INTERNATIONAL BOUNDARY AND WATER COMMISSION
UNITED STATES AND MEXICO

Ciudad Juarez, Chihuahua
August 25, 1989

JOINT REPORT OF THE PRINCIPAL ENGINEERS
CONCERNING MEASURES THAT SHOULD BE UNDERTAKEN TO IMPROVE THE
QUALITY OF THE WATERS OF THE RIO GRANDE AT
LAREDO, TEXAS/NUEVO LAREDO, TAMAULIPAS

To the Honorable Commissioners
International Boundary and Water Commission,
United States and Mexico
El Paso, Texas and Ciudad Juarez, Chihuahua

Sirs:

In accordance with your instructions, we respectfully submit for your consideration this joint report proposing measures that should be undertaken by the United States and Mexico as part of a jointly financed project to improve the quality of the waters of the Rio Grande at Laredo, Texas/Nuevo Laredo, Tamaulipas.

We considered, the following criteria to accomplish the objective of improving the quality of the waters of the Rio Grande in this area:

1. That the measures adopted result in a significant water quality improvement.

2. That the cost of the measures be equally shared between the United States and Mexico.

3. That the measures be under the supervision of the International Boundary and Water Commission, United States and Mexico.

I. DESCRIPTION OF THE PROBLEM

We have reviewed the record of water quality sampling and analyses, along with the information on discharges of wastewaters to the Rio Grande in the Laredo, Tex./Nuevo Laredo, Tam. area, and observed that present sanitary conditions threaten the health and well-being of inhabitants in both countries in this area or impair the beneficial uses of these waters.

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EXHIBIT IV

OF THE
JOINT REPORT OF THE PRINCIPAL ENGINEERS
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QUALITY OF THE WATERS OF THE RIO GRANDE AT
LAREDO, TEXAS/NUEVO LAREDO, TAMAULIPAS

PRINCIPAL ELEMENTS FOR A JOINT SANITATION PROJECT

The three major components of the SEDUE preliminary project were divided to form six principal elements that could make up a jointly financed project. The principal elements and their preliminary cost estimates are as follows:

Principal Element	Cost in U.S. Dollars
a). Riverside Collector	$ 8,080,000
b). Coyote I Collector	$ 3,510,000
c). Expansion of Sewage Collection System	$ 6,270,000
d). Rehabilitation of Sewage Collection In Specific Areas	$ 3,030,000
e). Pumping Plant	$ 990,000
f). Treatment Plant	$13,120,000
Total	$35,000,000

It is considered of great importance to carry the accounting of expenses encumbered for each principal element in order to arrive at 50 percent division to each country for the total costs of constructing the six principal elements. Present costs estimates are based on a preliminary design prepared by the Government of Mexico, and are subject to change based on final design and actual costs.

DESIGN CRITERIA FOR THE SIX PRINCIPAL ELEMENTS OF A JOINT SANITATION PROJECT

a) RIVERSIDE COLLECTOR

a-1) General Criteria

General criteria for the riverside collector should be that conveyance throughout the length of the collector will be by gravity to the maximum extent possible. The materials used in the fabrication of the collector lines will be resistant to sulfate attack. The collector will intercept sewage from existing collectors

and sub-collectors and those to be constructed as part of the Coyote I collector. The riverside collector will have a capacity to collect and convey to a treatment plant the design load expected to be generated by the year 2010 with a design population of 600,000. The collector would be located outside the design floodplain created by the design flood of 140,000 cfs (3964 cms) in the Rio Grande, or be adequately protected against damage from such flood, including provisions to prevent excessive inflows from the design flood.

a-2) Location

The riverside collector will be constructed along the right high bank of the Rio Grande beginning at approximately River Mile 362.2 (km 583) in the vicinity of the Arroyo Alazanas downstream to approximately River Mile 353 (km 569) in the vicinity of the Arroyo del Coyote. The estimated total length will be 11 miles (17.7 km).

a-3) Preliminary Design Data

A design population of 600,000 is expected to generate an estimated average sewage load of 31 mgd (1355 lps). Preliminary design indicates the riverside collector will vary in diameter from 30 inches (76 cm) at its upstream end to 60 to 72 inches (152 to 183 cm) at the downstream end, increasing in diameter in such a manner that the collectors will sufficiently intercept and convey the design load to the treatment plant.

The riverside collector will have the necessary junction structures to intercept and sufficient capacity to convey, without any overflow, sewage flows from existing collectors and sub-collectors.

Similarly, the riverside collector will have the necessary junction structures to intercept and sufficient capacity to convey, without any overflow, sewage from the Coyote I collector in Principal Element "b)", new sewer collectors and sub-collectors that will be constructed under Principal Element "c)", and those rehabilitated sewage collection lines in Principal Element "d)".

The exact location and dimensions of the riverside collector will be established in the final design.

The material used in the construction of the collector lines, junction structures, and manholes will be resistant to sulfate attack and minimum construction standards will be established in the final design. The configuration and location of manholes and junction structures will also established in the final design.

b) COYOTE I COLLECTOR

b-1) General Criteria

The general criteria for the Coyote I collector should be such that conveyance throughout the length of the collector will be by gravity to the maximum extent possible. The materials used in the fabrication of the collector lines will be resistant to sulfate attack. The collector will intercept sewage from existing collectors and subcollectors and those to be constructed as part of this collector. The Coyote I collector will have a capacity to collect and convey to the downstream end of riverside collector for sewage for conveyance to a treatment plant. The design load for this collector is included in the Nuevo Laredo design population of 600,000. The collector would be located outside the floodplain created by the design flood in the Arroyo del Coyote, or would be adequately protected against damage from such flood, including provisions to prevent excessive inflows from the design flood.

b-2) Location

The Coyote I collector will be constructed along the left bank of the Arroyo del Coyote for a distance of about 5.6 miles (9 km). A parallel sub-collector will be located along the right bank of that arroyo. Combined flows will discharge into a junction structure at the downstream end of the riverside collector.

b-3) Preliminary Design Data

The area served by the Coyote I collector system would generate an average sewage load of about 5.4 mgd (238 lps) of the Nuevo Laredo design average sewage load of 31 mgd (1355 lps). Preliminary design indicates that the Coyote I collector pipeline will vary in diameter from 12 inches (30 cm) at its upstream end to 48 inches (122 cm) at the downstream end at the junction structure, increasing in diameter in such a manner

that the collector will sufficiently intercept and convey the design load to the riverside collector junction structure.

The Coyote I collector will have the necessary junction structures to intercept and sufficient capacity to convey, without any overflow, sewage flows from existing collectors and sub-collectors and new sewer collectors and subcollectors that could be constructed, and from rehabilitated sewage collection lines.

The exact location and dimensions of the Coyote I collector will be established in the final design. The material used in the construction of the collector lines, junction structures, and manholes will be resistant to sulfate attack and minimum standards will be established in the final design. The configuration and location of manholes and junction structures will also established in the final design.

c) EXPANSION OF THE SEWAGE COLLECTION SYSTEM

c-1) General Criteria

The general criteria for sewer collection lines should be such that conveyance will be by gravity to the maximum extent possible. The materials used in the fabrication of the collector lines will be resistant to sulfate attack. The lines will directly or indirectly discharge into the riverside collector.

c-2) Location

The expansion will consist principally of providing new sewage collection to the northwest part of Nuevo Laredo, Tamaulipas, now unsewered.

c-3) Preliminary Design Data

Preliminary information indicates that servicing the new areas will require placement of an additional 30 miles (48.3 km) of connections and sub-collectors to the existing sewage network. These lines will collect and discharge by gravity, either directly into the riverside collector or into the existing Anahuac collector. The Anahuac collector will discharge into the riverside collector. The subcollectors and the Anahuac collector will have the necessary junction structures to intercept and sufficient capacity to

convey, without any overflow, sewage flows from existing collectors and sub-collectors and new sewer collectors and sub-collectors that could be constructed, and from rehabilitated sewage collection lines.

The exact location and dimensions of the juncture structures of the new lines into the riverside and the Anahuac collectors will be established in the final design. The material used in the construction of the sub-collector lines, junction structures, and manholes will be resistant to sulfate attack and minimum construction standards will be established in the final design. The configuration and location of manholes will also established in the final design.

d) REHABILITATION OF THE SEWAGE COLLECTION SYSTEM

d-1) Criteria

The general criteria for sewer collection lines should be such that conveyance will be by gravity to the maximum extent possible. The materials used in the replacement of sewer lines collector lines will be resistant to sulfate attack. The lines will directly or indirectly discharge into the riverside collector.

d-2) Location

Rehabilitation will take place in the older sections of Nuevo Laredo, Tamaulipas where many of the lines are broken, collapsed, and plugged and are combined with storm drains.

d-3) Preliminary Design Data

Rehabilitation will require: Repair of collapsed lines, cleaning and debris or solids removal, and separation of sanitary sewer from storm drains.

Repair of Collapsed Lines

Preliminary indications are that collapsed lines will be removed and replaced at some 23 sites totaling to an estimated 2,800 feet (857 m) in combined length. Their sizes vary in diameter from 6 inches (15 cm) to 30 inches (76 cm).

The material used in the replacement lines, collector lines, junction structures, and manholes will be

resistant to sulfate attack and minimum standards will be established in the final design. The configuration and location of junction structures and manholes will also be established in the final design.

Cleaning and Debris or Solids Removal

Cleaning and debris or solids removal will be performed in some 111,000 feet (33,833 m) of existing collectors and sub-collectors, and approximately 30 percent of the house connections which are presently clogged.

The manner in which the work will be performed and the final coverage will be established in the final design.

Separation of Sanitary Sewers and Storm Drains

Some 24 connections between sanitary sewers and storm drains would be eliminated to separate storm runoff. These connections are located in the older parts of Nuevo Laredo. Separation will require relocation of about 22,400 feet (6828 m) of lines varying from 8-inch (20 cm) to 18-inch (46 cm) diameters.

The material used in the construction of replacement lines, collector lines, junction structures, and manholes will be resistant to sulfate attack and minimum standards will be established in the final design. The configuration and location of junction structures and manholes will also be established in the final design. The manner in which the work will be performed and the final coverage will be established in the final design.

e) PUMPING PLANT

e-1) General Criteria

The general criteria for a pumping plant should be such that the plant will provide sufficient capacity to handle all sewage loads. Standby pumps and alternative power supply for emergency cases will be included.

e-2) Location

The pumping plant will be located on the right bank of the Rio Grande just upstream of the Arroyo del Coyote at approximately River Mile 353 (km 569). The plant

will not be located in the floodplain created by the design flood of 140,000 cfs (3964 cms) in the Rio Grande or will be adequately protected against such flood.

e-3) Preliminary Design Data

The pumping plant will consist of the following components:

Pre-treatment Structures--The pre-treatment structures should consist of two separate modules capable of operating independent of the other and with a capacity to handle the combined peak flows of both the riverside and Coyote I collectors arriving at a junction structure. Preliminary analysis indicate that the combined peak flows would be about 47 mgd (2060 lps). This estimate is subject to further evaluation. Each pre-treatment module will consist of mechanically operated bar screens, grit chambers, and comminuters. The pre-treatment structure will be located upstream of the pumping plant.

Structure--The plant shall consist of two separate and independent pumping modules, housed either in a single building with the units separated by a common wall or in two separate buildings. Each unit shall be capable of handling the maximum flows that can be expected from the combined peak flows of the riverside and Coyote I collectors and to convey these flows by means of a pressure line about some 800 feet (244 m) to the treatment plant. The specific pumping plant characteristics will be determined in the final design.

The wet well or wells will be separated from the motors and pumps which are to be housed in a dry well. Pumps and motors will be such that the pump shafts lengths will not be excessive to avoid problems due to vibrations. Wet well capacity would be sufficient to handle the volume for 10 minutes at peak flow. The wet and dry wells should be easily accessible for routine maintenance and provisions included for dewatering.

Pumping and Control Room Characteristics--The pumps will be equipped with stainless steel

shafts and impellers capable of passing 3-inch solids. The units will be operated automatically. The pumps and motors specifications and for mechanical and electrical equipment will be determined in the final design. The control room will be designed for automatic controls.

Power Supply--The pumps will be powered by electricity from the Nuevo Laredo, Tamaulipas network using a special substation at the treatment plant site with sufficient capacity to supply power to both the pumping plant and treatment plant complex. A diesel powered standby electrical power unit also with sufficient capacity to supply power to both the pumping plant and treatment complex will be installed at the treatment plant site. A third power source from the United States will be considered, but at a cost additional to that of the first two sources, which if required will be at the expense of only the United States.

f) TREATMENT PLANT

f-1) General Criteria

The general criteria for a treatment plant should be such that the plant will have sufficient capacity to handle all sewage loads. The plant will provide secondary treatment to meet effluent standards recommended by the Commission and approved by the two Governments. An alternative power supply for emergency cases will be included.

f-2). Location

The treatment plant will be located on the right bank of the Rio Grande downstream of the confluence of the Arroyo del Coyote. The plant will be located outside the floodplain created by the design flood of 140,000 cfs (3,960 cms) in the Rio Grande or will be adequately protected against such flood.

f-3). Preliminary Design Characteristics

Capacity--The plant will have a capacity to provide secondary treatment to all the flows captured by the riverside and Coyote I collectors. The initial plant capacity is estimated to be 31 mgd (1354.5 lps) average daily flow.

Treatment Level--The effluent will meet the standards established in the Commission Minute of which this Exhibit to the Joint Report of Principal Engineers forms a part. Treatment must achieve a 30-day average value of 20 mg/l of Suspended Solids and a 30-day average value of 20 mg/l of BOD_5.

Treatment System--Treatment will be by a mechanical system, preferably by use of oxidation ditches having the following elements:

Oxidation Ditches--In the case of oxidation ditches, depth should not be greater than 10 feet (3 m) with width and length dimensions and number of aeration rotors sufficient to provide 20 mg/ SS and 20 mg/l BOD_5.

Distribution Boxes--There will be one distribution box for each two oxidation ditches. The interconnections should allow for independent operations to ensure there are no interruptions while an oxidation ditch is out for maintenance.

Clarifiers--A sufficient number of clarifiers will be installed to provide sufficient retention time to assure 20 mg/l SS and 20 mg/ltr BOD_5.

Chlorine Contact Chamber--The chamber will provide for a 20-minute detention time and the design will be sufficient to produce an effluent with 200 colonias/100 ml fecal coliform.

Site Work--The area designated, estimated at 63 acres (29 hectares) for the plant, should be sufficient to cover the oxidation ditches and associated facilities, and should be fenced to prevent encroachments.

Sludge--Sludge pumping plants should be sufficient to handle the estimated volume generated. The acreage necessary for sludge drying beds estimated at 23 acres (9.3 hectares) should be included in the site designated for the plant. The area of the sludge beds and the capacity of the sludge recirculation should be in relation to the plant capacity.

Sludge Disposal--The sludge will be taken to disposal sites removed from the floodplains of the Rio Grande or its tributaries, and at a site protected against runoff into the Rio Grande or its tributaries. An approved plan for ultimate sludge shall be jointly developed prior to start of operations of plant.

Effluent Discharge--The effluent will be discharged into the Rio Grande by means of an adequately protected outfall.

Other Facilities--The administration building, laboratory, power control panels, grounding system, exterior lighting, chlorine storage facilities, mechanical equipment, sanitary sewer system, and other general plant features should be sized consistent with the plant capacity.

The administration building should include sufficient facilities for the Commission representatives who will be responsible for the supervision of this international project.

Power Supply--The treatment plant will be powered by electricity from the Nuevo Laredo network using a special substation at the treatment plant site with sufficient capacity to supply power to both the treatment plant and the pumping plant. A diesel powered standby electrical power unit also with sufficient capacity to supply power to both the treatment plant and the pumping plant will be installed at the treatment plant site. A third power source from the United States will be considered, but at a cost additional to that of the first two sources which, if required, will be at the expense of only the United States.

Dechlorination--Dechlorination facilities will be considered at a cost additional to that of the chlorination facilities which, if required, will be at the expense of only the United States.

Jose S. Valdez 8/25/89

Jose S. Valdez
Principal Engineer
U.S. Section

J. Arturo Herrera Solis
Principal Engineer
Mexican Section

A. Conditions at Laredo, Tex.

We observed that the City of Laredo, Tex., with a 1988 population of about 115,000, collects all of the existing sewage load and provides secondary treatment before discharge to the Rio Grande. Secondary treatment is provided by two plants with a capacity totaling 11 mgd (486 lps) which discharge to the Rio Grande. The first plant, Zacate Creek Wastewater Treatment Plant, is an 8 mgd (350 lps) activated sludge/trickling filter facility located at the confluence of Zacate Creek and the Rio Grande, about 0.5 mile (0.8 km) downstream of the Juarez/Lincoln International Bridge. The second plant, Laredo Southside Wastewater Treatment Plant, is a 3 mgd (131 lps) oxidation ditch facility located about 3 miles (5 km) south of the City of Laredo, Tex. on the left bank of the Rio Grande. The effluents from these treatment plants are disinfected prior to discharge to the Rio Grande. The City of Laredo carries out a continuous operation and maintenance program to ensure compliance with United States effluent standards and surface water quality standards of the river. Finally, the city plans to increase its treatment capacity, as needed to keep ahead of the growing sewage load.

B. Conditions at Nuevo Laredo, Tam.

For Nuevo Laredo, Tam. on the right bank of the river, we observed that the City, with a 1988 population of about 400,000 does not have sewage treatment facilities. About 70 percent of the population is connected to the Nuevo Laredo sewage collection system, which discharges to the Rio Grande an average of about 20 mgd (876 lps) of untreated sewage at some 28 locations. These discharges of untreated sewage create a serious health hazard in the river for a distance of 41 miles (66 km) downstream. A map that shows the present sanitary conditions in the Laredo, Tex./Nuevo Laredo, Tam. area is enclosed as Exhibit 1.

C. Existing Water Quality of the Rio Grande

We have reviewed the record of continuing water quality sampling and analyses made under the memorandum of the Commission's Engineers entitled "Initial International Program for Observation of the Quality of International Waters of the United States and Mexico", dated July 5, 1977. We observed that the Rio Grande water quality analyses at stations established, 8.6 miles (13.8 km) and 41 miles (66 km) downstream of the Nuevo Laredo, Tam. discharges shows fecal coliform concentrations exceeding 10,000 colonies/100 ml. A

record of fecal coliform levels upstream and downstream of the Laredo, Tex./Nuevo Laredo, Tam. urban area is shown on Exhibit 2.

Downstream of the Laredo, Tex./Nuevo Laredo, Tam. urban area, large areas of lands, both in the United States and Mexico, are irrigated with water pumped directly from the river. Using contaminated water for crops presents a potentially serious health threat to the people consuming agricultural products irrigated with those waters. Of greater importance, the communities of San Ygnacio, Tex. and San Ignacio, Tam. located 40 miles (64 Km) downstream of Laredo,Tex./Nuevo Laredo, Tam., obtain their drinking water from the river. Also there is a health threat to those people coming in contact with those contaminated waters.

We observed that during periods when the International Falcon Reservoir storage has declined significantly, the waste-load assimilative capacity of that reservoir is reduced. During such periods, the pollution generated in the Laredo, Tex./Nuevo Laredo, Tam. area could adversely affect the municipal water systems at Zapata, Tex. and Nuevo Ciudad Guerrero, Tam. Should inflows of polluted water continue over a long period, accelerated eutrophication of the reservoir could take place. We further observed that downstream of International Falcon Dam, communities with a combined population of 1.5 million in the United States and Mexico and some 1.2 million acres (486,000 hectares) of irrigated lands in both countries depend on the waters stored in International Falcon Reservoir.

We concluded that the assimilative capacity of high flows in the Rio Grande from releases made from the upstream International Amistad Dam has prevented more serious pollution in the water downstream of Laredo, Tex./Nuevo Laredo, Tam. Nevertheless, such high river flows cannot be depended on to provide dilution during dry years when there would not be sufficient assimilation capacity and dilution in that reach of the river, and we estimate that sewage contributions in this area would continue to increase.

II. FUTURE CONDITIONS

We estimate that the population of Laredo, Tex. will grow to about 180,000 by the year 2000 with a total sewage load of about 18 mgd (790 lps), such that unless expansion of the sewage system takes place, there could be untreated sewage discharges into the Rio Grande.

For the year 2000, the city of Nuevo Laredo, Tam. is expected to have a population of about 600,000 with a collected sewage load of about 31 mgd (1,358 lps). As the city of Nuevo Laredo, Tam. expands along the Rio Grande and in the absence of improvements, there will be discharges of untreated sewage into the river.

We observed that a large number of industrial plants are being located in both cities. Should they not have wastewater treatment systems, these plants could add industrial pollutants to the Rio Grande, aggravating the present problem. We concluded that it will be of great importance to include in the plan to resolve the Laredo, Tex./Nuevo Laredo, Tam. sewage problem, provisions for an appropriate treatment of industrial wastewaters.

III. RECOMMENDATIONS TO IMPROVE THE QUALITY OF THE WATERS OF THE RIO GRANDE AT LAREDO, TEX./NUEVO LAREDO, TAM.

A. Water Quality Standards

We observed that to protect the public health and beneficial uses of the waters of the Rio Grande, each Government has established water quality standards for receiving bodies in its territory. We observed, however, that the Commission continues to evaluate analyses in both countries of intensive water quality monitoring, preparatory to recommending surface water quality standards applicable for the solution of border sanitation problems.

B. Effluent Standards

For the United States, the effluent from the treatment plants into the Rio Grande at Laredo, Texas should comply with the following standards:

Qualitative:

The effluent shall not contain floating solids or existence of persistent foam beyond the immediate vicinity of the outfall.

The effluent shall not contain substances in concentrations, which are toxic or harmful to human, animal, or aquatic life or may significantly impair the beneficial use of the waters receiving the effluent.

Quantitative

The effluent shall be limited to the following:

Dissolved Oxygen (DO)	Not less than 2.0 mg/l
pH	Not less than 6.0 or greater than 9.0
Fecal Coliform	30-day average value of 200 colonies/100 ml
Suspended Solids	30-day average value of 20 mg/l
Biochemical Oxygen Demand (BOD_5)	30-day average value of 20 mg/l

For Mexico, the standards for effluent for Nuevo Laredo, Tam. into the Rio Grande are different than those in the United States. Nevertheless, we observed that the standards utilized by the United States for this reach of the river could be applicable for the case of the effluent from the treatment plant in Nuevo Laredo, Tam., subject to the control measures necessary to achieve these standards being jointly financed by the Governments of the United States and Mexico.

Notwithstanding the above, each country in accordance with its internal regulations, could impose more restrictive limits on discharges emanating in its respective territory.

C. Laredo, Tex.

To prevent the discharge of untreated sewage into the Rio Grande from the city of Laredo, Tex., the responsible authorities plan to unilaterally expand Laredo's collection and treatment system consistent with wastewater planning requirements in the United States.

The United States Government, consistent with its pollution control laws would assure that the inflows into the Laredo, Texas treatment plants are not adversely impacted by industrial wastewaters.

D. Nuevo Laredo, Tam.

1. Joint Sanitation Project Conditions

We examined the information provided to the Commission by the Secretariat of Urban Development and Ecology of Mexico (SEDUE) and the Secretariat of Urban Infrastructure of the State of Tamaulipas regarding an Integrated Potable Water and

Sewerage Project for Nuevo Laredo, Tam. We recognized that Mexico has initiated works contemplated in this project for which Mexico should be given credit of such costs towards the financing of an international project. We considered that for that project the following conditions should be met so that both Governments participate in its joint financing:

For Sewage Collection Lines

a) Eliminate all discharges into the Rio Grande of untreated sewage generated in the city.

b) Effect conveyance of all sewage by gravity to the maximum extent possible.

c) Utilize sulfate attack resistant materials in the construction of the main collectors.

d) Perform continuous cleaning of sewer lines.

e) Provide sufficient capacity in the collection system to convey all sewage to a treatment system.

For Pumping Plant

f) Implement a continuous program for preventative maintenance of mechanical equipment.

g) Provide standby pumps and alternative power supply for emergency cases.

h) Provide sufficient capacity to handle all sewage loads.

For Treatment Plant

i) Provide sufficient capacity to treat all sewage generated.

j) Provide secondary treatment that will meet the effluent standards in Section III, Part B.

k) Implement an adequate program of operation and maintenance at a treatment plant to consistently achieve the effluent standards in Section III, Part B.

1) Implement a preventative maintenance program that requires a supply of spare parts, equipment, and alternative power supplies in cases of emergency.

2. Principal Elements of a Joint Sanitation Project

Pursuant to your instructions, we reviewed the elements proposed in the integrated project developed by SEDUE at meetings in El Paso, Tex. and Ciudad Juarez, Chih. on May 30 and 31, 1989, respectively; on June 16, 1989 in Ciudad Juarez, Chih.; and on June 21 and 22, 1989 in Mexico City, and July 28, 1989 in Ciudad Juarez, Chih. which resulted in inclusion in the SEDUE project of the conditions in Point 1, Part D of this section in those elements that could be jointly financed by both Governments. The principal elements of a jointly financed project are as follows:

a) Construction of a riverside collector.

b) Construction of the Coyote I collector as an extension of the riverside collector located along the Coyote Arroyo to prevent the discharge of untreated sewage into this tributary of the Rio Grande.

c) Expansion of the sewage collection system to collect and convey to the riverside and Coyote I collectors the sewage generated in areas not currently served and which are presently discharged into the Rio Grande.

d) Rehabilitation of the sewer system at specific points to intercept and convey to the riverside and Coyote I collectors those uncontrolled sewage flows presently discharged into the Rio Grande through existing storm drains.

e) Construction of a pumping plant that would convey the sewage from the riverside collector to a treatment plant.

f) Construction of a secondary treatment plant with an estimated capacity of 31 mgd (1,358 lps) located at about 7 miles (11 km) downstream of the Juarez/Lincoln International Bridge.

The precise location of principal elements a), b), e) and f) of a joint sanitation project are shown on the map attached as Exhibit 3. A detailed description of the six principal elements, their costs, and the design criteria necessary to comply with the conditions required for a jointly financed project is attached as Exhibit 4. The conceptual plans for the

pumping and treatment systems of the proposed international project are shown on Exhibit 5.

We conclude, therefore that the border sanitation problem in the vicinity of Laredo, Tex./Nuevo Laredo, Tam. would be resolved, if: 1) the jointly financed works, consisting of the principal elements described in Exhibit 4, are constructed and operated and maintained in a manner that meet the joint sanitation project conditions described in Point 1, Part D of this section and, 2) the governments of Mexico and of the State of Tamaulipas construct, operate and maintain those sewage works not included in the principal elements of this joint project, in a manner to meet the conditions required for the joint project mentioned in 1) above.

IV. FINANCING OF THE INTERNATIONAL SANITATION PROJECT PROPOSED FOR NUEVO LAREDO, TAM.

A. Division of Construction Costs

We consider that for the proposed international sanitation project, the design, construction, and operation and maintenance of the principal elements should be jointly financed and its cost be equally divided by the United States and the Mexican Governments. In this manner, the cost corresponding to the Government of the United States in no case shall exceed 50 percent of the costs necessary to construct the principal elements of the sanitation project estimated at a total cost of $35 million United States dollars, which includes the costs necessary to meet the conditions described in Section III, Part D, Section 1, with the understanding that the Government of Mexico should assure the completion, at its expense, of all the principal elements proposed for this jointly financed project in the event that the cost of construction of those elements exceeds the $35 million United States dollars. This total cost to be equally divided by the two Governments is detailed in Exhibit No. 4, which contains the unit costs for each of the principal elements proposed in this jointly financed project.

Because of the international nature of the sanitation project, the design and construction of the principal elements should be under the supervision of the International Boundary and Water Commission and under the direct control of the Mexican Section. In this manner, the Commission would be able to oversee the disbursement of funds provided by the United States Government. To the extent possible those funds would be utilized in the purchase of materials and equipment in the

United States. The materials and equipment used in the jointly financed project's principal elements, should be manufactured in either the United States or Mexico.

Finally, we consider that to the extent possible, construction of the principal elements should be performed by Mexican contractors under the supervision of the Commission.

B. Operation and Maintenance of the Proposed International Project

We consider that with a jointly financed project between both countries, the operation and maintenance of the principal elements should also be jointly financed by the United States and Mexico. The Commission, in a subsequent agreement, should determine the manner in which the operation and maintenance costs should be divided. We suggest that such an agreement be approved prior to the start of operations of this joint project. Nevertheless, we believe the cost to the United States should correspond to the difference between the cost to Mexico of operation and maintenance for Mexico to meet its national effluent standards established for Nuevo Laredo, Tam., and costs of operation and maintenance necessary to meet the effluent standards proposed in Section III, Part B of this report.

With a distribution of costs between the two Governments, we also consider that the daily operation and maintenance of the jointly financed principal elements should also be under the supervision of this Commission, and under the direct control of the Mexican Section. We recommend that such supervision involve the daily presence of representatives of the Commission. This presence would be to make observations of the riverside and Coyote I collectors, insofar as the effectiveness to convey Nuevo Laredo, Tam. sewage to the treatment plant and thereby prevent the discharge of untreated sewage into the Rio Grande. Also, this supervision would be to assure the efficient operation of the pumping and treatment plants. The operation and maintenance of the international project elements should be performed in accordance with an operations and maintenance manual, and a program recommended by the Commission and approved by the two Governments.

V. CONSTRUCTION SCHEDULE FOR THE INTERNATIONAL PROJECT

For a timely and orderly solution of this border sanitation problem, it is advisable to begin construction of the expansion

and rehabilitation of the sewage collection system immediately. For the remaining principal elements that make up this international jointly financed project, we consider it necessary that the construction plans to be developed by the Government of Mexico to conform with the construction time in Exhibit 6 of this report.

RECOMMENDATIONS

Based on the above considerations, we respectfully recommend the following:

1. That the Commission continue its intensive water quality monitoring in the Rio Grande preparatory to recommending to the two governments surface water quality standards that should be applied to the solution of border sanitation problems.

2. That the effluent from the proposed jointly financed wastewater treatment plant in Nuevo Laredo, Tam. meet the effluent standards described in Section III, Part B of this report, with the understanding that each country, in accordance with its legislation could establish more restrictive limits on discharges into the Rio Grande emanating in its respective territory.

3. That for the case of Nuevo Laredo, Tam., the measures necessary for the solution of the border sanitation problem in Laredo, Tex./Nuevo Laredo, Tam. consist of the construction of the jointly financed principal elements described in this report. The locations of principal elements Nos. a), b), e), and f) are shown on the map in Exhibit 3. A detailed description of the six principal elements, of the jointly financed project, their costs, and the design criteria necessary to comply with the conditions required for this jointly financed project, is presented in Exhibit 4.

4. That the principal elements detailed in Point 3 of these recommendations and in Exhibit 4 of this report, be jointly financed by both countries insofar as their design, construction and operation and maintenance, and be under the supervision of the Commission.

5. That the actual costs of construction of the jointly financed sanitation project be divided equally between the United States and Mexican Governments. The cost corresponding to the United States, in no case, shall

exceed 50 percent of the total cost estimated at $35 million United States dollars which is the amount required to comply with the conditions described in Section III, Part B, point 1 of this report. The costs corresponding to Mexico will be covered in Mexican pesos.

6. That, should the construction costs exceed the amount mentioned in Point 5 of these recommendations, the Government of Mexico assure completion at its expense of the construction of all the six principal elements described in Point 3 of these recommendations.

7. That to the extent possible, construction of the elements proposed in Point 3 of these recommendations, be performed by Mexican contractors under the supervision of the Commission, and that materials and equipment used in their construction be only those manufactured either in the United States or Mexico.

8. That the operation and maintenance of the principal elements mentioned in Point 3 of these recommendations, be jointly financed by the Governments of the United States and Mexico, and that the Commission reach an agreement on approvals of the division of operation and maintenance costs prior to commencement of operations of the proposed project.

9. That the design, construction and operation and maintenance of the principal elements described in Point 3 of these recommendations, be under the supervision of the Commission and under the direct control of the Mexican Section. Also, that the operation and maintenance of components of the international project be in accordance with an operations and maintenance manual and specific program recommended by the Commission and approved by both Governments.

10. That the construction of the expansion and rehabilitation of the sewage collection system works begin immediately in accordance with a construction schedule proposed by the Government of Mexico, described in Exhibit 6.

11. That the Commission recognize that Mexico has initiated works contemplated in this joint sanitation project for which Mexico should be given credit towards the financing of an international project.

That to provide this credit, the engineers of the Commission, immediately but no later than 90 days after the Minute enters into force, make an evaluation of such works to determine the amount paid by Mexico in the costs associated with the expansion of the sewage collection system, rehabilitation of the collection system and the works associated with the construction of part of the riverside collector performed since 1988 and are part of this international project.

12. That the appropriation of funds by each Government be made in accordance with the construction schedule also described in Exhibit 6.

13. That the Government of Mexico require all industries discharging wastewater into facilities of the proposed jointly financed sanitation project provide an adequate pretreatment to assure efficient operation of the proposed treatment plant.

14. That before the start of the construction of the treatment plant proposed for Nuevo Laredo, Tam. the Principal Engineers jointly develop an appropriate program for monitoring of the water quality in the Rio Grande and discharges to the river for the reach of the river whose quality would be improved by the works proposed in this jointly financed project.

Respectfully Submitted,

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U.S. Section

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