Border Environment Cooperation Commission

Wastewater treatment facility replacement and sewer collection system improvements for the town of Patagonia, AZ.

December 13, 1999

I. General Criteria

1. Type of Project. The project consists of the rehabilitation and expansion of the sanitary sewer system and the improvements to the sewage treatment system.

2. Location of Project. The Town of Patagonia is a small community located in Santa Cruz County, Arizona, about 80 miles south of Tucson and 20 miles northeast from Nogales, Arizona. According to the Arizona Department of Economic Security, Patagonia has a population of 968 people, and is expected to increase to 1033 by the year 2020.

3. Description of Project and Tasks. The project consists of improvements to the wastewater treatment plant, which include

replacement of the existing treatment unit with a new treatment process encompassing secondary and advanced treatments. In addition, a preliminary treatment and an enhanced effluent disinfecting process will be added. Rehabilitation of deteriorated sewer sections of the existing sewage collection system is also part of this project. This project will address the needs of the Town of Patagonia for the next 20 years.

The new process will allow the plant to meet its Aquifer Protection Plan and NPDES Permits requirements. The proposed treatment is intended to achieve the required reduction of polluting substances in the discharged effluent to within allowable limits as setforth by the permits. The target concentration for the effluent relative to BOD and TSS is 30 mg/l. The design average daily flow of the plant is 0.11 MGD (Expected peak hourly flow of 0.44 MGD). During intense rainstorm events, wastewater flow rates at the plant increased beyond the plant capacity due to excess water volumes introduced into the collection system by infiltration and inflow. The resulting flow rates during these events allowed the discharge of solids and pollutants with the effluent. In addition, the excessive volumes of incoming wastewater bypassed treatment and were diverted into the existing lagoons. These lagoons were part of the former treatment system. Since the lagoons are not lined, there is a concern that the bypassed wastewater in the lagoons could percolate to the bottom of the lagoons and pollute the aquifer.

4. Compliance with International Treaties and Agreements. The project does not affect any international treaties between the United States and Mexico.

II. Human Health and the Environment

Human Health/Environmental Needs. Based on data available from the Arizona Department of Economic Security (DES), the current population of the Town of Patagonia is 968. In the past 20 years, the Town of Patagonia has experienced little or no growth due in part to the lack of proper infrastructure services. The low rate of growth and periodic decreases in growth have made communities such as the Town of Patagonia face difficult challenges in maintaining the quality of life for its residents. Based on the trends of the area's growth, the DES has projected the town's population to be 1033 in the year 2020. The proposed treatment improvements will provide wastewater treatment for the projected growth, which otherwise could not be provided by the existing facilities. Overall, seasonal

rainfall, relatively shallow groundwater levels, and ephemeral stream flows characterize the hydrology of the project study area. Sonoita Creek, a tributary of the Santa Cruz River Basin, generally flows through the Town of Patagonia from southeast to northwest and mostly borders the town on the north. Several tributaries, which collect surface water from the surrounding mountains, converge with the creek within the town limits.

The new wastewater treatment plant will be able to achieve total nitrogen removal as required by the APP and the NPDES allowable limits.

Environmental Assessment. The project incorporates improvements that will not affect undisturbed areas, since the proposed wastewater treatment plant will be constructed in the tract of land that has been occupied by the existing treatment unit for the past 30 years. Additionally, the sewer system improvements contemplate only rehabilitation of the existing sanitary sewage collection lines. The effluent will continue to being discharged into the Sonoita Creek. However, the quality of the effluent will be of higher quality and will comply with the APP and NPDES permit requirements. The EPA ordered the preparation of the Environmental Information Document. The US-EPA Region 9 reviewing the document and prepared an environmental assessment (EA) that was issued on November 3, 1999, followed by a Finding of No Significant Impact (FoNSI), dated November 22, 1999. The EA is currently under a public comment period of 30 days. It is necessary to have the FoNSI to enable the EPA to approve the financial scheme relative to the Border Environment Infrastructure Fund (BEIF) that is being proposed by the North American Development Bank (NADB).

III. **Technical Feasibility**

1. Appropriate Technology. As part of the wastewater treatment facilities plan for the Town of Patagonia, completed in May 1999, and prepared under the supervision of the BECC, six wastewater treatment alternatives were evaluated. The alternatives were developed and evaluated using a 20-year planning horizon. Additionally, there are sewer sections that will be rehabilitated based on inspections conducted during the preparation of the facilities plan.

Wastewater Treatment In accordance with chemical analysis conducted on the effluent from January 1994 to December 1997, it was determined that the WWTP effluent was not meeting its NPDES effluent requirements for the following parameters:

a) BOD5

b) Suspended solids

c) Total phosphates

d) Coliform

e) Total residual chlorine

Thus, EPA issued a Finding of Violation and an Order of Compliance on February 3, 1998. The NPDES permit for Patagonia's WWTP stipulates BOD and TSS concentrations of 30 mg/l for both parameters (monthly average). The effluent from the above period ranged from 39 mg/l to 153 mg/l (monthly average) for BOD, and from 35 mg/l to 132 mg/l (monthly average) for TSS. The alternative evaluation process considered an inflow with a BOD of 200 mg/l. For the WWTP the following alternatives were evaluated.

· Sequence Batch Reactor (SBR)

· Phase Isolation Ditch (PID)

· Oxidation Ditch, Single Channel

· Countercurrent Extended Aeration

· Retrofitting Existing Modular Unit

· Constructed Wetlands

The alternative selected was the Oxidation Ditch, Single Channel, due to its ability to achieve consistently high levels of BOD removal and TSS removal with minimum operation, high levels of nitrification and denitrification with proper operation, easy O&M, ability to handle variations of flow, and long sludge retention time. The plant will have an average daily flow capacity of 0.11 MGD, and a maximum daily flow capacity of 0.14 MGD.

Sewer System

The sewer system of Patagonia was constructed in 1965 under the town's "Sewer Improvements District One" project. The sewage collection system consists of 19,000 feet of 6, 8, and 10-inch gravity sanitary sewer pipes. The proposed improvements include the rehabilitation and replacement of about 5,800 linear feet of asbestos-cement sewer, with open trench replacement or in-situ repair.

O&M Plan As part of the facility improvements, the town's operation and maintenance manual will be updated and expanded to include the new additions and to include the required management procedures for operating the facilities. The manufacturers will train the plant operators during the start up phase and after the completion of the construction and installation activities.

2. Compliance with applicable design norms and regulations. Arizona Department of Environmental Quality (ADEQ), Rural Development, and EPA have validated the requirements for construction of the sewer system and the wastewater treatment facilities. The effluent from the proposed WWTP will meet the National Pollutant Discharge Elimination System (NPDES) and Aquifer Protection Plan (APP) permit requirements.

IV. Financial Feasibility and Project Management

1. Financial Feasibility

The NADB has conducted a preliminary analysis of the project information presented by the project proponent and consultant, to determine the project's financial feasibility. Based on this analysis, the amounts for loan and grant components were determined, as well as the impact the project would have on the user rates. The results of the analysis were presented in a public meeting held on October 13, 1999.

The table below summarizes the project construction costs, as identified by the project the components in May 1999.

Estimated Cost

Wastewater Treatment Plant: $763,000.00

Sewer System Improvements: $495,000.00

Engineering/Administrative: $300,000.00

TOTAL: $1,558,000.00

Based on the analysis developed by the project consultant, the NADB determined the amount of grant funds and loan components. It will be necessary to follow the procedure requirements by each one of the agencies participating in the development of this project.

Financial Structure Recommended by the NADB

USDA-Rural $481,382.00 Grant

NADB-BEIF $776,585.00 Grant

WIFA $300,033.00 Credit

TOTAL $1,558,000.00

2. Rate model: The rate model has been developed by NADB's project consultant, and was used to determine the impact the project would have on the user rates. The rate model developed by the consultant has been reviewed by the NADB. The proposed sewer rate structure suggest that the current sewer base service fee of $20.50 be increased $0.90 annually through the year 2008 to reach $27.70/month, and modified thereon be adjusted for inflation or other costs increases (e.g., O&M).

3. Project Management The project will be managed by staff of the Town of Patagonia that has operated the public utility section for several years. The Town of Patagonia is the agency that will adopt the rate adjustments. The town will continue to operate in a self-sufficient manner, supporting itself through charges imposed on the users.

V. Public Participation

Comprehensive Public Participation Plan. The Patagonia steering committee submitted a Public Participation Plan (Plan) in early September 1999. The Plan includes the development of a steering committee, meeting with local stakeholder organizations, conducting public outreach to inform residents of the project, hold two public meetings and submitting a final report documenting public support for the project.

Steering Committee: A steering committee was formed in the early phases of the project in early 1998. Committee members are John Spitler, chairman, Randy Heiss, Gilbert Quiroga, Robert Woods, Susan Wethington, Robin Baxter and Dick Volz. The town representative is Keith Weidemann and the technical advisor is Daniel Kale. Committee representatives attended city council meetings on the project and disseminated information to the community. In addition, they provided input into the selection of the wastewater alternative, and conveyed the concerns and interests of the community in the development of the facilities planning phase. The committee also developed the Plan and the Outreach & Information strategies.

Local Organizations: Local organizations contacted to present the project and solicit their support were 4H Club, Patagonia Community Association, Patagonia Community Foundation, Arizona Center for Law in the Public Interest, Veterans of Foreign Wars, Rotary Club, Nature Conservancy. Letters of support for the project were received from the Patagonia Community Association, Patagonia Regional Community Foundation, Arizona Center for Law in the Public Interest and the Nature Conservancy.

Public Information: Project information has been made available to the public 30 days prior to the first required public meeting at the Patagonia Town Hall and public library during business hours, and the Marshall's office after work hours. The Weekly Bulletin of Sonoita published an article the 6th of October on the project, which included statements from the steering committee chairman, and ran another article on the project on October 20th. Further outreach activities included providing through the mail a project fact sheet and cover letter from the steering committee to the public prior to the last public meeting.

Public Meetings: An initial public meeting was held on January 21, 1998 to introduce the project to the city council and the public. Two more public meetings were scheduled on October 8 and October 13, 1999 per BECC requirements.

At the first public meeting approximately 15 people were in attendance. The steering committee chairman, Town Mayor and several Town Council members were present. The engineering consultant was there to make presentation of project. After the presentation, during the question and comment period, the public asked about sludge requirements meeting B grade level, and the fact

that there is not much sludge volume or about 5 yards per month. The engineer consultant added that project will add a new digestive system that will reduce sludge. Disinfection was another issue and the pros and cons of ultra violet disinfection vs. chlorination were discussed. The engineer mentioned that it ultra violet disinfection is not feasible due to the lack of a laboratory in town that would give information about discharge infection in the creek and violation of pollution regulations. Chlorination, it was added, was more reliable as it gives real time results, is very good and its cost is equal to ultra violet disinfection. The issue of flood cycles of whether the technology of the plant considered the flood flow cycle was confirmed by assuring the community that whatever is to be built will meet the 100-year flood cycle. The consultant added that the existing plant does not meet 100-year flood cycle to the question of the potential of the treatment plant flooding away in a flood. The steering committee chairman added that the project hopes to make the plant according to the 100-flood cycle but can't know if it will be safe from flooding. At the end of the meeting Mayor Chipmann announced the date of the next public meetings to be on October 13 and 27.

At the second public meeting that was held on October 13, the financial rate structure was presented. The NADB consultant for CH2Mhilll stated that the rate study was based on a $315,000 loan that represents about 25% of the total cost of the improvements to the wastewater system. The total cost of the project is estimated to be $1.2 million. The NADB and USDA-RD would provide about 76% of grant funding while the Water Infrastructure Finance Authority would provide 24% in loans to cover the total cost of the project. NADB would provide transitional funds to cover a $0.90 rate increase on residential sewer rates for over 6 years. There was discussion on the commercial rates and the acknowledgement that the rates were low and needed to increase.

The Town Council held a meeting on October 27, five days before the bond election to authorize the debt, for further discussion on the project, the debt component and rate increase and to request public support for the project. On November 2 the bond election was held and approved by 134 to 12.

VI. Sustainable Development

1. Definition and Principles. The project complies with BECC's definition of Sustainable Development: An 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.

With the implementation of this project, all the environmental parameters (and respective limits and standards) will have been met and the improved treated effluent will continue replenishing the Sonoita Creek, maintaining the existing local ecosystem. The principles of sustainable development are satisfied, which include:

Human beings are the central point of all concerns for sustainable development; they are entitled to a healthy and productive life in harmony with nature. This Principal fulfilled by the project's objective, which is to solve human health problems by improving the quality of the treated effluent, and decreasing pollution of the environment and health risks to the population, through sewerage improvements and treatment of wastewater.

2. Institutional and Human Capacity Building. The investment of almost $1.6 million dollars in improvements to the wastewater infrastructure for the Town of Patagonia will have a deep impact on both the local government and economy, as well as to the community residents. The improved capacity for wastewater treatment will allow the city to receive new business, because the city will have the capacity to absorb the increase that will result from the wastewater treatment demand.

The new wastewater treatment plant will enable the Town to allocate resources for strengthening their institutional capacity, by eliminating the potential burden relative to fines imposed for violating their NPDES and APP permits.

3. Conformance with Applicable Local/Regional Conservation and Development Plans. ADEQ has validated the project to improve the sewerage and sanitation system for the Town of Patagonia. It is consistent with the regional guidelines of the State of Arizona (Bulletin 11), to plan for providing services of sewerage and sanitation. The construction of the wastewater treatment plant will comply with EPA regulations.

4. Natural Resource Conservation. The construction of the new WWTP and the sewer system improvements will reduce the load of contaminants that are discharged into the Sonoita Creek and will reduce the potential aquifer contamination. Furthermore, the improved effluent will promote proper development of some native and indigenous species, which are currently listed as endangered species (e.g., Gila Top minnow and willow flycatcher).

Community Development

The construction of approximately $1.6 million dollars in infrastructure will be the foundation for the future growth of the community. Without an adequate infrastructure, the city could not accommodate the development of new businesses or the current population growth, and would be subject to legal action from the U.S. Federal government for violating NPDES requirements. The positive impacts related to the project are short as well as long term.