track of all water use.

VI. WATER CONSERVATION LANDSCAPING:

The System does not have the authority to establish subdivision regulations which would require developers to plant only low water using plants and grasses. The advertising program will include suggestions on landscaping and irrigation procedures which will save water usage and money. The excess use fees should encourage customers to save water outdoors.

VII. LEAK DETECTION AND REPAIR:

The System currently has a leak detection program which will be maintained. The program includes:

1. Monthly water use accounting by the billing computer which identifies high water use after the service meters indicating leaks,
2. Constant monitoring of elevated tanks which identifies major watermain breaks,
3. Visual inspection by meter readers and System employees who keep a constant watch out for abnormal conditions indicating leaks,
4. An adequate maintenance staff which is available to repair any leaks.

VIII. RECYCLING AND REUSE:

The System currently has two wastewater treatment plants with effluent that is available for anyone who wants to reuse it. One major reason for the lack of reuse of wastewater is due to the high dissolved solids content of the wastewater in this area. This is due to infiltration of high salinity groundwater caused by close proximity to saline water. Most reuse of this wastewater would involve demineralization or dilution with treated or raw water.

The best use of this wastewater effluent is irrigation. The city currently has the ability to irrigate the municipal golf course and the Town of Palm Valley utilizes its wastewater to irrigate the Harlingen Country Club golf course.

IX. IMPLEMENTATION AND ENFORCEMENT:

The Water Conservation Plan will be enforced by the following methods:

1. Service Taps will not be given to customers who do not meet the requirements of the water conservation plumbing fixtures. A field inspector will have to be hired, or existing staff could be used to insure new buildings are installing the plumbing fixtures that are proposed in the service tap application.

2. The proposed excess use fees should encourage retrofitting of old plumbing fixtures which are using large amounts of water. People will realize that replacing their fixtures will save them money on their water bill.
3. The water rate structure will be enforced because people who do not pay their water bill will have their water disconnected.
4. The building inspector will not certify new construction unless it has met the proposed plumbing codes.

X. CONSERVATION PLAN ANNUAL REPORT

The System will file an Annual Report with the Executive Administrator which addresses the progress and effectiveness of the Water Conservation Plan. The report will include:

A. Public Information which has been issued.
B. Public Response.
C. Excess use fees which have been charged.
D. Effectiveness of water conservation plan in reducing water use by providing consumption data.
E. Implementation progress and status of the City's water conservation program.

XI. WHOLESALE CUSTOMERS

The City of Harlingen sells treated water to the political subdivisions of the City of Combes, the Town of Palm Valley, and the City of Primera. Each political subdivision is responsible for providing their own water rights.

During contract renewals to provide treated water and/or wastewater services, the City of Harlingen will furnish copies of their adopted conservation plan and require the approval from the Texas Water Development Board and adoption of a conservation plan for each public entity. Many provisions contained within this plan, such as rates, public information, etc., will be also be enforced or encouraged through Harlingen's plan.

DROUGHT CONTINGENCY PLANS

I. TRIGGER CONDITIONS: The following trigger conditions indicate when drought contingency measures will be put into effect. Trigger conditions will be set for mild, moderate, and severe conditions.

A. Mild Drought

1. Average Daily Water use is approaching 11.7 mgd (90% of firm plant capacity) for three consecutive days.
2. Consideration will be given to weather conditions, time of year, and customer complaints of low water pressure.

B. Moderate Drought

1. Average Daily Water use reaches firm plant capacity of 13.0 mgd for three consecutive days.
2. Net storage in raw water reservoirs is continually decreasing on a daily basis and falls below 195 million gallons (60% capacity) for 48 hours.
3. Water pressures approaching 40 psi in the distribution system as measured by the pressure gauges in the system.

C. Severe Drought

1. The Imminent or actual failure of a major component of the system which would cause an immediate health or safety hazard.

2. Water Demand is exceeding the firm system capacity of 13.0 mgd for three consecutive days.
3. Rio Grande River level is so low that the river pumps cannot pump the daily raw water demand.
4. All raw water is being pumped from System's storage reservoirs and all replenishment of raw water reservoirs has stopped.

NOTE: Upon completion of water system improvements, scheduled for completion in 1988, firm treatment capacity will increase to 27 mgd and the above will be adjusted accordingly.

II. DROUGHT CONTINGENCY MEASURES: The System has in their Rules and Regulations a plan in which water can be partially or totally restricted, in the purview of the General Manager and as necessitated by the emergency.

1. A STEP I curtailment is one where the General Manager can restrict, the use of water for outdoor sprinkling, watering of lawns, shrubs, driveways and automobiles to certain areas of the Service area by days and to certain hours. Said restrictions will remain in effect until the General Manager lifts the restrictions. More specifcally stated shall be:
   a. Inform the public through the news media that a trigger condition has been reached, and that they should look for

ways to voluntarily reduce water use. Specific steps which can be taken will be provided thru the news media.

b. Notify major commercial water users of the situation and request voluntary water use reductions;

c. The following mandatory lawn watering schedule shall be implemented:

> Customers with even numbered street addresses may water on odd numbered days of the month. Customers with odd numbered street addresses may water on even days of the month. Watering shall occurr only between the hours of 6-10 a.m. and 8-10 p.m.

d. During winter months, request water users to insulate pipes rather than running water to prevent freezing; and

e. City will begin monitoring water pressure in the distribution system and water levels in teh storage tanks.

2. A STEP II curtailment would be one where the General Manager will ban the use of water totally for outdoor sprinkling, watering of lawns, shrubs, driveways and automobiles. Said restriction will remain in effect until the General Manager lifts the ban. More specifically stated as follows:

a. Continue implementation of all relevant actions in preceding phase;

b. Car washing, window washing, pavement washing prohibited except when a bucket is used;

c. The following public water uses, not essential for public health or safety, are prohibited.

1. Street washing
2. Water hydrant flushing
3. Filling pools
4. Golf course watering
5. Athletic field watering

3. The curtailment will be effective upon the General Manager's giving notice of curtailment to the communities within the Area; the posting of a notice of curtailment and notifying the news media of curtailment and as stated in Section III.

4. The curtailments will be terminated upon the General Manager giving notice of termination as he does for the institution of the curtailment.

5. The General Manager can amend, add, or delete any of these Rules and Regulations and shall notify the Utility Board of Trustees at its regular Meeting of said amendments, additions, or deletions.

6. Any violation of the Rules and Regulations adopted by the System shall carry a penalty of imprisonment for not more than Thirty (30) Days or a fine of $200.00, or both.

In addition to the existing Drought Contingency Plan, the System will enact the following Drought Contingency measures.

A. Mild Drought Contingency Measures:

1. Inform public by giving notice of a mild drought to the communities within the System; the posting of the notice, and notifying news media of the mild drought.
2. Included in the information to the public will be the recommendation that water users look for ways to conserve water.
3. Public will be advised of the trigger condition situation daily.

B. Moderate Drought Contingency Measures:

1. Public will be informed as mentioned above.
2. The STEP I Curtailment will be enacted.
3. Public will be advised of the trigger conditions daily.

C. Major Drought Contingency Measures:

1. Public will be informed as mentioned above.
2. The STEP II Curtailment will be enacted.

3. Certain industrial and commercial water users which are not essential to the health and safety of community will be prohibited from water use.
4. Public will be advised of the trigger conditions daily.

III. INFORMATION AND EDUCATION: Once trigger conditions and emergency measures have been approached, the public will be informed of the conditions, and measures to be taken. The process for notifying the public includes:

A. Posting the Notice of Drought conditions at the Harlingen Waterworks Building, City Hall, Post Office & Major supermarkets.
B. Letters to Mayors of Communities in the Service Area.
C. General Circulation to Newspapers.
D. Notifying Local Radio Stations.
E. Direct mailing to customers explaining need for and provisions of Drought Contingency Plan.

IV. TERMINATION NOTIFICATION: Termination of the Drought measures will take place when the trigger conditions which initiated the drought measures have subsided, and an emergency situation no longer exists. The public will be informed of the termination of the drought measures in the same manner that they were informed of the initiation of the drought measures through the General Manager.

APPENDIX A - LISTING OF WATER CONSERVATION LITERATURE

TEXAS WATER DEVELOPMENT BOARD
WATER CONSERVATION LITERATURE

Single copies of all of the following publications and materials can be obtained at no charge. The * indicates those publications that are available free to political subdivisions in small quantities. Larger quantities can be obtained through special arrangement or at the cost of printing. To make a request, write: CONSERVATION, Texas Water Development Board, Capitol Station, Austin, Texas 78711-3231

Agricultural Conservation Literature

Title	Published By	Description	Length
Agricultural Water Conservation in Texas*	TWDB	Pamphlet with Tear-out	8 pages
Have Your Irrigation System Evaluated Free*	TWDB	Pamphlet	4 pages
LEPA Irrigation*	TWDB	Pamphlet	6 pages
Drip Irrigation*	TWDB	Pamphlet	6 pages
Plastic Ruler*	TWDB	6" x 1 1/4"	-
Furrow Dikes*	HPUWCD #1	Pamphlet	4 pages
Soil Moisture Monitoring*	HPUWCD #1	Pamphlet	4 pages
Center Pivot Irrigation Systems L-2219*	TAEX	Pamphlet	4 pages
Surge Flow Irrigation L-2220*	TAEX	Pamphlet	4 pages
Surge Irrigation*	SCS	Pamphlet	6 pages
Coloring Poster for Children*	TWDB	Coloring Poster	1 page
Water Conservation Coloring Book* (No. 1)	TWDB	Booklet	4 pages

Municipal Conservation Literature

Title	Published By	Description	Length
Water Half-A-Hundred Ways To Save It*	TWDB	Pamphlet	8 pages
Water Saving Ideas For Business and Industry*	TWDB	Pamphlet	8 pages
How To Save Water Outside The Home*	TWDB	Pamphlet	8 pages
How To Save Water Inside The Home*	TWDB	Pamphlet	8 pages
Toilet Tank Leak Detector Tablets*	TWDB	2 Tablets	-
Municipal and Commercial Water Conservation Services	TWDB	Pamphlet with Tear-out	8 pages
A Homeowner's Guide To Water Use and Water Conservation	TWDB	Booklet	22 pages
Guidelines for Municipal Water Conservation and Drought Contingency Planning and Program Development	TWDB	Loose-leaf	36 pages
How to Xeriscape	NXC	Pamphlet	10 pages
Texas Sesquicentennial Native Plant Landscape	TDA/TWDB	Pamphlet	8 pages
Municipal Water Conservation Workshop Notebook (See Attachment "A" for a Description of Contents)	TWDB	Notebook	6 sections
Water Conservation Coloring Book* (No. 2)	TWDB	Booklet	4 pages

Texas Water Resources and Planning Literature

Title	Published By	Description	Length
TWDB Report 294 - Surveys of Irrigation in Texas	TWDB	Book	243 pages
Summary of Water for Texas (C-20)	TDWR	Pamphlet	8 pages
Water Planning in Texas	TDWR	Booklet	27 pages
Texas Water Development Board (Funding Programs)	TWDB	Pamphlet	4 pages
Water For Texas (GP-4-1)	TDWR	Books	
Volume 1 (Comprehensive Plan)	[Available for purchase only from the Texas Water Commission, P.O. Box 13087 Austin, Texas 78711]		72 pages
Volume 2 (Technical Appendix)			530 pages
Texas Water Facts	TDWR	Booklet	12 pages

Abbreviations:

HPUWCD #1	High Plains Underground Water Conservation District No. 1
NXC	National Xeriscape Council, Inc.
SCS	USDA - Soil Conservation Service
TAEX	Texas Agricultural Extension Service
TDA	Texas Department of Agriculture
TDWR	Texas Department of Water Resources
TWDB	Texas Water Development Board

PUBLICATIONS AND AUDIOVISUAL MATERIALS AVAILABLE FOR LOAN FROM TEXAS WATER DEVELOPMENT BOARD (TWDB) (a)

The following water conservation publications and audiovisual materials are available for a loan of up to two weeks from TWDB. To borrow any of these write to: CONSERVATION, Texas Water Development Board, Capitol Station, Austin, Texas 78711-3231.

Publications

Title	Published By	Description	Length
Water Audit and Leak Detection Guidebook	California Dept. of Water Res.	Book	142 pages
Example Brochures and Promotional Material	Compiled by TWDB	Ringbinder	32 pages
Regional Teachers Guide Supplements	California Dept. of Water Res.	Books	Nos. 1-7

Audiovisual Materials

The Alternative is Conservation	Water Films	16mm Film VCR/VHS Format	28 minute
Water Follies	American Water Works Assoc. (AWWA)	16mm Film VCR/VHS Format	7.5 minute
Orangutans (Public Service Announcement)	AWWA VCR/VHS Format	16mm Film VCR/VHS Format	30 secon
Gooney Birds (Public Service Announcement)	AWWA VCR/VHS Format	16mm Film VCR/VHS Format	30 secon
Tanks (Public Service Announcement)	AWWA VCR/VHS Format	16mm Film VCR/VHS Format	30 secon
Spot Announcements	Lower Colorado River Authority	Audio Cassette	30 secon

(a) The films, video cassettes, and publications are provided for review purposes only. Permission to use any of this material for print or broadcast must be obtained from the producer or publisher of the material.

Attachment A

Contents of the Municipal Water Conservation Workshop Notebook

The notebook is distributed to participants at Board-sponsored Municipal Water Conservation Workshops. In addition, single copies of the notebook can be provided to cities and utilities. Single copies of selected materials from the notebook can also be provided.

Title	Published By	Description	Length
Section 1: The Need for Conservation			
Texas Water Resources and Conservation	TWDB	Paper	38 pages
Section 2: Water Conservation Techniques			
Efficient Use of Water in the Garden and Landscape (B-1496)	TAEX	Booklet	20 pages
Xeriscape	City of Austin	Booklet	20 pages
Water Pressure Reducing Valves	Watts Regulator	Booklet	21 pages
Texas Native Tree and Plant Directory, 1986	TDA	Book	162 pages
Sources of Leak Detection Equipment and Services	TWDB	List	2 pages
Sources of Water Saving Devices	TWDB	List	21 pages
Locating and Reducing Unaccounted For Water Through The Use Of The Water Audit And Leak Detection	TWDB	Guidebook	30 pages
Water Rate Design Emphasizing Conservation Rate Structures	TWDB	Guidebook	30 pages
Model Water Ordinances	TWDB	Guidebook	25 pages
The Authority of Cities, Water Utilities, and Water Districts to Regulate and Enforce Water Conservation Measures	TWDB	Guidebook	25 pages

Section 3. Alternate Sources

The Cost of Conventional Water Supply Development and Treatment	TWDB	Paper	9 pages
Potential for Utilization of Brackish Groundwater	TWDB	Paper	21 pages
Guidelines for Water Reuse EPA-600/8-80-036	EPA	Book	105 pages

Section 4: Workshop Exercise

Example Problem	TWDB	Loose-leaf	15 pages

Section 5: Plan Elements

Guidelines for Municipal Water Conservation and Drought Contingency Planning and Program Development	TWDB	Loose-leaf	36 pages

Section 6: Plan Development

Water Conservation and Drought Contingency Plan Development Procedures	TWDB	Loose-leaf	58 pages

APPENDIX B - WATER PRELIMINARY RATE ANALYSIS

WATER REVENUE PROJECTIONS FOR 1967 -1968 BUDGET YEAR

K GALS	TOTAL K GALS BY USE/MO	# OF CUST BY USE	AVG GALS /CUST/MO	FUEL ADJMT	BASE RATE	FLOW RATE	REVENUE FUEL	REVENUE BASE RATE	REVENUE FLOW RATE	PERCENT INCREASE
RESIDENTIAL (CITY)										
0 - 3	2262	1055	2145	$0.15	$5.00	$0.00	$4,072	$63,281	$0	40.98%
4 - 20	87769	9416	9322	$0.15	$5.00	$1.20	$157,985	$564,937	$857,126	
21 +	12872	346	37227	$0.15	$5.00	$1.40	$23,170	$20,747	$234,514	MO. RESIDENTIAL BILL
TOTAL	102904	10816	9514 AVG				$185,228	$648,965	$1,091,639	MIN AVG(10000)
							RATE REVENUE		$1,740,604	$5.00 $14.45
INDUSTRIAL (CITY)										
0 - 3	0	0	0	$0.15	~~$5.00~~ 10.00	$0.00	$0	$0	$0	
4 - 20	85	6	13933	$0.15	~~$5.00~~	$1.20	$153	$367	$964	
21 +	8692	8	1065188	$0.15	$5.00	~~$1.40~~	$15,645	$490	$146,455	
TOTAL	8777	14	614650 AVG				$15,799	$857	$147,419	
							RATE REVENUE		$148,276	
NON-RESIDENTIAL (CITY)										
0 - 3	790	474	1665	$0.15	$5.00	$0.00	$1,423	$28,458	$0	
4 - 20	8925	826	10802	$0.15	$5.00	$1.20	$16,065	$49,572	$92,835	
21 +	60941	411	148254	$0.15	$5.00	$1.40	$109,695	$24,664	$1,045,520	
TOTAL	70657	1712	41282 AVG				$127,182	$102,694	$1,138,345	
							RATE REVENUE		$1,241,039	
							TOTAL CITY REVENUE		$3,129,919	
RESIDENTIAL (OUTSIDE CITY)										
0 - 3	816	389	2100	$0.15	$7.50	$0.00	$1,469	$34,976	$0	42.42%
4 - 20	6349	780	8137	$0.15	$7.50	$1.80	$11,429	$70,227	$106,580	
21 +	1197	27	45138	$0.15	$7.50	$2.10	$2,155	$2,387	$32,267	MO. RESIDENTIAL BILL
TOTAL	8362	1195	6995 AVG				$15,052	$107,590	$118,846	MIN AVG (10000)
							RATE REVENUE		$226,436	$7.50 $21.15
INDUSTRIAL (OUTSIDE CITY)										
0 - 3	0	0	0	$0.15	$7.50	$0.00	$0	$0	$0	
4 - 20	7	1	7268	$0.15	$7.50	$1.80	$13	$90	$52	
21 +	225	1	224808	$0.15	$7.50	$2.10	$405	$90	$5,744	
TOTAL	232	2	116038 AVG				$418	$180	$5,837	
							RATE REVENUE		$6,017	
NON-RESIDENTIAL (OUTSIDE CITY)										
0 - 3	27	13	2000	$0.15	$7.50	$0.00	$48	$1,193	$0	
4 - 20	350	34	10391	$0.15	$7.50	$1.80	$630	$3,029	$5,374	
21 +	5003	32	158226	$0.15	$7.50	$2.10	$9,006	$2,846	$128,582	
TOTAL	5379	79	68493 AVG				$9,683	$7,069	$133,956	
	136312 AVG KGALS / MO						RATE REVENUE		$141,025	
UTILITY DISTRICTS										
	29912	5		$0.15	----	$0.95	$53,841		$340,991	
							OUT CITY REVENUE		$714,468	
TOTAL/MO	226223 KGAL	% INC-DECR	-5.2%							
TOTAL/YR	2714680 KGAL	% INC-DECR	-5.2%			TOTALS	$407,202	$867,353	$2,977,023	
TOTAL/DAY	7541 KGAL	% INC-DECR	-5.2%				RATE REVENUE		$3,844,387	
							TOTAL REVENUE		$4,251,589	
							REVENUE REQUIRED		$4,163,731	
							NET EXCESS OR DEFICIT		$87,858	

APPENDIX C - PUBLIC INFORMATION SUGGESTIONS

APPENDIX C - PUBLIC INFORMATION SUGGESTIONS

Suggestion on ways to save water which may be included in public information are listed below.

A. Bathroom:

1. Take a shower instead of filling the tub and taking a bath. Showers usually use less water than tub baths.
2. Install a low-flow shower head which restricts the quantity of flow at 60 psi to no more than 3.0 gallons per minute.
3. Take short showers and install a cutoff valve or turn the water off while soaping and back on again only to rinse.
4. Do not use hot water when cold will do. Water and energy can be saved by washing hands with soap and cold water; hot water should only be added when hands are especially dirty.
5. Reduce the level of the water being used in a bath tub by one or two inches if a shower is not available.
6. Turn water off when brushing teeth until it is time to rinse.
7. Not let the water run when washing hands. Instead, hands should be wet, and water should be turned off while soaping and scrubbing and turned on again to rinse. A cutoff valve may also be installed on the faucet.
8. Shampoo hair in the shower. Shampooing in the shower takes only a little more water than is used to shampoo

hair during a bath and much less than shampooing and bathing separately.

9. Hold hot water in the basin when shaving instead of letting the faucet continue to run.

10. Test toilets for leaks. To test for a leak, a few of drops of food coloring can be added to the water in the tank. The toilet should not be flushed. The customer can then watch to see if the coloring appears in the bowl within a few minutes. If it does, the fixture needs adjustment or repair.

11. Use a toilet tank displacement device. A one-gallon plastic milk bottle can be filled with stones or with water, recapped, and placed in the toilet tank. This will reduce the amount of water in the tank but still provide enough for flushing. (Bricks which some people use for this purpose are not recommended since they crumble eventually and could damage the working mechanism, necessitating a call to the plumber). Displacement devices should never be used with new low-volume flush toilets.

12. Install faucet aerators to reduce water consumption.

13. Never use the toilet to dispose of cleansing tissues, cigarette butts, or other trash. This can waste a great deal of water and also places an unnecessary load on the sewage treatment plant or septic tank.

14. Install a new low-volume flush toilet that uses 3.5 gallons or less per flush when building a new home or remodeling a bathroom.

B. Kitchen:

1. Use a pan of water (or place a stopper in the sink) for rinsing pots and pans and cooking implements when cooking rather than turning on the water faucet each time a rinse is needed.
2. Never run the dishwasher without a full load. In addition to saving water, expensive detergent will last longer and a significant energy saving will appear on the utility bill.
3. Use the sink disposal sparingly, and never use it for just a few scraps.
4. Keep a container of drinking water in the refrigerator. Running water from the tap until it is cool is wasteful. Better still, both water and energy can be saved by keeping cold water in a picnic jug on a kitchen counter to avoid opening the refrigerator door frequently.
5. Use a small pan of cold water when cleaning vegetables rather than letting the faucet run.
6. Use only a little water in the pot and put a lid on it for cooking most food. Not only does this method save water, but food is more nutritious since vitamins and

minerals are not poured down the drain with the extra cooking water.

7. Use a pan of water for rinsing when hand washing dishes rather than running faucet.
8. Always keep water conservation in mind, and think of other ways to save in the kitchen. Small kitchen savings from not making too much coffee or letting ice cubes melt in a sink can add up in a year's time.

C. Laundry:

1. Wash only a full load when using an automatic washing machine (32 to 59 gallons are required per load).
2. Use the lowest water level setting on the washing machine for light loads whenever possible.
3. Use cold water as often as possible to save energy and to conserve the hot water for uses which cold water cannot serve. (This is also better for clothing made of today's synthetic fabrics.)

D. For Appliances and Plumbing:

1. Check water requirements of various models and brands when considering purchasing any new appliance that uses water. Some use less water than others.
2. Check all water line connections and faucets for leaks. If the cost of water is $1.00 per 1,000 gallons, one

E. Out-of-Door Use:

1. Water lawns early in the morning during the hotter summer months. Much of the water used on the lawn can simply evaporate between the sprinkler and the grass.
2. Use a sprinkler that produces large drops of water, rather than a fine mist, to avoid evaporation.
3. Turn soaker hoses so the holes are on the bottom to avoid evaporation.
4. Water slowly for better absorption, and never water in high winds.
5. Forget about watering the streets or walks or driveways. They will never grow a thing.
6. Condition the soil with compost before planting grass or flower beds so that water will soak in rather than run off.
7. Fertilize lawns at least twice a year for root stimulation. Grass with a good root system makes better use of less water.
8. Learn to know when grass needs watering. If it has turned a dull grey-green or if footprints remain visible, it is time to water.
9. Not water too frequently. Too much water can overload the soil so that air cannot get to the roots and can encourage plant diseases.

could be paying a large bill for water that simply goes down the drain because of leakage. A slow drip can waste as much as 170 gallons of water EACH DAY, or 5,000 gallons per month, and can add as much as $5.00 per month to the water bill.

3. Learn to replace faucet washers so that drips can be corrected promptly. It is easy to do, costs very little, and can represent a substantial amount saved in plumbing and water bills.

4. Check for water leakage that the customer may be entirely unaware of, such as a leak between the water meter and the house. To check, all indoor and outdoor faucets should be turned off, and the water meter should be checked. If it continues to run or turn, a leak probably exists and needs to be located.

5. Insulate all hot water pipes to avoid the delays (and wasted water) experienced while waiting for the water to "run hot."

6. Be sure the hot water heater thermostat is not set too high. Extremely hot settings waste water and energy because the water often has to be cooled with cold water before it can be used.

7. Use a moisture meter to determine when house plants need water. More plants die from over-watering than from being on the dry side.

10. Not over-water. Soil can absorb only so much moisture and the rest simply runs off. A timer will help, and either a kitchen timer or an alarm clock will do. An inch and one-half of water applied once a week will keep most Texas grasses alive and healthy.
11. Operate automatic sprinkler systems only when the demand on the town's water supply is lowest. Set the system to operate between four and six a.m.
12. Do not scalp lawns when mowing during hot weather. Taller grass holds moisture better. Rather, grass should be cut fairly often, so that only 1/2 to 3/4 inch is trimmed off. A better looking lawn will result.
13. Use a watering can or hand water with the hose in a small areas of the lawn that need more frequent watering (those near walks or driveways or in especially hot, sunny spots).
14. Learn what types of grass, shrubbery, and plants do best in the area and in which parts of the lawn, and then plant accordingly. If one has a heavily shaded yard, no amount of water will make roses bloom. In especially dry sections of the state, attractive arrangements of plants that are adapted to arid or semi-arid climates should be chosen.

15. Consider decorating areas of the lawn with rocks, gravel, wood chips, or other materials now available that require no water at all.
16. Not "sweep" walks and driveways with the hose. Use a broom or rake instead.
17. Use a bucket of soapy water and use the hose only for rinsing when washing the car.

APPENDIX D - ORDINANCE ADOPTING WATER CONSERVATION/DOUGHT CONTINGENCY PLAN

ORDINANCE 87-_____

AN ORDINANCE ADOPTING A CITY OF HARLINGEN WATER CONSERVATION PLAN AND DROUGHT CONTINGENCY PLAN; PROVIDING A PENALTY OF NOT LESS THAN $10.00 PER DAY NOR MORE THAN $200.00 PER DAY FOR EACH DAY OF NON-COMPLIANCE WITH THE PROVISIONS THEREOF; DECLARING A PUBLIC NEED OF AN EMERGENCY NATURE FOR THE ADOPTION HEREOF ON ONE READING; PROVIDING FOR PUBLICATION AND ORDAINING OTHER MATTERS RELATED TO THE FOREGOING

BE IT ORDAINED BY THE CITY OF HARLINGEN:

WHEREAS, that the City of Harlingen is in the process of issuing its $2,760,000 City of Harlingen, Texas, Sewer System Revenue Bonds, Series 1987;

WHEREAS, the Texas Water Development Board (the "Board") has committed to purchase the Bonds from the City, subject to the City complying with various rules and regulations; and

WHEREAS, the Board's rules require that the City adopt a Water Conservation/Drought Contingency Plan which has been approved by the Executive Director of the Board; and

WHEREAS, the City has previously submitted to the Board a proposed Water Conservation/Drought Contingency Plan which has been reviewed and commented upon by the Board and the City has made certain required changes therein and adopted certain additional ordinances related thereto as required by the Board; and

WHEREAS, the City Commission has determined there is an urgent need in the best public interest of the City of Harlingen, Texas to adopt a Water Conservation Plan and Drought Contingency Plan, and the City Commission further determines that such public need is of an emergency nature and the legal requirement of two required separate readings of the subject ordinance be dispensed with and waived; and

WHEREAS, the City Commission of the City now desires to evidence its approval of the Water Conservation/Drought Contingency Plan and adopt such plan as an official policy of the City; Now, Therefore,

BE IT ORDAINED BY THE CITY OF HARLINGEN, TEXAS:

SECTION I: Approval of the Plan: The City Commission hereby approves and adopts as the City's Water Conservation Plan the Water Conservation/Drought Contingency Plan Attached hereto as Exhibit "A" to be included in full as a part of this Ordinance as if recited verbatim herein. The City commits to implement the program according to the procedures set forth in the adopted plan.

SECTION II: The City shall report to the Texas Water Development Board annually on the implementation and effectiveness of the plan in accordance with the outline set forth in the plan.

SECTION III: In regards to implementation and enforcement of the Conservation/Drought Contingency Plan the General Manager of the Waterworks System is designated as the official responsible for implementation and enforcement, and the following guidelines are adopted:

(a) Mild Conditions: At any time the average daily water use approaches 11.7 mgd (90% of firm plant capacity) for three consecutive days the General Manager shall be authorized to request voluntary compliance by all users and initiate other measures in accordance with the Conservation/Drought Contingency Plan as setout in the said attached plan.

(b) Moderate Conditions: At any time the average daily water use occasionally reaches firm plan capacity of 13.0 mdg for three consecutive days, and/or, the net storage in raw water reservoirs is continually decreasing on a daily basis and falls below 195 million gallons (60% capacity) for 48 hours, and/or water pressures approach 40 psi in the distribution system as measured by the pressure gauges in the system, the General Manager shall implement compulsory compliance by all users in accordance with the Conservation/Drought Contingency Plan as setout in the said attached plan.

(c) Severe Conditions: At any time the actual failure of a major component of the system which would cause an immediate health or safety hazard and/or water demand is

exceeding the system capacity of 13.0 mgd for three consecutive days and/or the Rio Grande River level is insufficient to supply the daily raw water demand and/or all raw water is being pumped from the system's storage reservoirs and replenishment of these reservoirs has stopped, a penalty shall be imposed on all users not acting in compliance with the Conservation/Drought Contingency Plan attached hereto in accordance with the standards of usage outlined within the plan and with the penalties established therein.

In the event the item 3 above, Critical Conditions persist for an extended period of time the City may ration water usage or terminate service to selected users of the system in accordance with the following sequence:

First: Industrial Users
Second: Commercial Users
Third: Residential Users
Last: Public Health and Safety Facilities

NOTE: Upon completion of the water system improvements scheduled for completion in 1988 firm treatment capacity will increase to 27 mgd and the above will be adjusted accordingly.

SECTION IV: Users of city water except for the City, that do not comply with Section III of this Ordinance shall be subject to a penalty and fine of not less than $10.00 per day nor more than $200.00 per day for each day of non-compliance and/or disconnection or discontinuance of water services to such users by the City.

SECTION V: The City Commission finds and declares that a sufficient written notice of the date, hour, place and subject of this meeting of the Commission was posted at a designated place convenient to the public at the City Hall for the time required by law preceding this meeting and that such place of posting was readily accessible at all times to the general public; that all of the foregoing was done as required by law; and that this meeting has been open to the public as required by law at all times during which this Ordinance and the subject matter thereof has been discussed, considered and formally acted upon.

The Commission further ratifies, approves, and confirms such written notice and the contents and posting thereof.

PASSED AND APPROVED THIS 5 day of August, 1987.

CITY OF HARLINGEN

BY: _____
H. WM. CARD, JR., MAYOR

ATTEST:

_____
JEAN NESMITH, CITY SECRETARY

APPENDIX E - ORDINANCE AMENDING PLUMBING CODE

ORDINANCE NO. 87-_____

AN ORDINANCE AMENDING CHAPTER 8, ARTICLE VI, SECTION 8-75 OF THE CODE OF ORDINANCES OF THE CITY OF HARLINGEN, TEXAS BY ADOPTING APPENDIX J (WATER CONSERVATION) OF THE STANDARD PLUMBING CODE, 1985 EDITION COMPLIED AND PUBLISHED BY THE SOUTHERN BUILDING CODE CONGRESS INTERNATIONAL, INC.; PROVIDING A PENALTY NOT TO EXCEED $200.00 FOR EACH VIOLATION THEREOF; PROVIDING FOR PUBLICATION AND ORDAINING OTHER MATTERS RELATED TO THE FOREGOING

BE IT ORDAINED BY THE CITY OF HARLINGEN:

SECTION I: Chapter 8, Article VI, Section 8-75(a) of the Code of Ordinances of the City of Harlingen, Texas is hereby amended by adopting Appendix J (Water Conservation) of the Standard Plumbing Code, 1985 Edition published by the Southern Building Code Congress International, Inc.

SECTION II: That Appendix J of Standard Plumbing Code,1985 Edition published by the Southern Building Code Congress International, Inc. adopted by Section I of this Ordinance is hereby amended to add the following language:

" All new swimming pools installed in the City of Harlingen after the effective date of this Ordinance shall be equipped with recirculating filtration equipment".

SECTION III: That any violation of the provisions of the said Appendix J of the Standard Plumbing Code adopted pursuant to Section I of this Ordinance shall be punishable by a fine not to exceed $200.00 upon conviction.

SECTION IV: That the City Secretary of the City of Harlingen, Texas is hereby authorized and directed to cause a true and correct copy of the caption of this Ordinance to be published in a newspaper having general circulation in the City of Harlingen, Cameron County, Texas and as an amendment to be published in the Code of Ordinances of the City of Harlingen, Texas.

SECTION V: That the Elective Commission of the City of Harlingen hereby determines that there is an urgent need in the best public interest of the City of Harlingen, Texas to adopt this Ordinance and

that such public need is of an emergency nature and the legal requirement of two separate readings of this Ordinance is hereby dispensed with and waived.

FINALLY ENACTED THIS 5TH day of August, 1987 at a regular meeting of the Elective Commission of the City of Harlingen, Texas at which a quorum was present and which was held in accordance with TEX. REV. CIV. STAT. ANN. Art. 6252-17, as amended.

CITY OF HARLINGEN

BY: _____
H. WM. CARD, JR., MAYOR

ATTEST:

_____
JEAN NESMITH, CITY SECRETARY