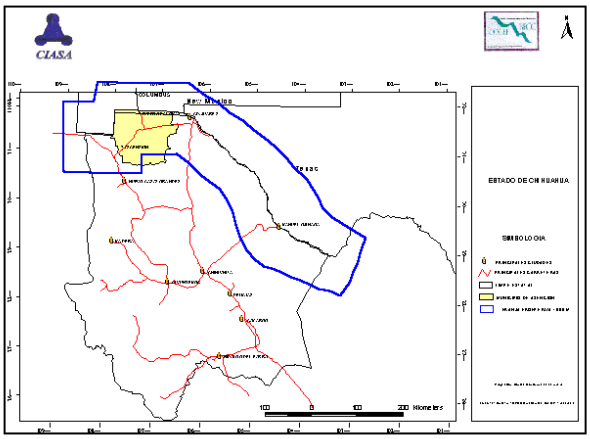
Border Environment Cooperation Commission
Improvement to Wastewater Collection and Treatment System for
Puerto Palomas, Chihuahua

Environmental Information

I. General Criteria

1. **Type of Project.** The project consists of rehabilitation and expansion of the wastewater collection system and the construction of a wastewater treatment plant.
2. **Location of Project.** Puerto Palomas is located in the northeast part of the State of Chihuahua, in the Municipality of Ascension. The community is bordered on the North by Columbus, Luna County , New Mexico. The project is located within the 100 km border region as defined by the La Paz agreement. The 1999 population of Puerto Palomas is approximately 7,200 people, and is expected to reach 14,800 people by the year 2020. To determine the population a historical growth rate of 4.64% was used and reduced to 3% by the end of the planning horizon. The location of the city is shown in the following map:



3. Description of Project and Tasks.

The project consists of improvements to the existing wastewater system in two phases. The first phase will meet existing demands through 2012 for the collection system and 2010 for the treatment system and the second phase for both systems through 2020. In both phases, wastewater service coverage will be maintained equivalent to the water service coverage. A summary of the various components of the project are listed below:

Phase I

1. *Wastewater collection, 1st Phase:*
   - Install 40,647 m (133,322 ft) of sewer pipes.
   - Install 3,004 m (9,853 ft) of lines at the Lerdo, Galeana, Guerrero and J. Rosas subcollectors.
   - Install 5,371 m (17,617 ft) of lines at the Mexico, Progreso and Lerdo collectors.
   - Install a 732 m (2,401 ft) gravity interceptor
   - Install an 778 m (2,552 ft) forcemain
   - Build 544 manholes and backdrop boxes.
   - Lift station
   - 2,856 sewer hookups; 1,400 immediately
2. *Wastewater Treatment, 1st Phase*
   - Construction of a lagoon system with 25 lps (396 gpm) installed capacity.
3. *Institutional Development of the Utility*
   - Improvement to the billing system
   - Rate study and implementation
   - Update to User List
   - Water Conservation Program
   - Energy Conservation Program
   - Administrative Improvements to the Utility

Phase II

1. *Wastewater collection, Second Phase:*
   - Rehabilitation of the wastewater collection system and lift station
   - Rehabilitation and expansion of the sewer pipes
   - 800 sewer hookups.
2. *Wastewater treatment, Second Phase*
   - Construction of an additional 9 lps (143 gpm) module for a total installed capacity of 34 lps (539 gpm).
3. *Institutional Development*
   - Actions similar to the first phase

It is important to note that part of the system is already constructed or under construction. Since 1996, the Mexican government has increased the sewer coverage from 25% to 40%, constructed the lift station, interceptor and forcemain, constructed a portion of the collectors and is constructing a portion of the wastewater treatment plant. It must be noted that, as of the end of 1999 only 26% of the total population was connected to the sewer system.

Wastewater treatment consists of a natural system that includes the construction of two treatment trains, each with a primary or anaerobic lagoon, a facultative lagoon, and a wetland. The treated effluent will have a quality of 30 mg/l of total suspended solids, 30 mg/l of biochemical oxygen demand, and 1000 mpu of fecal coliforms. This will be used to irrigate 6 hectares (14.8 acres) of tree farms, since there is no receiving body or nearby agriculture. Any additional outflow will flow into a dry river bed. The tree

farm is located within the project site. Additionally, the treatment plant site of 10 hectares (24.71 acres) will be situated within an ‘‘Ejido’’ and the required agreement with the ‘‘Ejidatarios’’ for use of the site has been completed.

Figures 1 and 2 illustrate graphically the project.

Figures 1: Wastewater Treatment System

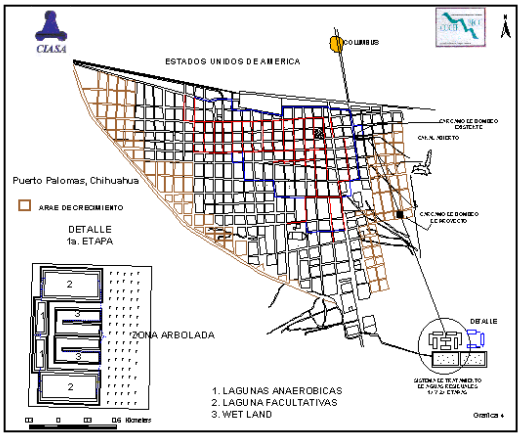
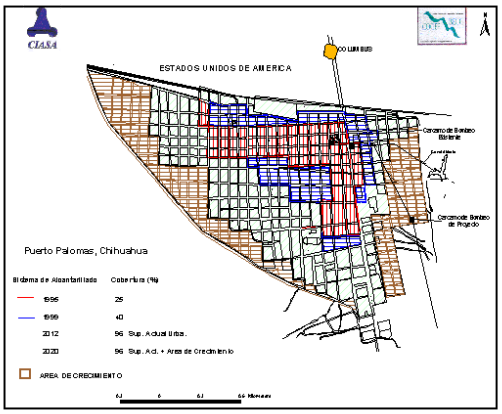


Figure 2: Proposed Wastewater Collection System



4. Compliance with international Treaties and Agreements. The project complies with the rights and obligations established in applicable treaties and agreements

II. Human Health and the Environment

1. Human Health and Environment. The community of Palomas does not have adequate sewage collection and treatment. Currently wastewater collected is not treated and disposed of in an open-air disposal site. Additionally, only 40% of the population has sewer available and as of the end of 1999 only 26% are connected. The remaining population has septic tanks and latrines, which leads to the infiltration of raw sewage into the aquifer. According to the study ‘‘Water Quality on the U.S.-Mexico Border: An Assessment of the Mimbres Basin Aquifer and Region Surrounding Columbus, New Mexico USA and Puerto Palomas, Chihuahua, Mexico done by Southwest Center for Environmental Research and Policy (SCERP) concluded that there is evidence of groundwater contamination by nitrates associated to wastewater infiltration. This results in the existence of a source of contamination to the environmental, an immediate health threat to the community such as the occurrence of water borne diseases. .

The implementation of the project will resolve the human health and environment problems associated with inadequate collection and wastewater treatment, which Puerto Palomas currently experiences.

2. Environmental Assessment . As required by the Mexican Law for Ecological and Environmental Protection, an Environmental Impact Statement (EIS) of the project was completed and presented to the State of Chihuahua Ecology Secretariat, for review and approval. A favorable finding was issued by Ecology Secretariat on December 1,1999.

To comply with the environmental requirements for solicitation of BEIF, additional environmental information to complement the Mexican EIS was developed. The EIS and additional information was sent to the United States Environmental Protection Act (USEPA) for review and initiation of the NEPA (National Environmental Policy Act) process. A FONSI was emitted on May 27, 2000 by USEPA and the NEPA process has concluded.

4. **Compliance with Environmental and Cultural Resources Law and Regulations.** All of the relevant documents have been presented and reviewed. According to the favorable finding by the Ecology Division of the State of Chihuahua and the list of protected areas provided by the National Institute of Ecology (INE), the project does not affect any ecological reserve or habitat, or protected species. Additionally, the National Institute of Anthropology and History emitted a finding on November 10, 1999 indicating that the project will not affect historically or anthropologically significant areas.

III. Technical Feasibility

1. **Appropriate Technology**. A water and wastewater master plan was completed in 1997 for the project through the BECC technical assistance program. The state of Chihuahua has completed final design of Phase I of the project for the wastewater collection system and the wastewater treatment plant. Development of the wastewater collection and treatment final design has meet the criteria established in the Master Plan developed with technical assistance provided by the BECC. The planning period is for a 20-year horizon and divided into two implementation phases. Three wastewater treatment alternatives were analyzed: two lagoon systems and activated sludge package plant. The criterion used to select the best treatment alternative was a combination of ease of operation, lowest initial investment and lowest operation and maintenance cost during the planning period. Additionally, the discharge permit has already been obtained and the site secured for the plant.

   Final design was developed by the Government of the State of Chihuahua through the Junta Central de Agua y Saneamiento (JCAS), are based on the design criteria by C.N.A. and JCAS and comply with the applicable official norms established by C.N.A., I.N.E. (National Institute of Ecology), and Health Department in each case . Through the BECC's Technical Assistance program, a consultant was hired to perform a technical review of these studies and final designs for the purpose of validating or improving the design. This resulted in two reports: A Comprehensive Review of the Conceptual Design and Assumptions, July 7, 1999, and A Comprehensive Review of the Final Design, August 9, 1999. These reports recommended some minor adjustments to the project, which have been incorporated. Additionally, the population projections have been validated by C.N.A.

2. **Operation and Maintenance Plan.** A complete restructuring of the water utility is recommended. Within this context development of operations, procedures, and administrative manuals is considered. A funding component is also included.
3. **Compliance with applicable design norms and regulations.** The project is in compliance with applicable design standards and regulations. Additionally, C.N.A has validated all documents including final design.

IV. Financial Feasibility and Project Management

1. Financial Feasibility.

The project costs for the various components of the project are the following:

Cost of the Project to Improve the Wastewater Collection and Treatment Systems and strengthen the Utility

	TOTAL	1st Phase	2nd Phase
Wastewater collection	$33'705,504	$26'775,342	$6'930,162
Wastewater treatment	$10'906,452	$7'907,231	$2'999,221
Utility	$3,600,000	$1'800,000	$1'800,000
TOTAL	$48'211,956	$36'482,573	$11'729,383

Costs in pesos. December 1999 (includes taxes)

Of this total budget, approximately $11'821,061 have been expended. Phase I of the project initiated construction in 1996 and continues to date with funds from the Mexican government. The construction to date includes primarily the interceptor and forcemain, lift station, a portion of the sewer and hookups, and a portion of the wastewater treatment plant.

The recommended financial structure for the first phase is summarized in the table below. Since a portion of phase I has been constructed more accurate unit costs have been established. Additionally, since final design has been completed on the first phase of the project, the quantities of materials needed are better defined.

Financial Structure for the First Phase

Source	Type	Amount MX$	% of Phase I Project Cost
Mexican Government	Grant	$17'329,222	47.5%
USEPA	BEIF- Grant	$17'329,222	47.5%
NADB	Credit	$1'824,129	5.0%
TOTAL		$36'482,573	100%

2. **Rate Model:** The current rate structure is a fixed fee depending on the level of service. The table below summarizes for 1999 and 2000 the rate structure for and number of users in each category. There are four domestic rates, A through D, and nine commercial rates, E through M. Categories A through C are for water service without sewer. Category D is for water and sewer service. The remaining commercial rates depend on the type of business and estimated consumption. All of the commercial rates have sewer included. Additionally, since there is no micrometering or macrometering the cost per cubic meter is based on an assumed average consumption of 300 liters/person/day (75 gals/person/day) for domestic consumption and 2,387 liters/connection/day (597 gals/connection/day) for commercial consumption.

Current 1999 and 2000 Rate Structure

Category	Number of Users		Monthly Fee		Cost/Cubic Meter	
	1999	2000	1999 $Mx/Month	2000 $Mx/Month	1999 $MX	2000 $MX
A	104	109	16.80	19.32	0.44	0.50
B	1,038	1,086	33.50	38.53	0.87	1.00
C	242	253	50.30	57.85	1.31	1.51
D	455	476	54.40	62.56	1.41	1.63
E	60	61	82.90	95.34	2.16	2.48
F	13	13	91.20	104.88	2.37	2.73
G	42	42	130.60	150.19	3.40	3.91
H	0	0	137.50	158.13	3.57	4.12
I	1	1	164.90	189.64	4.29	4.94
J	27	27	187.50	215.63	4.87	5.62
K	4	4	371.90	427.69	9.67	11.15
L	2	2	635.90	961.29	16.53	25.05
M	1	1	1,500.00	1,725.00	39.00	44.95

Total	**1,989**	**2,076**			**1.24**	**1.45**

In 2000 the overall average rate was $1.45/cubic meter yet the domestic rate was on average $1.29/cubic meter for domestic use and $2.27/cubic meter for commercial use.

The proposed rate structure, which includes water, wastewater collection and treatment, is summarized in the table below. This is an average rate, which will have to be further analyzed in a rate study to determine the impact to each type of user.

Proposed Average Rate for Water and Wastewater Service

Year	Rate $Mx/Cubic Meter	Average Bill $Mx/Month	Increase
2000	1.45	51.91	
2001	3.19	113.68	119%
2002	4.62	98.91	45%
2020	4.62	97.39	0%

As mentioned previously, the assumed domestic consumption for 2000 is 300 l/p/day (75 gal/p/d). The decrease in the monthly average bill is due to a decrease in the assumed consumption to 180/l/p/day or (45 gal/p/day). This decrease is expected to result from the installation of macro and micrometering which the state and utility provider have committed to and increased efficiency's in the operations.

3. **Project Management**. The project will be managed by the utility provider, Junta Rural de Puerto Palomas. The system is expected to operate in a self-sufficient manner, supporting itself through user fees.

V. Public Participation

Comprehensive Public Participation Plan. The community of Palomas approved and submitted a public participation plan (Plan) to BECC on September 21, 1999. The Plan includes the following activities: public opinion survey, outreach strategy, two public meetings and compilation of the final report documenting public support for the project. The activities carried out thus far are in fulfillment of this Plan.

Steering Committee: The steering committee was formed on May 13, 1999. It is composed primarily of five members of the community and includes Ricardo Gutierrez, (president), Nohemy Baron (vice president), Luz Jurado (secretary), Manuel Chaires (Treasurer), and Jaime Sanchez. There have been three meetings with the consultant and steering committee to review the details of the project. The steering committee has had additional meetings with respect to the implementation of the public participation plan.

Local Organizations: The local organization, which met with the steering committee, is that of the "Ejidatarios" or farmers, which is where the treatment plant will be located. This required a legal agreement between the project sponsor and association of farmers for use of the land for beneficial use. A meeting where the farmers unanimously voted to sign the agreement was held on March 19, 2000. The agreement is now executed and the process completed. Additionally, through BECC's technical assistance program, Colegio de la Frontera Norte (COLEF), performed scientific public opinion survey to obtain information useful for developing the most effective way of diffusing the information to the public. There community was divided into 4 areas and 11 meetings held with the various residents of those areas.

1. **Public Information:**

The following was completed to assure that the public was informed:

- At the JRAS the project information was available for consultation
- 2,500 flyers were distributed to residents
- Signs were painted on various walls throughout the city
- There was 84 radio spots on two local stations on La Caliente and Radio Unica
- Television announcements were made on a local station
- A large advertisement was published in the local newspaper announcing the first public meeting and where the project information was held.
- A publication in a local magazine describing the project was completed.

It is important to note that with BECC Technical Assistance, College of the Northern Border (Colegio de la Frontera Norte or COLEF) completed a Public Opinion Survey using a scientific methodology to obtain information on how is the most effective way of informing the public of the project, identify average family incomes capacity to afford a rate increase for a new service, and opinion on a rate increase.

From this COLEF study, the steering committee developed the public participation plan, which was approved by the BECC for its implementation. Some of the most important results of the public opinion survey are summarized below:

- Preferred Method to be Informed of Project:: 45% by Television; 20% by Flyers; 18% by portable loudspeaker; 14% by newspaper, and 5% by radio.
- Capacity of Payment for Services and Acceptance of Project: By estimate of COLEF, it was calculated that between 3% and 5% of monthly income was used for payment of services. It was determined that 59% of surveyed population considered that rage as ideal and 25% considered that rage to low and very low and 16% considered that rage to high. The results showed that 72% of the population is in support of the project, and 84% are willing to pay between 3% and 5% of their average monthly income, approximately between 80 pesos and 135 pesos.
- Evaluation of the Utility Provider: The utility provider known was the Rural Water and Sanitation Provider for Palomas, Chih., (Junta Rural de Agua y Saneamiento or JRAS) in general obtained a positive evaluation on behalf of the community, which indicates the confidence, the community has in this institution.

Additionally, in preparation for the second public meeting a survey was taken the week of October 9 through 13. The 70 surveys were distributed at the JRAS offices when people went to pay their bill. The following is a summary of the results of the survey:

- 95.7% of those surveyed felt the projects the JRAS was supporting were very important.
- 65.7% had a very high confidence level in the projects ; 10% a high confidence level, and 14.3% a low or very low confidence level.
- 81.2% of those surveyed are willing to support a rate increase
- 76.8% consider themselves informed of the project and its benefits.

Public Meetings: The first public meeting was held on April 29, 2000 at the local movie theater and was announced 30 days in advance of the meeting. The announcement of the first public meeting was published on March 22, 2000. Approximately 70 people attended At this meeting the technical aspects of the project were presented. At this time the project included rehabilitation to the water system, expansion of the sewer system, and wastewater treatment plant. In early October 2000 it was decided to separate the projects and first certify the sewer and wastewater treatment plant. The water portion of the project will be certified once the required hydrogeology study is completed to determine the most adequate water source.

The second public meeting was held on October 19, 2000 at 6:00 p.m. in the gymnasium of a local grammar school. Approximately 300 people attended, 4.1% of the population. The population was informed of the separation of the water and wastewater project, the project cost, financial structure, and rate. In order to better determine the acceptance of the wastewater project and rate a survey was taken of the attendees at the end of the public meeting. The survey was distributed to 250 people and included 6 questions, which could be easily answered such as gender and age. The last question asked was if the public was willing to accept the rate necessary for the project explained at the public meeting which resulted in a 95.2% acceptance rate which was verified by COLEF, the steering committee, utility, state of Chihuahua, and BECC. The following table summarizes the results of the last and most important question:

Will you accept the proposed rate increase?

Answer	Number of Responses	Percentage
Yes	238	95.2 %
NO	4	1.6 %
Eliminated	1	0.4 %
Not Returned	7	2.8 %
Total	**250**	**100 %**

This overwhelming positive response at the second public meeting further confirmed what the results of the previous studies had already indicated.

VI. Sustainable Development

1. Definition and Principles

Principle 1: The project will provide a solution to current local problems by offering greater efficiency in wastewater collection and treatment services. This will result in a healthier and more productive lifestyle for Palomas' residents.

Principle 2: The project does not compromise developmental and environmental needs of present and future generations; on the contrary, it promotes them through a rational management of resources protected by the implementation of the project.

Principle 3: Increasing the sewer coverage from 40% to 96% and adequate wastewater treatment and effluent disposal will result in a reduction in environmental contamination. Additionally, the project includes a reforestation area to help preserve environmental balance. The above contributes to sustainable development, with environmental protection being an integral part of the process.

Principle 4: The project will promote active participation of stakeholders such as local residents and authorities, through the establishment of environmental education programs with active participation from the community.

2. Institutional and Human Capacity Building. The project intends to restructure the existing organization with substantial improvements in the administrative, financial and operating areas, proposing first a functional organization that can later be developed by reorganizing positions to develop functions required for a more efficient and economic operation of the system.

3. Conformance with Applicable Local/Regional Conservation and Development Plans. The project is consistent with the various planning documents such as the ECOPlan of the state of Chihuahua, State Plan for Urban Development, and the Municipal Plan for Urban Development. For Ascensión, and the Water and Wastewater Master Plan Puerto Palomas.

Palomas is now developing an Urban Development Plan, which will use the information of this project and the other planning documents. There has been coordination with the participants of the Urban Development Plan.

4. Conservation of Natural Resources. The natural resources related to the project are flora, fauna, and the aquifer. Flora and fauna, none of which are protected or endangered, will be affected positively and negatively in the various stages of the project. The negative effect will be due to the removal of the vegetation during the construction phase and installation of a wastewater treatment plant, yet the wetlands by provide a positive source for growth of the flora and fauna. Therefore, the effects will be much more positive. Additionally, the aquifer will be much more positively affected by the project since there will be adequate collection, treatment, and disposal of the wastewater generated by the residents will result in a dramatic reduction in the contamination of the aquifer as well.

5. Community Development. The most notable improvements to the community will be in areas of public health and environment, especially with respect to the wastewater treatment plant