Border Environment Cooperation Commission
Rehabilitation of the Wastewater Collection System in Nogales, Sonora

I. General Criteria

1. Project Type.

The project consists of the rehabilitation of approximately 30,000 linear meters of primary and secondary sanitary sewer lines, which corresponds virtually 100 percent of the city's wastewater collection sewers and mains.

Figure 1. Location of the City of Nogales

2. Project Location.

The project is located within the City of Nogales, in the State of Sonora. The totality of the proposed rehabilitation tasks will take place in the Nogales Wash watershed which, after running through the urban area, flows into the United States until it reaches the Santa Cruz river north of Nogales, Arizona. According to the 2000 Population and Housing Census, Nogales has 159,787 residents. A four percent growth rate is expected and, if maintained, such rate will result in the city having approximately 350,000 residents by the year 2020. The project sponsor is Sonora's Water and Wastewater Commission [Comisión de Agua Potable y Alcantarillado del Estado de Sonora (COAPAES)].

3. Project Description and Tasks.

The proposed project is composed of 19 tasks for the rehabilitation of wastewater collection sewers and mains. Overall, the project proposes to rehabilitate 30,000 meters of lines ranging from 20 to 70 cm (8 to 28 inches) in diameter. Of the 19 tasks, two are targeted to improve the city's collectors, while the other 17 are for subcollectors.

The following table summarizes the 19 proposed tasks:

Sewer	Length (m)	Diameter (in.)
A. Obregon	3,747.00	18, 24, 28
Astolfo R. Cardenas	890.00	12
Buenos Aires	668.00	16
Ensueño	2,011.00	12, 16
Ruiz Cortines	9,139.48	24,28
Tecnologico	2,200.00	14, 16, 18, 20
5 de Febrero	1,080.00	12, 16
Virreyes	1,120.00	18
Reforma	1,830.00	12
Hermosillo	1,242.00	12, 16
De los Maestros	720.00	12
Kennedy	400.00	12
Olimpia	823.00	12
Penitenciaria	1,072.00	12
Niños Héroes	510.00	12
Celaya	511.00	12
Orizaba	723.00	12
J. García	860.00	12, 16
Las Aguilas	370.00	12

All the tasks will take place in areas that are currently developed and have water, wastewater collection and treatment services. For the majority of the project, the diameter of pipes will be maintained, except in a few places that, given the city's population growth, require an expansion of the pipes' diameters.

The preferred rehabilitation method will be traditional excavation and replacement of concrete lines with PVC pipes.

4. Conformance to International Treaties and Agreements.

The wastewater collection project for Nogales, Sonora was developed under a binational scheme with the goal of addressing the problem both in Nogales, Arizona and Nogales, Sonora. For this purpose, the Binational Technical Committee was created with representation from local, state and federal agencies in both the U.S. and Mexico. The U.S. agencies represented in the Committee included the U.S. Environmental Protection Agency (EPA), the Arizona Department of Environmental Quality (ADEQ), the Arizona Department of Water Resources (ADWR), the U.S. section of the International Boundary and Water Commission, Santa Cruz County, and the City of Nogales. The Mexican agencies represented in the Committee were the Mexican Water Commission (CNA), the State of Sonora Potable Water and Wastewater Commission (COAPAES), the State of Sonora Water Commission (CEA), the Infrastructure and Urban Ecology Department (SIUE), COAPAES – Nogales, the Municipality of Nogales, and the Mexican Section of the International Boundary and Water Commission. In addition to these agencies, both the Border Environment Cooperation Commission (BECC) and the North American Development Bank (NADB) participated in the Committee. The Binational Technical Committee held several meetings to plan and make decisions regarding the wastewater problems faced in Ambos Nogales. This rehabilitation project is a result of the recommendations of the Binational Technical Committee.

The project will improve public health and environmental conditions on both sides of the border, inasmuch as it will prevent untreated wastewater runoffs to the Nogales Wash, which flows into U.S. territory.

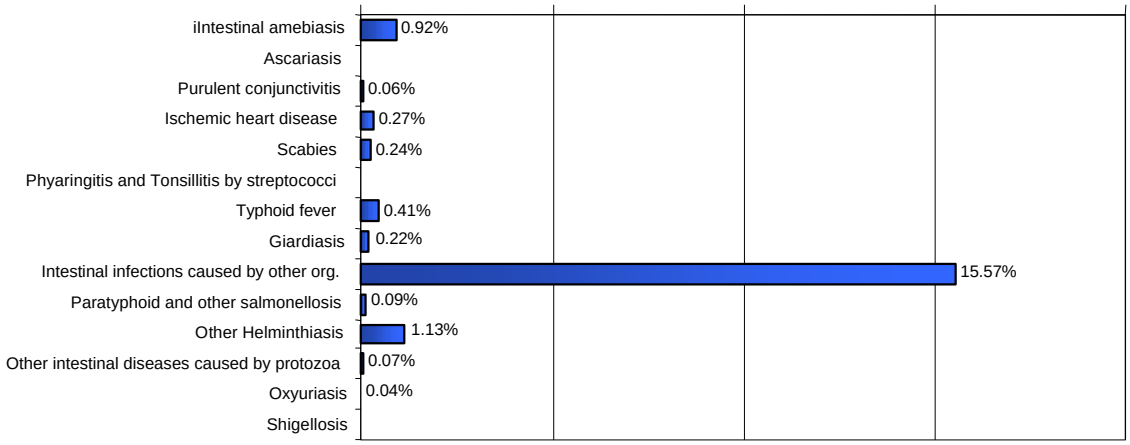
II. Human Health and Environment

1. Human Health and Environmental Need.

The project's objective is to improve environmental and human health conditions in the City of Nogales.

Nogales has a long history of wastewater problems resulting from the age of some wastewater collection lines, the existence of areas that lack wastewater collection services, and the silting continuously found in the wastewater collection system. The problems found in the wastewater collection lines impact the environmental quality and thus, pose a risk for the health of Nogales residents. The figure below shows morbidity percentage statistics on diseases associated to the inappropriate management of wastewater.

MORBIDITY RECORDED IN NOGALES, SONORA
1999 - 2003
PRIMARY FACTOR: POLLUTION



Source: National Health System
Secretariat of Health
Sonora State Epidemiology Office
Statistical Yearbooks: 1999, 2000, 20001, 2002 and weeks 1 to 38, year 2003.

The rehabilitation of wastewater collection lines to meet waterproofing requirements established by the applicable regulations will help reduce the potential inflow of rainwater and/or groundwater to the wastewater lines, reducing the volume of water currently being received by the international treatment plants located in Nogales, Arizona. This is particularly important because the international facility at Nogales, Sonora has 434 lps capacity allocation.

Additionally, the project will help reduce wastewater collection line overloads and overflows to the Nogales Wash, caused by continuous silt build-up and clogging in the lines. Furthermore, the project will contribute to improve the city's environmental conditions and to reduce risks to human health resulting from an inappropriate management of wastewater.

2. Environmental Assessment.

An Environmental Impact Study was developed and submitted to Sonora's Secretariat of Urban Infrastructure and Ecology [Secretaría de Infraestructura Urbana y Ecología del Estado de Sonora (SIUE)] for review. Due to the nature of the project, SIUE issued an environmental exemption for the project on March 15, 2004.

In order to access to EPA's Border Environmental Infrastructure Fund (BEIF), the project had to comply with the *National Environmental Policy Act* (NEPA). EPA issued a Finding of No Significant Impact on April 2000 for the proposed project.

3. Compliance with Applicable Environmental and Cultural Resource Laws and Regulations

The proposed rehabilitation will take place in previously developed urban areas, therefore, no biological, cultural or archeological resources will be impacted. As previously mentioned, the rehabilitation method will consist of using conventional excavation in previously impacted areas.

III. Technical Feasibility

1. Appropriate Technology.

As stated above, the replacement of the lines will be carried out by conventional excavation methods.

The Binational Technical Committee was created to address environmental needs both in Nogales, Sonora and Nogales, Arizona (the pair of sister cities known as Ambos Nogales). It includes participation from CNA, COAPAES, CEAS, the City of Nogales, Sonora, CILA, EPA, NADB, IBWC, Arizona Department of Environmental Quality (ADEQ), Arizona Department of Water Resources (ADWR), and the City of Nogales, Arizona. As part of the project's development, a binational proposal was presented, which included: rehabilitating the international facility located in Nogales, Arizona; replacing the border outfall to the international facility; building a wastewater treatment plant and a pumping station on Mexican territory, and rehabilitating the wastewater collection sewers and mains in Nogales, Arizona.

The project being proposed for certification consists of a component for the rehabilitation of the Nogales, Sonora wastewater collection system. This addresses the most serious issue, that is, untreated wastewater runoffs to the Nogales Wash.

As part of the planning efforts, a videotaped inspection of sewers and mains was carried out in Nogales, Sonora. Such inspection helped prioritize the rehabilitation tasks.

The project already has a detailed design that includes location maps for the lines with manhole curb elevations and pipe layouts. In addition, there is also a work breakdown chart for purposes of construction cost estimation. The manhole covers will have a locking mechanism to prevent them from being opened during storm events and keep stormwater out of the wastewater collection system.

The wastewater collection system will continue its operation in the same way it has been operating to this date. Collected wastewater will continue flowing to the Nogales international facility. However, part of the volume generated in Nogales, Sonora south of the Virreyes sewer (see Figure 2) will be intercepted at the proposed pumping station and conveyed to the wastewater treatment plant proposed for the Alisos area located south of Nogales, Sonora. This project was identified as part of the planning process; however, it is not being considered for certification at this time, only the rehabilitation of the wastewater collection system is part of the proposal for certification.

2. Operation and Maintenance Plan.

The wastewater collection system will continue operating in the same way it has to this date, although operation and maintenance requirements will be reduced by the elimination of silting problems and inappropriate structural conditions.

COAPAES has operation and maintenance squads that continuously attend to the needs of the wastewater collection system.

3. Compliance with Applicable Design Regulations and Standards.

The final design was funded by BECC. The consulting company, CIEPS, developed the final designs in conformance with applicable state and federal regulations and standards. Both the State of Sonora and CNA participated in the design process.

Figure 2. Location of Sewer and Main Lines in Nogales, Sonora

IV. Financial Feasibility and Project Management

1. Financial Feasibility.

The project's cost is estimated at $124,618,086 pesos, or assuming a $11.50=US$1.00 exchange rate, US$10,836,355. The following table presents cost estimates for each of the proposed tasks.

Sewer	Adjusted Length (m)	Cost
A. Obregon	3,747.00	14,866,294.86
Astolfo R. Cardenas	890	1,690,335.81
Buenos Aires	668	1,803,231.66
Ensueño	2,011.00	4,522,069.26
Ruiz Cortines	9,139.48	40,840,326.97
Tecnologico	2,200.00	6,421,530.34
5 de Febrero	1,080.00	3,098,886.18
Virreyes	1,120.00	3,402,435.18
Reforma	1,830.00	3,716,191.61
Hermosillo	1,242.00	2,308,659.43
De los Maestros	720	1,479,729.43
Kennedy	400	694,439.03
Olimpia	823	1,791,505.29
Penitenciaria	1,072.00	1,689,629.46
Niños Héroes	510	938,603.51
Celaya	511	931,338.45
Orizaba	723	1,313,432.35
J. García	860	2,059,098.39
Las Aguilas	370	658,415.36
	SUBTOTAL	$ 94,226,152.57
	MANAGEMENT (5%)	$ 4,711,307.63
	CONTINGENCIES (10%)	$ 9,422,615.26
	SUBTOTAL	$ 108,360,075.46
	VALUE ADDED TAX (15%)	$ 16,254,011.32
	GRAND TOTAL	**$ 124,614,086.77**

The North American Development Bank (NADB) developed a financial analysis of COAPAES, which established that the utility does not have any additional debt capacity above the $100,000,000 pesos that are being discussed in ongoing negotiations with the Bank for the water project known as the "Acuaferico". Due to the utility's lack of debt capacity, this project will be funded partly by EPA grant funds and partly by the Mexican Government. There is an Agreement between CNA and the State Government that establishes the necessary arrangements to fund the project.

The following table presents the project's proposed funding scheme:

Funding Source	Amount (dollars)	%
EPA	5,418,177.50	50
CNA	2,275,634.50	21
State of Sonora	3,142,543.00	29
TOTAL	**10,836,355.00**	**100**

2. Rate/Fee Model

Since the project does not have a loan component, user fees will not be impacted by it. However, it must be noted that COAPAES is in the process of increasing user fees as a result of the water supply project.

The proposed fee increase is an average of 10 percent and up to 18 percent for certain user groups. The industrial sector would be subject to a 15 percent fee increase.

Residencial Sector (rates in pesos)					
Consumption (m^3)	**Until 2003**	**Jan-04**	**% change**	**Proponed***	**% change**
0-30	93.90	103.29	10.0%	**120.00**	16.2%
31 - 50	3.96	3.96	0.0%	**4.36**	10.1%
51 - 75	4.69	5.16	10.0%	**6.09**	18.0%
76 - 100	7.34	8.07	9.9%	**9.52**	18.0%
101 - 200	10.78	11.86	10.0%	**12.45**	5.0%
201 - 500	14.90	16.89	13.4%	**17.73**	5.0%
501 >	20.78	23.35	12.4%	**24.52**	5.0%
Commercial Sector (rates in pesos)					
Consumption (m^3)	**Until 2003**	**Jan-04**	**% change**	**Proposed**	**% change**
0-30	246.90	271.59	10.0%	**280.00**	3.1%
31 - 50	8.63	8.63	0.0%	**9.50**	10.1%
51 - 75	10.21	11.23	10.0%	**12.91**	15%
76 - 100	12.16	13.38	10.0%	**15.39**	15%
101 - 200	17.74	19.51	10.0%	**20.49**	5%
201 - 500	21.34	23.97	12.3%	**25.17**	5%
501 >	25.30	28.33	12.0%	**29.75**	5%
Industrial (rates in pesos)					
Consumption (m^3)	**Until 2003**	**Jan-04**	**% change**	**Proposed**	**% change**
0-30	246.90	271.59	10.0%	**300.00**	20.5%
31 - 50	8.63	9.49	10.0%	**10.92**	25.0%
51 - 75	10.21	11.23	10.0%	**12.92**	25.0%
76 - 100	12.16	13.38	10.0%	**15.39**	25.1%
101 - 200	21.28	23.41	10.0%	**26.93**	25.0%
201 - 500	25.63	28.19	10.0%	**32.42**	25.0%
501 >	30.37	33.40	10.0%	**38.41**	25.0%

*The proposed rates need to be approved by the State Congress. This process is on-going.

3. Project Management

The project will be managed by COAPAES, a utility that operates the water supply and wastewater collection systems. The project will not affect the manner in which these services are managed.

V. Public Participation

Public Participation Process: This public process started on November 12, 2003, when Mr. José Arreola Ortega, Manager of COAPAES in Nogales, Sonora, received BECC's Public Participation Guide and other reference documents as part of his role of official sponsor of the project, to initiate the public participation process.

Steering Committee: The Steering Committee was established on November 19, 2003 at a meeting held at the COAPAES Meeting Room in Nogales, Sonora, where the Committee's Board of Directors was elected. The Steering Committee is presided by the following individuals:

- Manuel Amador Laguna, Chairman
- Javier Martín Freig Carrillo, Secretary
- Agustín Varela Orozco, Treasurer

Comprehensive Community Participation Plan: With an enthusiasm strengthened by previous experiences with BECC, the community of Nogales, Sonora developed the project's Comprehensive Community Participation Plan, which was received by BECC on December 4, 2003 and approved on December 9, 2003.

Public Information: Information was distributed using brochures and flyers. Additionally, the project was promoted in local radio stations. The Steering Committee played an outstanding role holding information meetings for community groups, particularly unions, professional associations, civic clubs, and teachers' groups from local schools. The project has been available to the community for review at the COAPAES office in Nogales, Sonora.

Public Meetings:

First Public Meeting: This meeting was held on January 15, 2003 at the Lion Club's facility in Nogales. There were some welcoming remarks from the Mayor to formally open the meeting. Mr. Manuel Amador-Laguna, Chairman of the Steering Committee, introduced members of the Steering Committee to the community. The BECC representative participated to establish the objective, scope, and mechanics of the meeting.

The fact that the project does not impact user fees charged by COAPAES gave the question and answer session a very optimistic outlook. There were about 15 comments from the public, mostly to support the project and touch upon its technical aspects. Questions of a technical nature were answered by Cesar Martinez, Assistant Planning Director at COAPAES.

The meeting had approximately 105 attendees. In addition, the presence of citizens' groups and water users' organizations provided for a fair representation of the community. The Steering Committee was told that a better outreach effort could yield a more heterogeneous

attendance for the Second Public Meeting, instead of having mostly government employees attending.

Second Public Meeting: This meeting was held on Friday, April 23, 2004 at the Rotary Club facility in Nogales. It must be noted that one of the most important accomplishments of this public meeting was that it was attended mostly by community residents and by relatively few government employees, which establishes the efforts undertaken by the Steering Committee after the first Public Meeting and the great job done by the first attendees in informing the community in general. The meeting was attended by approximately 120 people and community and water users' organizations.

Special guests to the meeting included: Lorenzo Antonio de la Fuente Manríquez; Mayor of Nogales, Sonora; José Luis Jardines, General Director of Sonora State's Water Commission; Manuel Amador Laguna, Chairman of the Steering Committee; Javier Martín Freig Carrillo, Secretary of the Steering Committee; Agustín Varela Orozco, Treasurer of the Steering Committee. In addition, the meeting was attended by Josefina Guerrero, Steering Committee Advisor; Mauro Corrales Bufanda, Chairman of COAPAES' Managing Board in Nogales; Martín Mexía Salido, COAPAES' Director of Border Affairs, and José Arreola Ortega, Manager of COAPAES in Nogales, Sonora.

Main Issues presented:

The two Public Meetings included comments in support of the project and even some that expressed agreement with user fee increases, as long as the service was actually provided. There were also several remarks made by specific households that required COAPAES to solve their wastewater and water service problems. As in the First Public Meeting, at the Second Public Meeting the expectation of the development of the project prompted some residents who lack water and wastewater collection services to demand to be told when their households would have access to wastewater collection lines. They were explained that the project has more to do with sewer and main lines rather than secondary hookups, but that the overall project would benefit the entire community.

Public Participation Report: The public participation report was submitted by the Steering Committee according to the BECC public participation guidelines. The report outlines the activities executed as part of the public participation process.

Conclusions:
1) A better outreach effort by the Steering Committee was identified in the Second Public Meeting, inasmuch as it reached out to more community sectors.

2) The Public Process met its goal and the majority of the community showed clear and explicit support for the project.

VI. Sustainable Development

1. Definition and Principles

Sustainable Development is defined as "economic and social development based on the conservation and protection of the environment and the rational use of natural resources, but considering current and future needs, as well as present and future impacts of human activities", as defined in the Border 2012 Program developed by U.S. and Mexican authorities.

According to the definition of sustainable development, the Wastewater Collection System Rehabilitation Project for Nogales meets the principle of conservation oriented social and economic development that emphasizes the protection and sustainable use of natural resources, addressing current needs without compromising the ability of future generations to meet their own needs.

Principle No. 1 states that human beings are at the center of concerns for sustainable development and are entitled to a healthy and productive life in harmony with nature. This principle will be met, inasmuch as the project will promote the reduction of diseases directly associated with the potential infiltration of wastewater to the soil and groundwater tables, as well as with wastewater runoffs to the environment.

Principle No. 2 mentions that the right to development must be fulfilled so as to equitably meet developmental and environmental needs of present and future generations, which is met by this project, since it addresses the provision of wastewater services for present and future residents, ensuring thus the protection of the environment for the benefit of future generations.

Principle No. 3 is met by reducing the possibility of soil and groundwater table contamination caused by leaks in faulty wastewater lines, as well as the contamination of the Nogales Wash by wastewater runoffs.

Principle No. 4, which establishes that the stakeholders must be part of any activity related to the wastewater project, is met by the implementation of the community participation plan described above.

b. Institution and Human Capacity Building.

The project will improve the existing sewer and main infrastructure and will reduce rainwater and/or groundwater infiltration to the wastewater collection system, reducing thus the volume of water currently being received by the international wastewater treatment facility and optimizing the use of the 434 lps capacity allocated to Nogales, Sonora.

In some rare cases, the capacity for wastewater conveyance will be increased in response to the city's historic growth.

In order to prioritize the rehabilitation and pipe replacement tasks, a video inspection of the city's sewers and mains was carried out. Additionally, technical and financial assistance was provided to develop environmental studies and detailed designs for the rehabilitation and replacement of sewer and main lines.

Since COAPAES will partly fund the "Acuaferico" project with a NADB loan, the utility does not have any additional debt capacity in the mid term; therefore, the wastewater project will be funded using grant funds provided by EPA and the Mexican Government.

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

The project conforms to the following conservation and development plans:

- Plan Nacional de Desarrollo 2001-2006 [National Development Plan]
- Programa de Medio Ambiente 2001-2006 [Environmental Program, spin off of the National Development Plan]
- Programa Estatal de Desarrollo Urbano de Sonora 2003-2009 [Sonora State Urban Development Program]
- Programa Municipal de Desarrollo Urbano de Nogales, Sonora [Nogales' Municipal Development Program]
- U.S.-Mexico Border 2012 Environmental Program (Objective 1: reduce water contamination)

d. Natural Resource Conservation.

Improving the wastewater collection infrastructure will have a favorable impact on the natural environment, primarily by preventing contamination of soil, groundwater and surface waters such as the Nogales Wash, by substantially reducing raw wastewater runoffs.

e. Community Development.

Without the rehabilitation of the wastewater collection lines, negative impacts will continue affecting the community. Pipelines will continue deteriorating and frequent leak repairs will cause traffic jams with the resulting time delays and increased air contamination caused by vehicular emissions.

The reduction of the issues described above will create better living conditions for the overall community.

List of available documents:

1. Ambos Nogales Facilities Plan
2. Financial analysis
3. Public participation report
4. NEPA Environmental Assessment
5. EPA Finding of No Significant Impact
6. Mexican Environmental Document
7. Mexican Finding of No Significant Impact
8. Final design for the rehabilitation of the wastewater collection system in Nogales, Sonora