EXPANSION OF THE JONATHAN ROGERS WATER TREATMENT PLANT IN EL PASO, TEXAS

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1. General

a. PROJECT TYPE

The project described in this proposal provides an additional 20 million gallons per day of water supply to residents of El Paso County, Texas. El Paso County borders the US/Mexico border and includes several low income neighborhoods which lack water and sewer services and have been referred to as "colonias". A significant portion of the proposed project provides a long term water supply for these neighborhoods. This type of project falls under the BECC priority area of water supply.

b. PROJECT LOCATION

The project includes two major components, 1) an expansion of the Jonathan Rogers Water Treatment Plant and 2) a large water transmission main to convey the increased water production into areas where it can be used. El Paso County is presented on Figure 1.1 with the location of the two major project components. From the figure it can be seen that all facilities are within 100 km (62 miles) of the U.S./Mexican border.

c. PROJECT DESCRIPTION AND WORK TASKS

1) Project Description

The proposed Jonathan Rogers Water Treatment Plant expansion will consist of adding 20 MGD of capacity to the existing plant, providing additional backwash capacity for GAC filters, connecting the stabilization ponds to allow additional flow schemes through the ponds, and additional pumping capacity. A major transmission pipeline ranging in size from 42" to 54" will be constructed to connect two existing pipeline systems so that the increased water production can be utilized.

This project will be the water supply element which supports existing water distribution programs targeted at providing a water supply for the economically distressed areas of El Paso County. Many of these areas have been identified as having an elevated incidence of Hepatitis A believed by many to be related to the lack of potable water.

2) Program of Project Work Tasks

The Jonathan Rogers Water Treatment Plant expansion project will consist of the engineering design of the treatment and transmission lines, and construction of the treatment plant and transmission lines.

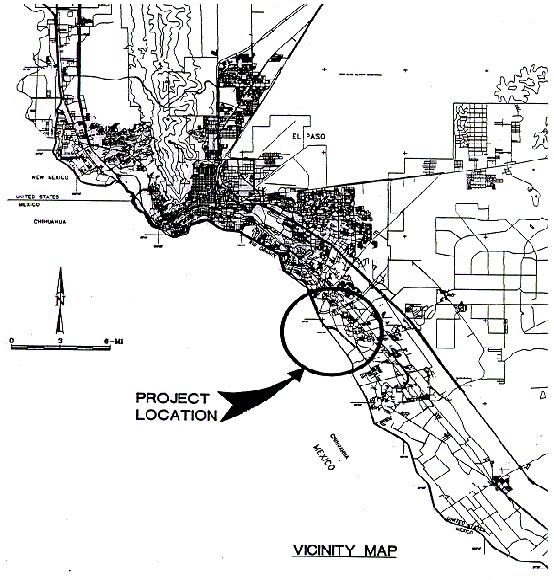
Table 1

Major Project Work Tasks

Task	Description	Anticipated Cost	Time Frame	Task Executor	% Complete
1	*Preparation of BECC Preliminary Design*				
2	*Preparation of EID*				
3	*Preparation of BECC proposal*	*$128,718*	*5/97 to 10/97*	*El Paso Water Utilities*	*100*
4	*Community Participation Plan*				
5	*Report Documenting Public Support*				
6	*Analysis of Institutional Capacity*				
7	*Preparation of Treatment Plant Technical Design*	*$2,000,000*	*4/98 to 3/99*	*El Paso Water Utilities*	*0*
8	*Construction of the treatment plant expansion*	*$24,099,000*	*10/99 to 10/01*	*El Paso Water Utilities*	*0*
9	*Preparation of transmission pipeline design*	*$923,000*	*6/99 to 4/00*	*El Paso Water Utilities*	*0*
10	*Construction of the transmission pipeline*	*$10,800,000*	*10/00 to 9/01*	*El Paso Water Utilities*	*0*
11	*Star up and operation of the facilities*		*10/01*	*El Paso Water Utilities*	*0*

Figure 1.1

Project Location



3) Description of Community

Demographic Information. *The population to be served by the project is shown in Table 1.2. It is significant that by 2020 about 17% of the served population will be out of the City of El Paso. Most of the out of city population resides in "colonias" as defined in the Economically Distressed Area Program (EDAP). These colonias are forecasted to account for 11% of the county population in 2015.*

Table 1-2

Projected Population Served

Year	*Inside City*	*Outside City*	*Percent Outside City*	*Total*
1990 (1)	*515,300*	*31,400*	*5.74*	*546,700*
1995 (2)	*568,245*	*34,060*	*5.65*	*602,305*
2000	*621,387*	*46,914*	*7.02*	*668,301*
2005	*662,633*	*68,095*	*9.325*	*730,728*
2010	*703,878*	*92,765*	*11.64*	*796,643*
2015	*748,084*	*123,158*	*14.14*	*871,242*
2020	*792,290*	*163,012(3)*	*17.06*	*955,302*

1. *From Census Data*
2. *1995 and later from City of El Paso population projections.*

The population is based on March 1994 projections from the City of El Paso Planning Department Demographics Section. Population is projected yearly for each county by Texas A&M University, the official demographic agency for the State of Texas. The 1994 projections include the 18,000 people undercounted by the 1990 census.

(3) Extrapolated at 5.8% per year since value was not included in previous studies.

Local Environmental Services. *Very nearly 100% of the persons listed in Table 1.2 as "Inside City" receives water, wastewater and solid waste services. These services are available on a continuous uninterrupted basis. The services available to those listed on the table as "Outside City" are constantly improving but are currently estimated to be:*

- *Water 99%*
- *Wastewater 10%*
- *Solid Waste over 90%*

Due to the current construction of major wastewater collection facilities, it is anticipated that in 3 to 4 years about 80% of those listed as "Outside City" will have wastewater service available.

4) Project Alternatives

Treatment Alternative I. The first alternative consists of expanding the plant with a technology similar to that currently in place at the Jonathan Roger Water Treatment Plant. This alternative requires a parallel treatment train consisting of the following major unit operations:

- *Pre-sedimentation*
- *Pre-ozonation system*
- *Rapid Mix (for Chemical Addition)*
- *Flocculation/Sedimentation Basins*
- *Pre-filtration Ozone*
- *Granular Activated Carbon Filtration (GAC)*
- *Final Disinfection and High Service Pumping*

Treatment Alternative II. **This scheme uses a relatively new but well proven membrane technology. Membranes have been used to replace conventional treatment technologies and can remove constituents down to particles of atomic size. The membrane technology option includes the following unit operations:**

- *Pre-sedimentation*
- *Strainer*
- *Micro Filtration Units*
- *Filtrate Storage*
- *Nano Filtration Feed Pumps*
- *Final Disinfection and High Service Pumping*

Treatment Alternative III. **This scheme uses a hybrid combination of membrane technology and conventional media filtration. The hybrid option includes the following unit operations:**

- *Pre-sedimentation*
- *Strainer*
- *Micro Filtration Units*
- *Filtrate Storage and Pumping*
- *Granular Activated Carbon Filtration (GAC)*
- *Final Disinfection and High Service Pumping*

Treatment No Action Alternative (IV). *The no action alternative will not have an impact due to construction but it will negatively impact the economically depressed areas that would be served by the added capacity. More substandard communities will come into being due to the lack of water service. Without expanding the JRWTP, the city will have to use ground water to make up that not produced at the plant, thus diminishing the potable water resources sooner. The depletion of these groundwater resources will make it necessary to search for new, more expensive sources of potable water.*

Transmission Line Alternative I. **The Mesa Drain, owned by the El Paso County Water Improvement District No. 1 was chosen as a possible route. This was due partly because of the advantage of it being located outside of most street right-of-way, therefore causing little public inconvenience during construction.**

Transmission Line Alternative II. *A route along North Loop Road was developed as an alternative based upon favorable results of the hydraulic model, which indicated that the location and the size lines utilized, were most compatible with existing and future distribution characteristics.*

North Loop Road from the intersection of Americas Avenue and North Loop to the intersection of North Loop and Zaragosa is presently being reconstructed with reinforced concrete paving. North Loop Road is a major thoroughfare of the Lower Valley with high volume traffic both day and night. The construction of a large diameter transmission line in North Loop for a length of six miles would create a serious traffic disruption leading to increased accidents and public inconvenience.

Transmission Line Alternative III. **This route was developed, in part, because the transmission line would be installed mostly within City street right-of-way. Most of the streets along this route are wide and traffic is light to moderate. The majority of the roadways along this route are constructed of asphalt paving. Traffic control would be a minor issue for much of the route, however, several residential neighborhoods would be affected by the construction. Close coordination with area residents would be required of the contractor in order to keep public disruption to a minimum.**

Transmission Line No Action Alternative (IV.) *The no action alternative will not have an impact due to construction but it will make it impossible to deliver the full capacity of the treatment plant into the system during times when the demand for water is low. If nothing is done, the plant will have to cut back on production and therefore the rest of the city will have to use ground water to make up what is not produced at the plant, thus diminishing the potable water resources sooner. The energy inefficient practice of pumping to a higher zone for transportation then dropping the pressure will continue.*

d. CONFORMANCE WITH INTERNATIONAL TREATIES AND AGREEMENTS

There are no known impacts to existing international treaties or agreements.

2. Human Health and Environment

a. HUMAN HEALTH AND ENVIRONMENTAL NEED

Issues to be addressed. *Significant health and environmental problems exist in the "colonias" of El Paso County, which lack adequate and safe supplies of water. The residents of these areas are aware of the dangers of disease transmitted by contaminated water, and many of them obtain their drinking water from a piped supply or purchase purified water from stores. Water borne transmission of pathogens can still occur, however. Water supplies can be contaminated by fecal matter and spread to the residents through that supply, and drinking water stored in the homes can be contaminated by an infected household member and infect other household members.*

Diseases resulting from contaminated drinking water and poor sanitation affect the growth and development of children and constitute a very real public health threat. An adequate and safe supply of water to these areas is essential to the public health of all residents of El Paso County.

The project proposed will provide a safe water supply to the residents and minimize the health risk due to environmental contamination of water supplies. Although the water distribution system is not a part of the proposed project, current construction programs are providing water distribution systems and wastewater collection systems.

Health Statistics. *Statistics related to health and environmental conditions in El Paso County and in the "colonias" of the county were obtained from:*

- *records of the El Paso City-County Health District,*
- *the Texas Department of Health*
- *and from pertinent data included in the Final Report on a Survey of Health and Environmental Conditions in Selected Colonias of El Paso County, Texas, prepared by James VanDerslice, Ph.D., Rick Mroz, D.A. and Theresa Byrd, Dr.P.H. and submitted to the Texas Department of Health, Office of Border Health in September, 1996.*

Statistics obtained from the El Paso City-County Health District and the Texas Department of Health related only to El Paso County as a whole. Those statistics did not include any break down of specific conditions as they relate to the colonias. The report on the VanDerslice, Mroz and Byrd survey of health conditions in the colonias contained specific data pertaining to the effects of inadequate and unsafe supplies of water on the health of the colonia residents. Although only four selected colonias were included in that survey, the results of the survey can be assumed to pertain equally to the colonias which would be served with potable water as part of the subject project.

The "Community of San Elizario, Texas Environmental Information Document" (Moreno Cardenas and Hicks & Company, August, 1993) cited The following:

1. A personal communication from Laurance N. Nickey, M.D., then Director of the El Paso City-County Health District, to the effect that El Paso County had five times the rate (defined as cases per 100,000 persons) of Hepatitis A as the rest of the United States; a shigella dysentery rate of three times the United States rate; and the possibility that these rates were underreported because of the number of people who seek medical care in Mexico.

2. A study made by the University of Texas Health Sciences at San Antonio in 1988 which found that approximately 90 percent of the sampled population in the San Elizario area had been infected with Hepatitis A before reaching the age of 35; 75 percent before the age of 15; and 35 percent before the age of 10. The study concluded that the spread of Hepatitis A in the area was the result of polluted water.

3. A study by Dr. Howard Applegate of the University of Texas at El Paso in 1988 which found that 100 percent of the water samples taken from 66 wells in the San Elizario area were bacteriologically contaminated with fecal coli, an indicator of the fecal-oral contact responsible for the spread of Hepatitis A and many gastrointestinal disorders.

4. A study by Dr. Jane Koehler of the Center for Disease Control in 1992 which was intended to assess the potential for the spread of cholera along the border found that over 50 percent of household wells in San Elizario were bacteriologically contaminated, with 98 percent of households surveyed relying upon hauled-in potable water. The study highlighted the difficulty in stopping the spread of cholera (which had been identified in Juarez, Mexico) into shallow groundwater should it occur in areas without adequate wastewater treatment in the El Paso Lower Valley.

The studies referred to above, together with the statistics obtained from the El Paso City-County Health District and the Texas Department of Health, confirm the existence of significant health and environmental problems in the colonias of El Paso County, Texas and the need for an adequate and safe supply of water for those areas.

b. ENVIRONMENTAL ASSESSMENT

For the proposed project, an Environmental Information Document was prepared in accordance with The Texas Water Development Board's (TWDB) publication entitled " Instructions for Preparing an Environmental Information Document (EID) for the State Revolving Fund." This document specifies the content, format and public participation required to produce an EID. A separate document is required by the TWDB. A document has been developed in accordance with the TWDB requirements.

According to the EID, the project involves expansion of an existing facility on the current site and construction of a transmission line along an agricultural drain. Alternatives for treatment technologies and water transmission pipeline routes were analyzed, and selection of the originally proposed alternative justified on economic grounds and the minimization of environmental and urban impacts. No current or future beneficial uses of land will be eliminated as a result of this project. Also no obstruction of scenic views; adverse effects on aquatic life; impact to environmentally sensitive areas, impact to historical, cultural, or archeological resources; impact to recreational areas or natural preserves; noise or insect nuisance, or impact to floodplains or flood levels, are anticipated. Air quality could be impacted due to 1) increased of ozone, however, levels will comply with TNRCC requirements, and 2) due to vehicle traffic which will be mitigated. While adverse impacts could occur with the change of 14,373 acre feet of water per year from agricultural to municipal use, the Applicant expects to acquire water rights in areas where urban expansion has displaced agriculture and from currently inactive water rights. Also, energy and resources will be consumed to operate and maintain the facility over its useful life, and waste sludge waste will be created which will be neutralized and use as landfill or will be properly disposed of in a landfill registered for that purpose. Growth stimulated by the provision of basic human services could lead to an increase in air quality problem in the Paso del Norte Air Basin, but this regional issue is being dealt with under other initiatives. No negative transboundary impacts are anticipated.

The project will utilize surface water to supply the El Paso area thus avoiding and/or decreasing dependency on scarce groundwater resources. Currently, groundwater is being depleted and conversion to surface water is a strategic long-term objective of the Applicant. Furthermore, provision of safe drinking water will provide long-term benefits by decreasing health risks to other areas of El Paso County and Mexico, as the number of hepatitis A cases and those of other infectious diseases exported outside El Paso County should be reduced.

c. COMPLIANCE WITH APPLICABLE ENVIRONMENTAL AND CULTURAL RESOURCE LAWS AND REGULATIONS

The project requires or has received authorizations/non-objections from the following institutions:

- *FONSI, Finding of No Significant Impact by the USEPA (submission pending)*
- *Final Environmental Information Document (received and under review by BECC)*
- *Approval of Final Environmental Information Document by the TWDB (if TWDB-funded only).*
- *Comments on the draft EID from the International Boundary and Water Commission (pending), U.S. Section; U.S. Fish and Wildlife Service (pending); Texas Parks and Wildlife Department (received, no objection); and the U.S. Army Corps of Engineers (received, no section 404 permit required)*
- *Letter from the Texas Historical Commission stating the project has no impact on historical or archeological sites (received, suggests inclusion of contingency plan should artifacts or sites be uncovered during construction)*
- *Approval of engineering plans and specifications by the TWDB (application made after final design if TWDB-funded only).*
- *Permit from the El Paso County Water Improvement District #1 (application made at 30% design)*
- *Permit from the Texas Department of Transportation (application made at 30% design)*

3. Technical Feasibility

This section includes a Preliminary Design Report has been prepared to address the items listed in the BECC guidelines, i.e.,

- *Appropriate Technology*
- *Operation and Maintenance Plan*
- *Compliance with Applicable Design Regulations and Standards.*

The organization of this section is however, such that all technical facets of the expansion of the Jonathan Rogers Water Treatment Plant are addressed in a manner consistent with a preliminary engineering report. The technical feasibility is developed by first examining the water supply needs of the area, then developing a water supply project appropriate to meet those needs.

3.1 EVALUATION OF AVAILABLE WATER SUPPLY

There are several planning documents that reflect the intended course of El Paso's water resource development. Major planning documents include the 1990 El Paso Water Resource Management Plan Study and the 1994 Water Facilities Master Plan Report. These two documents forecast the water demand, and identify a water resource development strategy necessary to meet the demand. The strategy previously developed will be followed in this section.

A general discussion of the quality and quantity of the water utilized at the Jonathan Rogers Water Treatment Plant (JRWTP) is also presented in this section. This raw water information will form the basis of design of the proposed expansion of the facilities at the JRWTP. In addition, the water rights required to support a facilities expansion are addressed.

3.1.1 WATER SUPPLY QUANTITY AND SOURCES

1. ***Population Served*** *- It is significant that by 2020 about 17% of the served population will be out of the City of El Paso. Most of the out of city population resides in "colonias" as defined in the Economically Distressed Area Program (EDAP). Figure 3.1.1a presents the population forecasts in a graphic format. Data is not available for the year 2020.*

Demands *- The water demands have been forecasted in the 1994 Water Facilities Master Plan Report. Figure 3.1.1b presents this data in graphic form. Current Average Day Demands are around 105 MGD with Peak Summer Days ranging around 200 MGD. By the year 2020, these respective values are expected to increase to about 152 MGD and 290 MGD.*

Figure 3.1.1a

Population Projections

1. **Areas in El Paso County that are outside of the designated EDAP areas and outside of the City of El Paso**

2. Areas designated by the Texas Water Development Board to be Economically Distressed Areas.

Figure 3.1.1.b

Future Demand for Supply

In million gallons per day

With the "colonias" population making up 10.9% of the total county population, it can be expected that in the year 2020 about 16.77 MGD average demand and 31.87 MGD peak demand will be due to the "colonia" areas. In terms of surface water treatment capacity required by the "colonia" demand, the effect is greater since the "colonia" demand must be supplied by increased surface water as no significant ground water resources exist. Because of the fact that surface water is only available in the irrigation season, existing ground water resources must be used in the winter to supply the "colonia" areas. The winter water use must be replaced during the irrigation season from treated surface water. Assuming the five winter months consume about 30% of the annual demand, the water treatment plant must be about 45% larger to replace the winter usage. Thus the actual water treated must be 1.45 times the average annual flow of 16.77 MGD or 24.31 MGD over the seven-month irrigation season. The "colonias" peak day demand of 31.87 MGD must also be met with the treatment of surface water.

Water Resource Development Plan - The Water Facilities Master Plan Report sets forth the production required from each source of water that is available to the El Paso Area. Because surface water is not currently available in the winter months, it is necessary to forecast the sources of supply for both winter and summer conditions.

In order to provide these production sources in the winter and summer with some standby capacity, the Water Facilities Master Plan listed the installed production capacity required of each source. These capacities are listed as Table 3.1.1f and reflect 20 MGD capacity increases that are consistent with the original treatment plant design.

Table 3.1.1f

Production Source Capacity

In million gallons per day including 15% excess capacity

Year	*Surface Water Plants*	*Well Fields*	*Reuse & Desalination*	*Total Installed Capacity(2)*
1995	*80*	*192*	*2*	*274*
2000	*100*	*194*	*5*	*299*
2005	*124*	*194*	*18*	*336*
2010	*144*	*183*	*22*	*349*
2015	*164*	*161*	*35*	*360*
2020(1)				

1. Data not available in Water Facilities Master Plan Report

2. Since water plants do not operate in winter, actual maximum operating capacity is less.

The need for increased surface water treatment capacity is indicated as the surface water treatment capacity required rises from 80 MGD currently to 164 MGD in 2015. Table 3.1.1g presents current plans for meeting the capacity increases:

Proposed Project - As discussed above, the most immediate need is a 20 MGD expansion of the Jonathan Rogers WTP by the year 2000. The proposed project provides this 20 MGD by increasing the total capacity of the Jonathan Rogers WTP and the necessary finished water transmission mains to 60 MGD from 40 MGD.

Water Rights Required for Proposed Project - Increasing the surface water treatment capacity will require surface water rights to allow increased diversions from the Rio Grande. The water rights required to support an additional 20 MGD treatment capacity depends in part upon the load factor of the treatment plant when it can be operated. El Paso's treatment

Table 3.1.1g

Surface Water Treatment Plant Increases

In million gallons per day

Year	*Roberson Umbenhauer WTP*	*Jonathan Rogers WTP*	*New Upper Valley WTP*	*Total*
1995	*40*	*40*	*0*	*80*
2000	*40*	*60*	*0*	*100*
2005	*44*	*60*	*20*	*124*
2010	*44*	*80*	*20*	*144*
2015	*44*	*80*	*40*	*164*
2020(1)				

1. Data not available in Water Facilities Master Plan Report

plants are operated in a base loaded condition in that they do not vary to meet the demand. The flow from ground water sources is adjusted to meet the actual demand that is always higher than the production from surface water treatment plants.

With this operational situation, the load factor or average amount of water treated divided by the installed capacity, is relatively high. A review of historical performance indicates that the raw water required for the project would equal about 88% of the installed capacity over the length of the season. About 14,000 acre feet per year of water rights will be required for a 20 MGD addition in capacity. The Public Service Board of the City of El Paso acquires water rights through a variety of means including ownership, leases, rights of way, effluent exchange and contract purchases.

3.1.2 ADEQUACY OF SUPPLY

The water resources available to the EPWU have been described in the previous paragraphs. The water quality characteristics for the 20 MGD expansion are anticipated to be very similar to the water currently utilized at the JRWTP. The raw water at the JRWTP has been effectively utilized over the last 4 years to produce a treated water of very high quality. This water supply is acceptable for use and is adequate for use with the proposed expansion facilities.

During drought conditions the Rio Grande can be dramatically reduced as a water supply source. Current planning considers that Rio Grande allotments can periodically be reduced to 25% of normal. When this occurs, EPWU must rely on ground water and other non-surface water sources to meet the demand. Table 3.1.2 illustrates the other resources that are currently planned to provide the backup water supplies during drought conditions. As shown, current planning provides for drought protection with no demand reduction until the year 2010. After this time, provisions for demand reduction or emergency surface water purchases must be implemented.

3.1.3 RAW WATER QUALITY DATA REVIEW

The raw water quality has been reviewed based on data collected by the JRWTP operations staff for the operation years of 1996 and partial 1997.

The treatment process is impacted mostly from turbidity and TOC. The removal of turbidity and TOC involves effective coagulation, flocculation, and sedimentation. The current ammonia levels are significantly less than the level of 6.7 mg/L that the JRWTP was originally designed to treat, as such, the breakpoint chlorination facilities have not been used. The TDS and sulfate levels currently limit the ability to operate the JRWTP during low flow periods (early spring and late fall) in the canal.

3.2 EVALUATE EXISTING FACILITIES AND CONDITIONS

The purpose of this section is to present a review of the existing facilities at the JRWTP and the operating conditions over the past few years. This review is important from the standpoint of determining if changes in process philosophy are needed and to identify any minor changes that may improve the overall operation of the JRWTP.

3.2.1 REVIEW OPERATIONAL DATA

Water quality data collected at the JRWTP was reviewed for the 1996 water production season, as well as the 1997 water production season through mid May. The 1996 data and 1997 data are presented separately due to the different chemical addition strategies used in each water production season, and the resulting impact on JRWTP performance. It should be noted that the data presented for 1997 is only for the partial operating year including the months of February through April. This 1997 data is presented to show the short term impact of operational changes implemented at the JRWTP.

The distribution system total trihalomethane (TTHM) data represents the combined surface water and groundwater sources. The groundwater typically produces very little TTHM because it is very low in total organic carbon (TOC). In addition, the TTHM data is somewhat limited due to the short period of time that this parameter has been monitored. In 1997, the EPWU began using only ferric chloride for coagulation and eliminated the practice of lime addition. As a result, the coagulation became much more effective and seems to have reduced the TTHM in the distribution system.

In addition to the water quality data, the chemical use at the JRWTP was evaluated for all of the 1996 operating season and part of the 1997 operating season. As discussed above, the use of lime was discontinued in the 1997 operating season. The constituent removal performance of the (JRWTP) is integrally linked to the chemical coagulation scheme and ozone and chlorine disinfection practices. The chemical dosage and disinfectant residuals, respectively, applied and maintained through out the 1996 and early 1997 water production seasons were also reviewed.

The JRWTP was originally designed to meet the Safe Drinking Water Act (SDWA) regulatory requirements in force at the time of design (1990), as well as future anticipated SDWA requirements.

A review of the operational data compared to the finished water quality goals, reveals that the JRWTP is in compliance with each of the objectives, except for EPWU's internal policy objective of delivering a finished water hardness less than or equal to 150 mg/L and a pH of 8.0 or more. Since the original design period, EPWU has modified their internal policies regarding finished water hardness and pH.

The operational data review also reveals the following information regarding the JRWTP performance:

- *The biological filters remove nearly all the ammonia and therefore breakpoint chlorination is not practiced.*
- *The ferric chloride coagulation strategy practiced in 1997 without lime addition provides lower clarified water turbidity and greater TOC removal than the chemical treatment strategy practiced in 1996. In addition, the TTHM levels in the distribution system have also been reduced based on the limited data available. The original coagulant utilized at the JRWTP was ferric sulfate. Ferric chloride is a preferred coagulant because it does not contribute to the sulfate levels which are already high in the raw water.*

3.2.2 MEETING WITH EPWU STAFF

Meetings with EPWU staff were conducted on two occasions to discuss expansion of the JRWTP from 40 MGD to 60 MGD.

At the first meeting, a plant investigation of the facilities physical condition was conducted. As one would expect, due to the plant's young age, the facilities are in excellent condition and appeared to be well maintained in all respects. The plant staff has done an excellent job of maintaining the facilities at the JRWTP.

At the second meeting the following agenda was addressed:

- *Discuss the status of the operational data review and evaluation.*
- *Discuss future regulatory implications.*
- *Discuss potential expansion scenarios.*

There are two future regulations that will have the greatest impact on the water supply industry. These are the Enhanced Surface Water Treatment Rule (ESWTR) and the Disinfectant/Disinfection Byproduct Rule (DDBPR). In summary, based on the limited available data, the existing JRWTP treatment processes appear to be well positioned to meet with future proposed SDWA regulations, however, optimization of existing processes will be required. Therefore, there are no regulatory compliance issues at this time that would preclude expansion of the JRWTP utilizing treatment processes similar to existing facilities.

Based on the previous discussions regarding JRWTP performance, operations, and status with respect to future proposed regulations, the remainder of the meeting was dedicated to identifying the two preferred expansion approaches for more detailed evaluation.

Based on the sound performance of the existing 40 MGD JRWTP, it was decided to consider a 20 MGD expansion alternative similar to the existing facilities with some modifications based on operating experience and future regulatory implications.

The second alternative selected for evaluation is a dual membrane treatment system comprised of microfiltration followed by nanofiltration. The microfiltration will act as a pre-treatment for the nanofiltration process and remove suspended particles down to around 0.2 microns in size. The microfiltration step will therefore remove Giardia and Cryptospiridium cysts in addition to turbidity. Microfiltration will not however remove TOC. Nanofiltration is effective at removing dissolved organic compounds and most divalent salts including sulfate and hardness. This treatment approach would also provide the performance required for compliance with all foreseeable SDWA regulatory requirements.

In addition to the above two alternatives, a third alternative was identified during the public meeting on July 30, 1997. This alternative consists of utilizing microfiltration for suspended solids and microbial removal followed by the use of granular activated carbon (GAC) for TOC removal. The use of GAC for TOC removal will require that the GAC is replaced on a regular basis. This alternative would not remove hardness or TDS and therefore could not be used to extend the operational season of the JRWTP.

It was recommended that a dual membrane microfiltration (MF) / nanofiltration (NF) pilot system in the expansion project to allow investigation of this treatment approach regardless of the ultimate treatment approach selected for the expansion.

3.2.3 APPROPRIATENESS OF TECHNOLOGY

Based on the previous information presented regarding the existing facilities, an expansion scenario with facilities similar to the current facilities with minor modifications, based on operational experience with the current facilities and consideration of future regulatory requirements is both feasible and appropriate.

With respect to the alternative expansion scenario using a dual membrane approach, this is essentially the same technology used to reclaim wastewater treatment plant secondary effluent to drinking water standards. Therefore, this treatment approach is robust and fully capable of treating the JRWTP raw water source to a quality commensurate with current and future proposed SDWA regulations. This process would be new to the operations staff and would require additional training. It is felt that membrane technology could be effectively operated in El Paso and is appropriate for this alternative comparison.

3.3 PROPOSED EXPANSION OF FACILITIES

The purpose of this section is to evaluate the facilities necessary for the 20 MGD expansion of the JRWTP. An evaluation of alternatives including expansion with similar facilities or dual membrane technology is presented.

3.3.1 IDENTIFY POTENTIAL PROCESS ALTERNATIVES

Three treatment process alternatives for a 20 MGD expansion to the JRWTP were identified. The first expansion alternative would provide facilities using the current JRWTP technology, with minor plant improvements. The second expansion alternative is a dual membrane treatment system comprised of microfiltration followed by nanofiltration. The third alternative is a process using microfiltration followed by GAC filtration.

3.3.2 EVALUATION OF PROCESS ALTERNATIVES

The criteria listed below were used to evaluate the three expansion alternatives:

- *Estimated capital cost*
- *Estimated annual operations and maintenance (O&M) cost*
- *Continuity with existing facilities*
- *Residual handling*
- *Performance*
- *Operability*
- *Reliability*

A comparison of each alternative for each evaluation criteria is summarized in
Table 3.3.2. Non-monetary criteria are assigned a "+", "0", or "-" value. If the value for all alternatives is "0", there is no significant difference between them.

Table 3.3.2

Evaluation of Process Alternatives

Evaluation Criteria	*Alternative 1 Current Treatment*	*Alternative 2 Membrane Treatment*	*Alternative 3 Microfiltration/ GAC*
Estimated capital cost for 20 MGD Expansion	*$22.31 million*	*$41.3 million*	*$32.7 million*

Estimated Annual O&M cost for 20 MGD Expansion	*$2.34 million*	*$2.08 million*	*$2.27 million*
Continuity with existing facilities	+	-	-
Residual handling	+	-	-
Performance	*0*	-	*0*
Operability	+	-	-
Reliability	*0*	*0*	*0*

Estimated Capital Cost - *Expansion alternative capital costs were developed for comparison purposes only.. The second and third alternatives are therefore less desirable from a capital cost standpoint.*

Estimated Operations and Maintenance Cost - *As with the capital costs, the expansion alternative O&M costs are order of magnitude estimates to be used for comparisons of alternatives.*

Continuity with Existing Facilities **- Since this alternative involves like treatment processes and new processes serving both the existing and expanded plant, Alternative 1 provides the highest level of continuity with existing facilities.**

Residuals Handling - *The residuals produced at JRWTP consist of silt removed from the presedimentation basins and ferric sludge generated during coagulation. Due to the difficulty of disposing of the nanofiltration concentrate, the disposal of residuals generated from Alternative 1 is preferred over the membrane technology.*

Performance **- The existing JRWTP meets all current regulations and with treatment optimization improvements will likely meet the expected future SDWA regulations. The dual membrane technology will however generate a waste concentrate brine stream. From an overall performance standpoint, Alternative 1 would rank above the dual membrane alternative.**

The Alternative 3 facilities will meet the SDWA regulations also and will therefore rank the same as Alternative 1 on the basis of performance.

Operability *- Since the 20-MGD expansion for Alternative 1 will provide similar treatment facilities, the EPWU operations and maintenance staff will have consistent unit processes for the new and existing plant. Therefore, the implementation of Alternative 1 will result in a higher operability rating that Alternative 2 or Alternative 3.*

Reliability *- The JRWTP has operated extremely well over the last four years which indicates that the process is quite reliable. The performance of microfiltration/nanofiltration treatment with Alternative 2 is not as sensitive to raw water quality fluctuations and proper chemical treatment. Therefore all three alternatives will rank similar in terms of reliability.*

Recommended Process Alternative - *Based upon the criteria discussed above, Alternative 1- Current Treatment Technology is preferred over Alternative 2 - Membrane Treatment or Alternative 3 - Microfiltration/ GAC. Therefore, Alternative 1 is recommended for the 20-MGD expansion of JRWTP.*

Presented below is a summary of the proposed improvements associated with the proposed 20 MGD expansion utilizing facilities similar to the existing JRWTP facilities.

3.3.3 PRETREATMENT FACILITIES IMPROVEMENTS

The 20 MGD expansion will require facilities to allow the additional flow and to improve the operation of the pretreatment facilities. Flow increases will require additional capacity in some of the pretreatment units while others were initially designed for 60 MGD so expansion is not required

3.3.4 RAPID MIX/FLOCCULATION/SEDIMENTATION

The 20 MGD expansion of the JRWTP will require improvements to the rapid mix/ flocculation / sedimentation facilities. Recommended modifications to the existing rapid mix/flocculation/sedimentation facilities are as follows:

- *Provide ability to add ferric chloride as the primary coagulant*
- *Provide particle counters on the settled water lines*

Recommended design improvements that will be incorporated into the rapid mix/flocculation/sedimentation expansion facilities are as follows:

- *Provide constant speed flash mixers*
- *Provide means to dewater the rapid mix basins*
- *Provide improved means to wash sludge out of the flocculation basins*

3.3.5 GAC FILTRATION

The 20 MGD expansion will require additional GAC filtration facilities. The following facilities are discussed:

- *Filter influent pump station*
- *GAC filters*

Recommended modifications to the existing and new filtration facilities are as follows:

- *Provide particle counters on each of the filter effluent lines*
- *Provide air conditioning in the filter control booths to protect the computer equipment*

3.3.6 OZONE FACILITIES

The 20 MGD expansion will require the ozone facilities to be expanded. New units required include:

- *Preozonation contactors*
- *Prefiltration ozonation contactors*

The ozonation system was originally designed to provide a total ozone dose of 10 mg/L. The current dosage is around 2.2 mg/L. Therefore, the addition of a single ozone generator will be sufficient for the proposed 20 MGD expansion.

The use of ozone is an effective method of achieving the required inactivation of viruses, Giardia, and Cryptospiridium. It is anticipated that future inactivation requirements for Cryptospridium will control the disinfection requirements.

3.3.7 CHLORINATION

Free chlorine is used for a secondary disinfection residual at the JRWTP to maintain a chlorine residual in the distribution system. The existing chlorination contactor was designed to remove ammonia through breakpoint chlorination; however, breakpoint chlorination is not practiced due low levels of ammonia in the raw water and to the ammonia removal capability of the biological GAC filters. Final residual disinfection occurs in the clearwell where chlorine solution is added in the turbulent area just downstream of the clearwell inlet weir.

Modifications to the existing chlorination facilities will consist of reconfiguring the breakpoint chlorination contactor. This will be accomplished by reconfiguring the baffle walls in the basin to provide additional backwash supply storage. As such, the breakpoint chlorination volume will be converted to filter backwash storage volume. Since breakpoint chlorination is no longer needed, the chlorine storage and feed facilities are adequate for this proposed 20 MGD expansion.

3.3.8 HIGH SERVICE PUMPING

A clearwell enlargement is not required for the 20-MGD expansion since the existing volume is adequate for the constant flow type operation used at the JRWTP. Baffles will be provided in the clearwell to optimize the available chlorine disinfection contact time before conveyance to the distribution system.

The high service pumping station is located at the opposite end of the clearwell inflow and introduces finished water into the distribution system. Additional pumping will be required for the 20-MGD expansion.

3.3.9 GENERAL FACILITY MODIFICATIONS

Other facilities requiring expansion or modifications are:

- *Solids handling facilities*
- *Chemical storage and feed*
- *Plant site*

Changing the primary coagulant will result in significantly less solids production. As such,, the existing residuals handling facilities have sufficient capacity to handle the residuals generated when operating at 60 MGD.

The following new chemical storage and feed systems will be provided for the 20-MGD expansion:

- *Liquid ferric chloride for coagulation*
- *Phosphate for corrosion control*

These two new chemical facilities will be sized to accommodate the existing plant and the 20-MGD expansion.

The existing JRWTP was designed to be constructed in two stages so adequate space is available to accommodate the 20-MGD expansion with similar facilities.

As part of the expansion project, a dual membrane microfiltration/nanofiltration pilot plant will be provided to allow investigation of this treatment approach. As discussed previously, the use of membrane technology may be appropriate for future expansions.

3.3.10 WATER TRANSMISSION/DISTRIBUTION SYSTEM MODIFICATIONS

The addition of 20 million gallons per day of capacity at the Jonathan Rogers Water Treatment Plant (JRWTP) requires analysis of the impact upon the finished water transmission piping system. A hydraulic model of the Valley Pressure Zone was used to determine what modifications, if any were necessary to increase the capacity of the existing piping network. It was determined that the worst case scenario as far as distribution problems would occur at the time of year when the demand was the lowest. The problem would be in the early years after the expansion goes on line. This would require transporting the 60-MGD further than in other scenarios and should therefore be the most critical.

In order to support these flows, it was necessary to add approximately 37,000 feet of pipe and tie to the existing 48 inch pipe that extends from the JRWTP to the Americas Reservoir at 3 places. These piping changes were determined incrementally by running the model over 45 times with different pipe lengths, diameters and locations until the best distribution was achieved.

Once the general location for the transmission line was determined, 3 alternative routes were established.

The first alternative was routing the pipe through the Mesa Drain. The Mesa Drain, owned by the El Paso County Water Improvement District No. 1 was chosen as a possible route because of the advantage of being located out of most street rights-of-way, therefore causing little public inconvenience during construction.

The second alternative was to route the pipe in North Loop Road. This route was chosen as an alternative based upon favorable results of the hydraulic model indicated a location in North Loop Drive was the most compatible with existing and future distribution characteristics.

The third alternative involved a route utilizing public streets through residential areas. Most of the streets along this route are wide and handle only light to moderate traffic.

NON-MONETARY EVALUATION OF TRANSMISSION LINE ROUTES

A number of items were evaluated to establish a ranking system to determine the most favorable route from a non-monetary point of view. The results of this ranking appear in tabular form in Table 3.3.10b.

Alternative Ranking Results

TABLE 3.3.10b

Item	*Alternative*		
	1	*2*	*3*
Public Disruption During	*1*	*3*	*2*
Ease of ROW/Easement Acquisition	*1*	*3*	*2*
Concrete/Asphalt Paving	*1*	*3*	*2*
Arterial/Canal Crossings	*2*	*2*	*1*
Existing Utility Crossings	*2*	*2*	*1*
Operating/Maintenance Flexibility	*1*	*3*	*2*
Construction Dewatering	*2*	*3*	*1*
TOTAL POINTS	*10*	*19*	*11*

MONETARY EVALUATION OF TRANSMISSION LINE ROUTES

In order to confirm the results of the non-monetary evaluation, comparative costs were developed and a monetary comparison performed. This was accomplished by sizing the system and estimating the costs of principle components of the system.

A summary of the comparative costs for the transmission line is as follows:

Alternative I: $10.02 million

Alternative II: $11.11 million

Alternative III: $ 9.94 million

SELECTED TRANSMISSION LINE ALTERNATIVE

The selected alternative is to route the pipe down the Mesa Drain shown on Figure 1.3. The 32,000 feet of pipe consists of 54 inch, 48 inch and 42 inch as follows:

- *9,730 feet of 54 inch diameter pipe*
- *4,307 feet of 48 inch diameter pipe*
- *17,965 feet of 42 inch diameter pipe*

This piping system would connect the 48-inch line from the plant to the 48-inch cross-town feeder via the Mesa Drain. One of the tie-ins to the existing 48 inch pipe from the plant to the Americas Reservoir at the Franklin Drain will require 700 feet of 20 inch at Americas and A & M Circle.

3.3.11 FACILITY EXPANSION CONSTRUCTION SCHEDULE

The 20 MGD expansion will require a construction period of around 2 years. A preliminary schedule showing the estimated time required for design, construction and startup is presented.

3.4 ESTIMATED FACILITIES CONSTRUCTION COSTS

The estimated costs of the proposed facilities needed for the 20 MGD expansion of the JRWTP are presented on Table 3.4b. The estimated costs shown are preliminary in nature and will change as the design of the facilities progresses. These estimated costs are conceptual in nature and are considered to be accurate within a range of 50% low to 30% high. A 20% contingency has been added to account for the very preliminary nature of the facility concepts. Cash flow projections for the administrative, engineering and construction components of the project are also presented.

3.5 OPERATIONS AND MAINTENANCE PLAN

3.5.1 OPERATIONS AND MAINTENANCE NEEDED FOR EXPANSION

The expansion facilities will require additional operation and maintenance personnel. The additional 5 staff required for the expansion represent an increase of approximately 23% over current staffing levels.

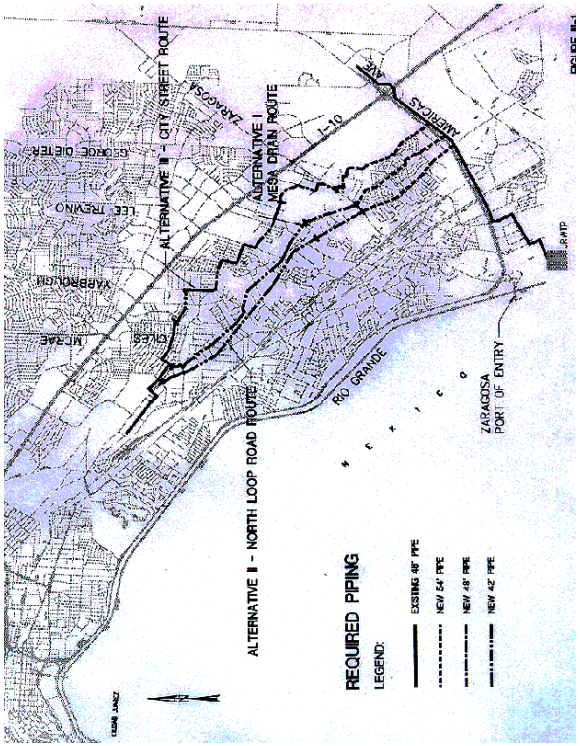


Table 3.4b				
Estimated Costs for Proposed 20 MGD Expansion				
Facility	*Estimated 1990 Costs for 20 mgd Expansion*	*Estimated June 1999 Cost for 20 mgd Expansion*	*Contingency, 20%*	*Estimated Cost of 1999 Expansion*
Raw Water PS	*$800,101*	*$1,015,435*	*$203,087*	*$1,218,522*
Presedimentation Ponds Improv.	*$0*	*$401,901*	*$80,380*	*$482,281*
Settled Water PS	*$535,909*	*$680,140*	*$136,028*	*$816,168*
Rapid Mix/Flocculation /Sedimentation Basins	*$2,056,979*	*$2,610,580*	*$522,116*	*$3,132,696*
GAC Filters	*$3,156,503*	*$4,006,022*	*$801,204*	*$4,807,226*
Ozone Facilities	*$5,172,565*	*$6,564,674*	*$1,312,935*	*$7,877,608*
Chemical Feed Facilities	*$693,096*	*$879,631*	*$175,926*	*$1,055,557*
Clearwell Improvements	*$1,915,173*	*$2,430,609*	*$486,122*	*$2,916,731*
Transmission Pipeline	*$0*	*$8,350,000*	*$1,670,000*	*$10,020,000*
Subtotal	*$14,330,326*	*$26,938,991*	*$5,387,798*	*$32,326,789*
Engineering, 15%				*$4,849,018*
Legal /Administration, 2%				*$646,536*
Total				*$37,822,343*

The estimated cost of operation will be around $6,022,000 per year. The projected unit cost of water production will be very close to the current cost of operation that is around $0.54 per 1,000 gallons of water produced.

3.5.2 STARTUP REQUIREMENTS

The startup procedures will be specified in the contract documents with specific details related to schedule and correction of deficiencies. If possible, the critical startup procedures will be scheduled during period of low water demands such as early spring.

3.5.3 OPERATIONS TRAINING PROGRAM

Training of the operations personnel will be accomplished after the startup of the facilities is complete and accepted.

3.5.4 OPERATIONS AND MAINTENANCE MANUAL

The Operations and Maintenance manual developed for the existing plant will be updated to reflect the new facilities and any changes in the existing facilities that may result from the new facilities.

3.6 COMPLIANCE WITH APPLICABLE DESIGN REGULATIONS AND STANDARDS

There are no regulatory compliance issues that would preclude expansion of the JRWTP with the same type of treatment process. The JRWTP will meet the current and proposed SDWA requirements. The planned expansion will comply with the Texas Natural Resource Conservation Commission regulations as well.

4. Financial Feasibility and Project Management

a. Financial Feasibility

The historical financial statements for the last five years have been submitted in accordance with generally accepted accounting principles.

The ProForma financial statements with income statement projections have also been submitted.

The El Paso Public Service Board (PSB) is requesting funding in the form of grants to cover 67.5 percent of the total project costs (approximately $25.5 million dollars of the $37.82 total cost of the project). The funds are being requested through the Border Environmental Infrastructure Fund (BEIF).

The capital improvements plan/budget and the operations and maintenance budget has also been submitted.

The El Paso Water Utilities/Public Service Board financial plan has taken into account all potable water and wastewater investment projects during a ten-year period. This plan has budgeted the EPWU's Investment and Capital Improvement Plan which includes areas in El Paso County located outside El Paso City limits.

The technical and financial projections show the system's total income, which exceed $84.6 million dollars in 1998 and after a ten-year period are estimated to reach $118.5 million dollars. The operation and maintenance costs go from $49.2 million in 1998 to $66.6 million in 2007, as such, the balance available for debt service is $51.8 million dollars. Three scenarios have been developed, with 10, 50, and 100% grant funds of the 67.5% considered. The project is only feasible if there is at least 50% grant funds of the 67.5% requested, that is, $12.7 million dollars. Based on current analysis, the project's minimum debt coverage is 1.2 times making the project financially feasible.

b. Fee/Rate Model.

Historical rate and fee schedules have already been submitted by the utility. The Utility Board approved the new rate schedule in January 1997. With this schedule, the Utility is able to ensure the income revenue to cover the projected debt service.

c. Project Management.

The Utility has submitted its organizational chart to the BECC which included the PSB Board Legal Counsel's recommendation stating that EPWU has the technical, administrative, and legal capacity to design, construct, implement, and operate the project as well as related services. Furthermore, EPWU has the legal capacity to undertake long term loan obligations and to use cash-flow as financial guarantees.

5. Community Participation

a. Comprehensive Community Participation Plan

The Project Applicant submitted an approved Comprehensive Community Participation Program. The Program included a local steering committee, access to public information and two public meetings.

The Local Steering Committee is comprised of representatives from the business, civic, non-profit, governmental, education and environmental sectors of the El Paso community. The Committee met on several occasions to discuss and address issues related to the project including: environmental, historical, cultural, technical process, treatment costs, environmental impacts, alternatives, and rate impact issues as well as the issue of water supply/sustainability for El Paso area. No one from the committee expressed any opposition to the expansion project and in fact are submitting a letter of support on the project as part of the applicant's final report to the public on community support.

The project applicant and the committee have also met with local organizations including the Lower Valley Water District Authority and the City of Socorro to review the project. Neither the City of Socorro or the Lower Valley Water expressed any opposition to the project and in fact, noted the project's importance in providing potable water to the colonia residents in the area.

Project information was made available to the public on August 18, 1997, 30 days prior to the first public meeting, scheduled for September 18. No one from the general public asked to review the project materials prior to either of the public meetings.

Two public meetings were held at Socorro High School on September 18th and September 19th. The local press provided notice of the two meetings. No one from the community surrounding the facility attended either of the public meetings, which, according to the applicant, is a sign that there is no public opposition to the project.

It should be noted that the applicant, from the beginning of the original project, held public meetings regarding the environmental document. Supplemental environmental information regarding the expansion project was presented during the scheduled public meetings.

b. Report Documenting Public Support

The applicant submitted a report documenting the public support.

6. Sustainable Development

a. Definition and Principles

Principle 1. This project is aimed at providing human beings a sustainable water supply and an improved health environment. The proposed project will provide a sustainable water supply while lowering rate of depletion of groundwater supplies. This will be accomplished through the use of surface water resources found in the river. The treatment plant expansion will treat an additional 20 MGD of surface water and eliminate the need to take that 20 MGD out of the ground.

Principle 2. Present and future generations will benefit from the water supply sustainability and the health improvements associated with this project. There have been many documented cases of Hepatitis A that occurred in the colonia areas that were attributed to contaminated drinking water. A 1988 study by the University of Texas Health Sciences Center at San Antonio revealed that approximately 90 percent of the population sampled in the San Elizario area had been infected with Hepatitis A before the age of 35. Once a treated domestic water supply is available and these people do not depend on shallow wells for their domestic water, the rate of Hepatitis A from ground water should decrease.

Principle 3. Environmental protection is an integral part of this project. Groundwater resources are protected in the project area. Minimizing the use of groundwater in the El Paso Area is a key part of the plan for the future. The Water Facilities Master Plan Report set forth the production required from each source of water that is available to the El Paso Area. It is projected that groundwater withdraws will decrease by 23% by the year 2015. For example, it was projected by the year 2015 that 155 MGD of water would be supplied by Surface Water Treatment Plants while only 115 MGD would be taken from the groundwater supply during summer months. In 1995, 148 MGD came from groundwater while only 80 MGD came from surface water.

Principle 4. Stakeholders have been involved in the planning process through the steering committee formed for the project. Continuing involvement is expected though the public hearing process. The steering committee was made up of members of the community along with people from government agencies. The committee members met twice and discussed the project and its potential environmental and economic impacts as well as discussing the treatment and transmission alternatives. The committee has issued a statement which all committee members have signed

b. Institutional and Human Capacity Building

The added capacity of the proposed expansion will be managed by the El Paso Water Utilities Public Service Board, an agency with a proven ability to manage a large water utility operation.

c. Conformance with Applicable Local and Regional Conservation and Development Plans

The proposed project complies with all long term planning that the El Paso Water Utilities/Public Service Board has executed over the past several years. El Paso Water Utilities/Public Service Board is the regional water planning agency.

Documents that were produced as a result of the El Paso Water Utilities long terms planning consist of the 1994 Water Facilities Master Plan and the 1990 El Paso Water Resource Management Plan Study. These studies forecast the water demands and identify water resource development strategy necessary to meet these demands.

d. Natural Resource Conservation

With an additional 20 MGD of capacity the Jonathan Rogers Water Treatment Plant will produce more water from El Paso's surface water resources during the summer months. This will ease the overdrafting of a major groundwater resource, the Hueco Bolson aquifer. This aquifer currently provides about half of the drinking water for the El Paso area.

The selected treatment alternative is similar to the existing treatment process and there is little water loss through the process. The alternative of membrane processes could waste in excess of 20 percent of the water being treated. Conservation was a consideration when evaluating alternatives. This fact made the similar treatment process more favorable than the membrane process.

The El Paso Water Utilities already includes tips on how to conserve water in their bills and periodically in the local paper. Working with a committee of citizens, the EPWU has implemented a conservation ordinance that requires customers to follow strict regulations pertaining to water usage. For example, an odd/even-watering plan has been implemented in order to prevent customers from wasting water on landscape irrigation. Customers living at odd numbered addresses can water on 3 days of the week and even numbered addresses on the alternate 3 days with Monday reserved for Public Parks.

e. Community Development

This project to increase the water resources available to the area coupled with water distribution projects already underway will serve to encourage the establishment of schools and medical clinics in the newly served areas of El Paso's Lower Valley. With the added capacity and the means to transport potable water to outlying areas, many services that require potable water resources for their operations will become more common. Residential and industrial growth as well as business growth can also be expected in these areas. This growth will occur with or without this project.

The added capacity of this project will also improve the quality of life for people in the "colonia" areas who currently have and maintain their own water wells. Many of these families have suffered from disease caused by contamination of their well water supplies with improperly contained and treated domestic sewage.

This project will require the El Paso Water Utilities to acquire more water rights in order to supply the additional 20 MGD of capacity. Approximately 50% of these water rights will come from leases on water rights that are not currently being used at all. The other 50% will come from agricultural land that has been urbanized and excess water that is not used for agriculture and can be purchased from the purveyor oaf the water. Due to current legal actions, it is not clear at this time whether the purveyor of this excess water will be the Bureau of Reclamation or the El Paso County Water Improvement District.