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ARGENTINA

LOAN TO THE ADMINISTRACIÓN GENERAL DE OBRAS SANITARIAS DE LA NACIÓN

(AR-101)

LOAN PROPOSAL

18 de noviembre de 1965

ARGENTINA

LOAN TO THE ADMINISTRACION GENERAL DE OBRAS SANITARIAS DE LA NACION

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LOAN TO THE ADMINISTRACION GENERAL DE OBRAS SANITARIAS
DE LA NACION FOR CONSTRUCTION AND IMPROVEMENT OF WATER
SUPPLY FACILITIES IN GREATER BUENOS AIRES, CORDOBA,
MENDOZA, TUCUMAN AND JUJUY

S U M M A R Y^{1/}

1. Borrower: The Administración General de Obras Sanitarias de la Nación (AGOSN), of Argentina, an autonomous State agency responsible for water supply and urban sanitation throughout the country.
2. Amount and Currency: The loan would total the equivalent of US\$18,500,000: US\$12 million in foreign currency and the equivalent of US\$6.5 million in national currency. Of the foreign currency funds, US\$2,170,000 would cover direct costs abroad and the remainder could be used for local costs, including indirect imports estimated at the equivalent of US\$1,275,000.
3. Source of Funds: The Fund for Special Operations.
4. Guarantor: The Argentine Republic.
5. Project Description: The project consists of the following installations:
 - a. Bernal purification plant in the Southern District of Greater Buenos Aires, to produce 1,000,000 m³ a day of treated water for expansion and improvement of water service in the metropolitan area of the capital. Total cost equivalent to US\$28,100,000; to be financed by the IDB loan: US\$11,240,000.
 - b. Purification plant and treated water conduit for expansion and improvement of water supply for the city of San Miguel de Tucumán. Total cost equivalent to US\$4,700,000; to be financed by the IDB loan: US\$1,880,000.
 - c. Intake, untreated water conduit and purification plant for expansion and improvement of water supply for the city of San Salvador de Jujuy. Total cost equivalent to US\$1,200,000; to be financed by the IDB loan: US\$480,000.

^{1/} 172 Argentine pesos = US\$1.

- d. Intake and conduction works, purification plant and treated water conduit for expansion and improvement of water supply for Greater Mendoza. Total cost equivalent to US\$3,700,000; to be financed by the IDB loan: US\$1,480,000.
- e. Main feeder pipelines of the water supply system for the city of Córdoba and environs. Total cost equivalent to US\$4,800,000; to be financed by the IDB loan: US\$1,920,000.

6. Term, Interest and Disbursement: The loan would be amortized in 33 semiannual installments, the first two for US\$75,000 and the third and fourth for US\$175,000; the remaining US\$18,000,000 would be divided into 29 equal semiannual installments. The first installment would due four years after the contract, representing a total term of 20 years. Interest would be charged at the rate of 3% per annum. The disbursement period would be five years, but would vary in accordance with each installation, as follows:

a. Greater Buenos Aires	5 years
b. Tucumán	4 years
c. Mendoza	4 years
d. Jujuy	3-1/2 years
e. Córdoba	2-1/2 years

7. Financing Plan

	<u>Currency of origin</u>		<u>Currency of use</u>		<u>Total</u>	<u>%</u>
	<u>In pesos</u>	<u>In US\$</u>	<u>In pesos</u>	<u>In US\$</u>		
	(In millions of US\$)					
AGOSN	26.7		26.7		26.7	59
IDB	<u>6.5</u>	<u>12.0</u>	<u>16.33</u>	<u>2.17</u>	<u>18.5</u>	<u>41</u>
	<u>33.2</u>	<u>12.0</u>	<u>43.03</u>	<u>2.17</u>	<u>45.2</u>	<u>100</u>

8. Loan Justification: The beneficiary zones have a total population of approximately 3 million, with a deficient water supply that fails to satisfy normal requirements. There is a high rate of disease and death, chiefly among children, caused by water pollution.

Argentina has assigned highest priority to the health sector and particularly to the improvement of drinking water systems. Furthermore, the proposed financing conforms to the following criteria:

- a. Adequate local contribution: AGOSN would contribute 59% of the total works cost.
- b. The program forms part of a broader national plan being organized by AGOSN.
- c. The new rate system approved by the Executive Branch is based on constructed area and land area, and retains the social considerations underlying the service, applying coefficients of modernization in terms of quality and age of property, its location, the value of land and fluctuations in operating costs.
- d. According to information supplied by AGOSN, 82% of total consumption of the water to be supplied through this financing would be residential. It is estimated that more than 90% of the beneficiary families have monthly incomes of less than 20,000 pesos (US\$116).

ANALYSIS OF THE PROJECT 1/

I. INTRODUCTION

1.00 Background

- 1.01 In October 1964, at the time of signature of the first loan to the Administración General de Obras Sanitarias de la Nación (AGOSN), an application for US\$22 million was submitted for the partial financing of various projects in different parts of the Argentine Republic.
- 1.02 At the IDB's request, AGOSN subsequently decided to limit its application to top-priority projects with prospects of prompt execution, for which the necessary government contributions could be made available to AGOSN as counterpart funds to the IDB contributions.
- 1.03 On May 19, 1965, formal application was made for US\$17 million limited to partial financing of the following five works: Bernal plant in Greater Buenos Aires, Córdoba, Mendoza, Tucumán and Jujuy.
- 1.04 In August 1965, two officials of the Administración General de Obras Sanitarias de la Nación visited IDB headquarters to discuss the information submitted with members of the Project Committee.
- 1.05 During analysis of the application, it was decided to increase the amount of the proposed financing to US\$18.5 million in order to cover certain additional costs, and to meet expenses of a consulting firm and those for inspection and control.

1/ 172 Argentine pesos = US\$1.

II. THE BORROWER

2.00 Description, Functions, Structure and Legal Capacity

- 2.01 The Administración General de Obras Sanitarias de la Nación was established in its present form in October 1949. Its current charter defines it as "an autonomous mixed agency with its own juridical personality, located in the federal capital. The relations of the institution with the Executive Branch shall be conducted through the Ministry of Public Works."
- 2.02 AGOSN is responsible for the study, planning, construction, renewal, expansion and operation of water supply and urban sanitation works in the federal capital, and the cities and towns of the Argentine Republic, and for the exploration and utilization of ground water. (The municipalities have the right to operate the systems executed by AGOSN for their own benefit.)
- 2.03 AGOSN is governed by a Board of Directors, consisting of the President, Vice President and four Directors appointed by the Federal Executive Branch for a four-year term, upon nomination by the Minister of Public Works with the consent of the Senate. The present members of the Board are as follows:

President

Ing. Hugo C. Albertelli

Vice President

Ing. Santiago Durieux

Directors

Dr. Manuel Castro

Ing. Enrique F. Pesagno

Dr. Juan E. M. de Larrechea

Arch. Jorge O. Riopedre

- 2.04 The law grants the Board broad powers to administer and resolve AGOSN affairs, including the power to contract foreign loans, subject to Executive Branch approval. The Legal Report appears in Annex I.
- 2.05 The proposed loan would have the guarantee of the Argentine Republic, as authorized by Law 16662 of the national general budget for the current fiscal year,
- 2.06 Internal administration is handled by a Technical Board which includes: Studies and Projects, Construction, Greater Buenos Aires Operations, Provincial Operations, Laboratories and Machinery and Industries, as well as a Business Office, Accounting Office, Office of Legal Affairs and Office of Social Welfare.
- 2.07 AGOSN has a generally favorable regulation in the financial and technical areas; its management is adequate to execute the proposed program.

3.00 Financial Position

- 3.01 AGOSN's fiscal year formerly ran from November 1 to October 31. Beginning in 1965, the fiscal year will coincide with the calendar year. The Financial Report (Annex II) utilizes figures as of October 31, 1964, to permit comparison with preceding years, since a cut-off date of December 31, 1964, would cover 14 months.
- 3.02 A summary of the consolidated balance sheet for the institution as of October 31, 1964, is presented below:

ADMINISTRACION GENERAL DE OBRAS SANITARIAS DE LA
NACION (AGOSN)

Consolidated Balance Sheet as of October 31, 1964

(In thousands of dollars) 1/

Assets

Current assets	74,332
Net fixed assets	440,014 <u>2/</u>
Other assets	<u>8,752</u>

<u>Total assets</u>	<u>523,098</u>
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Liabilities and Capital

Current liabilities	34,942
Long-term liabilities (nat'l. gov't.)	50,532
Other liabilities	426
Nat'l. gov't. - capital account	60,160
Capital and surplus	<u>377,038</u>

<u>Total liabilities and capital</u>	<u>523,098</u>
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- 3.03 The statement of earnings for the year ending October 31, 1964, is summarized below:

1/ Computed at 143 Argentine pesos = US\$1, the exchange rate in effect on 10/31/64.

2/ Based on the updated value as of 10/31/64 (61,600,000,000 pesos) plus various replacements for fixed assets (1,322,053,000 pesos).

ADMINISTRACION GENERAL DE OBRAS SANITARIAS DE LA
NACION (AGOSN)

Statement of Earnings for the Year ended 10/31/64

(In thousands of dollars) 1/

Receipts

Services (accrued)	64,555
Other receipts	<u>571</u>
	65,126

Expenditures - Costs

Operating costs	44,856
Depreciation fixed assets	<u>873</u>
	45,729
Other expenditures	<u>3,684</u>
	<u>49,413</u>

Profit

15,713

- 3.04 The ratio of current assets to short-term liabilities for the consolidated balance sheet of the Administración General de Obras Sanitarias (AGOSN) is 2.1 to 1, which is favorable, though slightly lower than in the previous year.
- 3.05 AGOSN's index of solvency or degree of indebtedness is satisfactory. For the 1963/64 fiscal year, this index was 0.20:1.
- 3.06 As stated in Annex II (Financial Analysis), the degree of delinquency in accounts receivable from users as of December 31, 1964, represents about 8 months, as a general average. For purposes of comparison, this delinquency represents approximately 6 months, in view of the billing system employed (every 4 months) a period similar to that used in other Latin American countries. The percentile ratio between amounts billed and collected during 1964 was estimated at 87%.
- 3.07 As stated in the document (DE-FFD/64/33) on the loan granted to AGOSN for the Avellaneda and Lanús project, there is actually a distortion in the figure for accounts receivable since accounts for several previous years are included.

1/ At the average exchange rate for the year: 140 pesos = US\$1.

- 3.08 Bills are presented to property owners every 4 months; a reasonable period is allowed for payment, after which they are subject to a monthly fine of 3% (up to a maximum of 15%). AGOSN is entitled to auction off property for debt but not to discontinue service.
- 3.09 If at any time an owner wishes to transfer his property, he must present a certificate showing that water service payments are up to date.

III. THE PROJECT

4.00 Description

- 4.01 The technical analysis of the Administración General de Obras Sanitarias (AGOSN) program, designed to increase production capacity of drinking water to 500 liters daily per capita, is shown in Annex III. The organization would allocate the proposed loan to the five projects listed below in order of importance.

A. Bernal

- 4.02 The project includes installations and intake tower, purification plant and the manufacture of sulfuric acid and coagulant. Its total cost is estimated at the equivalent of US\$28,100,000, of which the IDB has been requested to finance 40%.
- 4.03 As stated in the loan document on the Avellaneda and Lanús project (Document DE-FFD/64/33), this project is designed to interconnect the supply system of the federal capital, fed by the San Martín plant, and the proposed Bernal plant. Although the immediate function of this conduction would be to improve the water supply to Avellaneda and Lanús as soon as possible, its longer-range and principal objective would be to improve the supply to the entire southern district, from the Bernal plant, as the San Martín plant reached the limit of its capacity.
- 4.04 The new Bernal plant would, consequently, supply the southern district of Greater Buenos Aires, which includes the densely populated sectors of Lomas de Zamora, Almirante Brown, Quilmes, Avellaneda and Lanús, and Florencio Varela, with a total population of 1,619,000. This would solve all of the problems caused by current supply shortages which are steadily growing worse. The average cost would be 18 dollars per capita.
- 4.05 The first stage calls for the construction of facilities to treat 1 million cubic meters daily, although the basic installations necessary to allow future expansion of the plant's capacity to 2 million cubic meters daily would also be provided.
- 4.06 The daily output of the San Martín plant is 2.3 million cubic meters a day, which, added to the 1 million cubic meters a day to be produced by the Bernal plant, would mean a total daily output of 3.3 million cubic meters.

B. Córdoba

- 4.07 The city of Córdoba has a population of over 600,000 and the water supplied by AGOSN serves only slightly over 60% of the city's inhabitants, owing to the inadequacy of the basic works which has made it impossible to expand services.

- 4.08 Work is currently nearing completion on a new purification plant to supply areas of Córdoba that receive insufficient water service or none at all. Execution of the programmed works will provide basic facilities capable of supplying a population of 700,000.
- 4.09 In order to ensure this benefit, it is necessary to expand and improve the main conduits to pipe the water to all unserved districts. The system of smaller distribution pipelines is not considered since it would be financed by each of the users.
- 4.10 Expansion and improvement of the main conduits will be scheduled by stages; the works relating to the first stage have already been contracted. The documentation for execution of the second stage by administration, to meet immediate needs, has been prepared.
- 4.11 The total cost of this second stage is equivalent to US\$4,800,000, representing a per capita cost of US\$8.00; the IDB is requested to finance 40% of this amount. The total includes mains valued at US\$2,320,000 acquired prior to the application. It is considered desirable to request that the borrower provide a detailed inventory of these materials showing updated costs.

C. Mendoza

- 4.12 The city of Mendoza has a population of approximately 400,000, with only 75% receiving water service from AGOSN.
- 4.13 Two sources are currently utilized to provide service, one of which is limited by the impossibility of regulating river flow. The other source, the Mendoza River, has a permanent abundant flow.
- 4.14 However, since the plant fed by the Mendoza River is outdated and slow, solution of the problem has focused on construction of a new purification plant which will be supplied through an adduction conduit with intake at the Cipolletti Dam.
- 4.15 The project works consist specifically of the Cipolletti Dam intake, a purification plant to treat 200,000 cubic meters of water a day in the initial stage and a conduit 8 kilometers long and 1.1 meters in diameter.
- 4.16 The total cost of the works is equivalent to US\$3,700,000, (representing a per capita cost of US\$9.25); the IDB is requested to furnish 40% of this financing.

D. Tucumán

- 4.17 The city of San Miguel de Tucumán has an approximate present population of 300,000. Various sources are used for the water supply service provided by AGOSN to distribute 86,400 cubic meters a day which falls far short of requirements.

- 4.18 Since the system of rivers near the city is unregulated, it is impossible to increase the flow of supply in the dry season without curtailing irrigation.
- 4.19 The government of the province is completing the El Cadillal Dam, which will make it possible to solve the supply source problem permanently.
- 4.20 The new works for supplying water from the El Cadillal Dam consist of:
- a. emergency intake at the base of the El Cadillal Dam;
 - b. water conduction from the intake to the purification plant under construction;
 - c. purification plant for treatment of 130,000 cubic meters per day in the first phase;
 - d. conduit to pipe treated water from the purification plant to the city.
- 4.21 The IDB has been asked to finance 40% of the cost of the works mentioned in subsections c and d of the preceding paragraph, whose total cost is estimated at the equivalent of US\$4,700,000. This represents a total of US\$15.60 per inhabitant.
- E. Jujuy
- 4.22 The population of the city of San Salvador of Jujuy is approximately 70,000, of which only 75% receives water supply service.
- 4.23 Current installations are very poorly located, since progressive elevation of the bed of their feeder river has left them extremely low-lying and, consequently, exposed to flood damage, while the protective works under construction are inadequate for the purpose. Moreover, the plant is outdated and lacks sufficient capacity, urgently requiring modernization and expansion.
- 4.24 Owing to these circumstances and to the results of studies, it has been decided to build a new modern plant fed by another river whose waters are less muddy.
- 4.25 The project calls for construction of:
- a. a surface intake on the Guerrero River;
 - b. a seven-kilometer untreated water conduit to the purification plant;
 - c. a purification plant with a production capacity of 65,000 cubic meters a day and outlet pipes connecting with the feeder lines of the distribution system.

- 4.26 The total cost of this project is equivalent to US\$1,200,000, 40% of which is proposed for financing by the IDB. This would represent an average cost of US\$17 per inhabitant.

5.00 Engineering Plans, Execution of Works and Supervision

- 5.01 Preliminary plans for the works in the various communities have been submitted to the IDB. No data on conditions of the terrain have been presented.
- 5.02 In all cases, with the exception of the Córdoba project, it will be necessary to prepare detailed plans for the installation of mechanical and electrical equipment, together with construction plans. In some instances, AGOSN would permit the contractor to prepare the design for the part of the project to be constructed; in other cases, AGOSN will prepare the final plans and specifications.
- 5.03 For the Córdoba project, the IDB has received location plans and details on the main connections, as well as a budget itemizing various costs.
- 5.04 The works will be constructed by contract, following public bidding pursuant to the law governing bidding and/or contracting of public works. This does not include the main conduits in Córdoba and the Guerrero River intake (Jujuy), which would be constructed by administration.
- 5.05 AGOSN is an agency with more than 70 years of experience, whose technical capacity is considered to be one of the most outstanding in Latin America; it has executed such large-scale projects as the San Martín plant in Buenos Aires. Nevertheless, owing to the scale of the Bernal project and to the fact that it introduces new concepts (such as the intake tower on the La Plata River), the Technical Report recommends that the services of a competent consulting firm experienced in projects of this scope and type be contracted to review the plans prepared by AGOSN.
- 5.06 The IDB will formulate the rules governing approval of budgets, bidding procedures and certification of works, for which purpose the services of the same consulting firm or of a project engineer chosen by the IDB could be utilized.

6.00 Financing Plan

- 6.01 The total project cost has been estimated at the equivalent of US\$45,200,000, distributed as follows:

(In thousands of US\$)

a. Local costs

Installations and labor

Import component	1,275	
Local component	39,905	
Contingencies (5%)	1,850	43,030

b. Foreign costs

Equipment ^{1/}		1,320
Review, supervision, inspection and control		<u>850</u>

<u>Total project cost</u>	<u>45,200</u>
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6.02 The source of funds would be as follows:

	<u>Currency of origin</u>		<u>Currency of use</u>		<u>Total</u>	<u>%</u>
	<u>In pesos</u>	<u>In US\$</u>	<u>In pesos</u>	<u>In US\$</u>		
(In millions of US\$)						
AGOSN	26.7 2/		26.7		26.7	59
IDB	<u>6.5</u>	<u>12.0</u>	<u>16.33</u>	<u>2.17</u>	<u>18.5</u>	<u>41</u>
TOTAL COST	33.0	12.0	42.83	2.17	45.2	100

6.03 Local contributions representing 59% of the total cost of the over-all project would come from the following sources:

For the Greater Buenos Aires works (Bernal purification plant)

a. Urban Sanitation Fund, established by Law 16.437 of 1961, composed of:

- 1) Rate surcharges (10%) from the federal capital and the other communities in Greater Buenos Aires as the works financed with the Fund are completed.

^{1/} This amount covers importation of pumps to manufacture sulfuric acid and coagulant, laboratory equipment and apparatus for measuring and recording water volumes for the Bernal plant. For the El Cadillal conduit at Tucumán, it would be necessary to import three flow-control valves.

^{2/} Of this amount, US\$3.2 million represents pipes purchased prior to presentation of the application.

- 2) Contribution from the Province of Buenos Aires.
- 3) Contribution from the national government through public credit (Law 16.437).
- b. Contribution from the national government through public credit. The items would be included in the AGOSN investment budget.

For the other projects (Tucumán, Jujuy, Mendoza and Córdoba)

Contributions from the national government through public credit. Items to be included in the AGOSN investment budget.

Law 16.662 of the national general budget, enacted on February 19, 1965, stipulates in Art. 19 the credits required for the present fiscal year to furnish the "counterpart" funds necessary for the international loans contracted to finance projects in the public sector.

- 6.04 Furthermore, the operating surpluses, consisting of net operating receipts of AGOSN in the communities served, will be available. These surpluses can be used for installation in the communities where they occur.

7.00 Execution and Disbursement Program

- 7.01 The installation schedule is as follows:

a. Greater Buenos Aires -- Bernal	5 years
b. Tucumán	4 years
c. Mendoza	4 years
d. Jujuy	3-1/2 years
e. Córdoba	2-1/2 years

- 7.02 The total period for disbursement of funds for the works would therefore be five years, estimating annual investments as follows:

(In thousands of US\$)

First year	2,809
Second year	11,969
Third year	13,108
Fourth year	8,997
Fifth year	<u>7,467</u>
	<u>44,350</u>

The US\$850,000 balance remaining of the total cost, corresponding to inspection and control expenses, would be invested throughout the construction period.

8.00 Rates

- 8.01 The AGOSN rate system is calculated on the basis of property area, building size and property and building values. These variable factors are part of a formula that also includes a coefficient adjusted by AGOSN on the basis of its operating costs. Therefore, theoretically, the rate schedule not only depends on the estimated rates based on consumer resources but can also be adjusted to cover AGOSN costs.
- 8.02 If the systems run by AGOSN are to be self-sufficient, the rates in the federal capital must be increased by at least 25% prior to the completion of construction. AGOSN has communicated its willingness to recommend this increase to the Executive Branch. A nation-wide financial balance would be achieved, making it unnecessary to adjust rates outside of the capital.
- 8.03 It is considered advisable that the loan and guarantee contracts provide that both AGOSN and the guarantor adopt the necessary measures to ensure that rates for the services financed by the loan resources produce sufficient revenue to cover at least the ordinary operating costs of the systems, including administration, interest, maintenance and depreciation. If the amounts earmarked for depreciation should be insufficient to cover that part of loan service corresponding to those systems, the rates will have to generate additional resources for this purpose.
- 8.04 Further details on the current rate system are included in Section III of the Technical Report (Annex III).

IV. JUSTIFICATION

9.00 Financial Justification

- 9.01 The Financial Analysis (Annex II) contains projections of the income of the Administración General de Obras Sanitarias (AGOSN) for the five areas under consideration during the life of the proposed loan.
- 9.02 During the disbursement period profits are expected to fluctuate sharply from one community to the next. As indicated in Section 6.03, a government contribution will be available in addition to net operating receipts. Also, Article 19 of Law 16.662 of the national general budget for the present fiscal year authorizes funds required to provide counterpart financing as required by international loans contracted to finance public sector projects.
- 9.03 During the subsequent period of operations, profits are expected to vary from one community to another. AGOSN treats each community as a separate operation from accounting and operational standpoints.
- 9.04 Interest on the national government debt will be paid only when profits are available for this purpose.
- 9.05 Considering the five projects as a whole, net profits from systems would cover operating costs, depreciation and IDB interest, ^{1/} but not amortization of the IDB loan. However, overall AGOSN receipts have been projected on the basis of a K=1 coefficient and AGOSN has stated its intention of increasing this coefficient to 1.25 for the federal capital when the new tariff schedule becomes effective, submitting it to the Executive Branch for approval. This would furnish adequate funds to cover amortization of the IDB loan.
- 9.06 AGOSN and the government must agree in the contracts to adjust rates if necessary to cover debt service. The AGOSN authorities have indicated their willingness to accept this condition.
- 9.07 In addition, the IDB loan would have the guarantee of the Republic of Argentina.

10.00 Socio-economic Evaluation

- 10.01 With a per capita income of over US\$700 per year in 1964, Argentina has one of the highest living standards in Latin America. However, as a circumstance associated with its development, the country has undergone rapid urbanization; between 1914 and 1960, the percentage of urban to total population in Argentina rose from 58% to 72%, causing the national demand for urban sanitation services to spiral. Of the total urban population, almost 45% is concentrated in the area known as Greater Buenos Aires.

^{1/} Without taking into account interest on the debt with the national government.

10.02 To resolve the increasing inadequacy of current water and sewerage services, the Argentine Government, through AGOSN, has formulated an integrated plan designed to provide adequate water and sewerage services for the country's entire population by the year 2000. The project under consideration forms part of that plan, which is being implemented by stages, some of which have already been considered in other Bank operations. The current stage is designed to improve sanitary conditions in Greater Buenos Aires and in the cities of Tucumán, Jujuy, Córdoba and Mendoza, but will also have an important longer-range effect on national industrial development, once general conditions of water supply have been improved in the areas of heaviest industrial concentration.

10.03 According to information supplied by AGOSN, it is expected that close to 82% of the short-range increase in consumption will be residential, representing, in most cases, families with modest incomes, as shown in the following table:

MONTHLY INCOME PER FAMILY UNIT IN THE PROJECT COMMUNITIES

<u>Communities</u>	<u>Income under 15,000 pesos</u>		<u>Income between 15,000 and 20,000 pesos</u>		<u>Income over 20,000 pesos</u>	
	<u>Population served</u>	<u>To be served</u>	<u>Population served</u>	<u>To be served</u>	<u>Population served</u>	<u>To be served</u>
	(Percentage)					
Communities in Greater Buenos Aires (Bernal)	17	25	70	65	13	10
Córdoba	22	38	68	57	10	5
Mendoza	23	40	67	54	10	6
Jujuy	26	46	64	49	10	5
Tucumán	24	41	65	52	11	7

Source: AGOSN

This means that about 65% of the population benefited by the works will be individuals with average monthly incomes of about \$18,000 Argentine pesos (US\$105), 25% with lower incomes and 10% with higher incomes; on the average, a monthly charge equivalent to US\$2.50 will be made for water supply service.

10.04 Almost 66% of the resources earmarked for the current phase of the plan will be allotted to the urban area of Greater Buenos Aires and used to construct a purification plant at Bernal. According to data from the

1960 demographic census, between 1947 and 1960, the total population of the area surrounding the city of Buenos Aires increased 118%, from 1,741,000 to 3,795,000. This demographic expansion has been concentrated in the southern part of this urban area and is mainly the result of a migratory movement from the country to the city motivated by employment opportunities in the industrial sector concentrated in that urban area.

- 10.05 According to information provided by the applicant, the population residing in the so-called partidos in the southern sections of Greater Buenos Aires would total 1,619,000, of which some 33% lack household water service. Families lacking household connections use public outlets and wells built at their own expense. In addition to the impossibility of controlling the quality of water obtained from this latter source and, consequently, of its high incidence of waterborne diseases, these wells are drying up through over use.
- 10.06 In addition to the social impact of the project -- 82% of the resources are allocated for social purposes -- it will provide considerable benefits from the economic standpoint. There is a heavy industrial concentration throughout southern Greater Buenos Aires, which would be directly benefited by almost 15% of the water supplied by the new project. Many industrial enterprises have had to drill their own wells.
- 10.07 Since many other cities and communities in the provinces suffer from deficient water supplies, the AGOSN plan has included, since 1962, measures designed to promote administrative decentralization of sanitation services, to intensify the mobilization of domestic and especially municipal resources and to increase the contribution of users in financing the projects.
- 10.08 Under this policy the other subprojects should benefit populations whose standards of living are considerably lower than that of Buenos Aires, as can be noted in a comparison of per capita income levels for the respective provinces and their rates of infant mortality.

ARGENTINA: Per Capita Product and Rate of Infant Mortality

<u>Political division</u>	<u>Per capita product 1959 Argentine pesos</u>	<u>Mortality per 1,000 live births 1961</u>
Federal capital	60,987	60.3 ^{1/}
Province of Córdoba	25,475	58.0 ^{1/}
Province of Jujuy	23,740	133.1
Province of Tucumán	19,310	83.2
Province of Mendoza	29,659	48.0

^{1/} Provisional figures.

- 10.09 The four regional subprojects are designed to supplement the water supply in the cities, extending this service to almost 712,000 individuals, representing approximately 52% of their total population. This ratio indicates the potential importance of the proposed undertaking in improving living standards in those urban centers.

ARGENTINA: Population to be Benefited by Expansion of Water Services in the Provinces

<u>City</u>	<u>Population served</u>	<u>Population to be served</u>	<u>Population to be served with monthly family income under 20,000 pesos</u>
Córdoba	360,000	240,000	95
Tucumán	256,000	44,000	93
Jujuy	51,200	28,800	95
Mendoza	<u>300,000</u>	<u>100,000</u>	94
Total	967,200	412,800	

11.00 The First IDB Loan to the Administración General de Obras Sanitarias de la Nación (AGOSN) -- Avellaneda-Lanús

- 11.01 On October 7, 1964, two loan contracts were signed with AGOSN granting a total financing of US\$5,500,000 (\$3,500,000 from the Trust Fund and \$2,000,000 from the Fund for Special Operations), to improve the water supply in the communities of Avellaneda and Lanús. The project called for construction of a subterranean water tunnel under the Riachuelo stream, construction of a new pumping station at Lanús and installation of the related distribution system.
- 11.02 All plans and specifications have been completed and submitted to the satisfaction of the IDB. Bidding has been concluded on the subterranean tunnel and the contract let. However, bidding and awards for the pumping station and distribution network have not yet been carried out. Work on the tunnel has already been initiated by the contractor, but neither the initial report nor any progress reports have yet been received. No disbursement has been made to date. In view of this fact, it is advisable to include, as a condition precedent to signature of the new contract, fulfillment of the conditions precedent to initial disbursement on the previous loans.

V. CONCLUSIONS AND RECOMMENDATIONS

12.01 The project is considered satisfactory from the juridical, technical, economic and financial points of view for the granting of a US\$18,500,000 loan to the Administración General de Obras Sanitarias de la Nación (AGOSN) under conditions indicated in the proposed resolution and subject to the following recommendations which shall be fulfilled to the satisfaction of the Bank:

- (a) Prior to the first disbursement, the debtor shall present evidence that it has adopted a rational and effective system to collect accounts. Such system shall be applied within the year following the first disbursement.
- (b) Within three months from the date of the contract, the debtor shall enter into contracts for property evaluation studies of the areas to be served by the projects financed by the loan. Each such study shall be completed within the disbursement period of the loan for the respective project.
- (c) Within six months from the date of the contract, the debtor shall present a satisfactory program for meter installation in the cities of Jujuy, Tucumán, Mendoza and Córdoba, with a goal of metering 80% of domestic connections and 100% of other connections. Such program should be completed during the execution of the respective projects.
- (d) Within a year after the date of the contract, the debtor shall: (i) complete a detailed analysis of the present rate system and study of the feasibility of using water meters in Greater Buenos Aires; (ii) complete a detailed study regarding possible decentralization of its operations, and (iii) put into effect the new tariff system provided for in Decrees Nos. 9022/63, 2908/64 and 3299/65, at least in the areas corresponding to the specific projects under consideration.
- (e) The debtor shall present an inventory of the materials to be used in each of the projects, including their present value and origin.
- (f) Prior to the disbursement of funds for any system, the debtor shall: (i) present satisfactory evidence of its right to receive adequate amounts of water for the life of the respective system, and (ii) supply satisfactory hydrologic and chemical data to demonstrate the reliability and quality of the sources of supply.

- (g) The annual financial statements which the debtor shall present to the Bank shall be certified by independent governmental or private auditors satisfactory to the Bank.
- (h) The Bank shall retain a consulting firm to act for the Bank as project engineers, and to review and approve within criteria established by the Bank sources of water, soil studies, design criteria, plans and specifications, unit costs, budgets, proposed construction methods, requests for bids, purchases, awards of construction contracts and other technical and financial matters pertaining to the project. Up to an amount equivalent to US\$ 800,000 may be used from the loan for this purpose.
- (i) The disbursement of funds for the construction of any subproject shall be subject to the approval by the Bank of the respective plans and specifications after consideration of the corresponding report of the project engineers.
- (j) In appropriate cases, the works included in the project may be performed by Administración with the prior approval of the Bank.
- (k) United States dollar funds utilized for the loan shall be derived from resources contributed to the Fund for Special Operations in accordance with the increase approved by Resolution AG-2/65.
- (l) Up to US\$50,000 from the resources of the loan shall be used to cover inspection costs referred to in paragraph 8 (g) of the resolution.
- (m) Up to the equivalent of US\$6,500,000 of the total amount of the loan may be disbursed in Argentine pesos.

ANEXO I

INFORME JURIDICO

Se rinde el siguiente informe jurídico con relación al préstamo solicitado por la Administración General de Obras Sanitarias de la Nación, de Argentina, para la expansión y mejora de los sistemas de agua potable para las provincias de Buenos Aires, Tucumán, Mendoza, Jujuy y Córdoba y se ratifica la vigencia para este proyecto, del informe jurídico incluido como Anexo I del Documento de Préstamo que se preparó para el crédito otorgado a la misma entidad, para los sistemas de agua para la Zona Sur del Gran Buenos Aires (Documento DE-FFD-64/33, de fecha 21 de mayo de 1964). Solo es necesario agregar que - desde la fecha de dicho informe - el Poder Ejecutivo de Argentina aprobó el Decreto No. 9.022, del 10 de octubre de 1963, por medio del cual se autoriza a Obras Sanitarias de la Nación a emplear un nuevo regimen tarifario basado en la valorización inmobiliaria de los usuarios. Dicho regimen tiene que estar en vigencia, de acuerdo con el Decreto No. 3.299/65, a más tardar el 10. de enero de 1967.

Las tarifas tienen que ser propuestas al Poder Ejecutivo para su oportuna aprobación. En el contrato de garantía se establecería la obligación del gobierno a aprobar tarifas que sean adecuadas para cubrir los aspectos indicados en la resolución.

En los respectivos proyectos se debería establecer una recomendación que apruebe que le asisten los derechos para el uso del agua, en las cantidades requeridas, durante la vigencia del proyecto para los fines del mismo.

Consecuentemente con ello, la Asesoría Jurídica estima que no existen obstáculos jurídicos que se opongan al otorgamiento del citado préstamo.

DOCUMENTO DEL BANCO INTERAMERICANO DE DESARROLLO

PARA USO OFICIAL SOLAMENTE

ANEXO II

ANALISIS FINANCIERO

Proyecto: Argentina

Administración General de Obras
Sanitarias de la Nación.

DIVISION DE ANALISIS DE PROYECTOS
Sección de Análisis Financieros
Octubre de 1965

ADMINISTRACION GENERAL DE OBRAS SANITARIAS DE LA NACION
"A G O S N"

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1 - Introducción y consideraciones generales

1.1 El Solicitante de préstamo :

El solicitante de préstamo y prestatario (Préstamos Nos. 43/SF y 86 TF) es la Administración General de Obras Sanitarias de la Nación, creada como entidad autárquica con personería jurídica de derecho público y privado por Ley No. 13.577 promulgada el 20 de octubre de 1949 y modificada por la ley 14.160 del 8 de octubre de 1952, por el Decreto-Ley No. 3101 del 25 de marzo de 1957 y por el Decreto-Ley 6678 del 9 de agosto de 1963.

El objeto de la Institución está consignado en el art. 2 de la ley No. 13.577 mencionada más arriba.

Las atribuciones y competencia de la Institución están consignadas en el art. 6 de dicha ley. El inciso B)-9 bis dice así:

"A) Sujetos a la aprobación del Poder Ejecutivo, 9 bis (texto agregado por el art. 2 del Dto.-ley No. 6678/63) Contratar préstamos en dinero en carácter de deudor, con entidades de crédito extranjeras-oficiales o privadas e internacionales".

2.- Evaluación financiera, administrativa y contable de la AGOSN.

2.1 Examen del control interno y organización administrativa contable.

Hemos efectuado un somero examen de la organización actual de la AGOSN en los aspectos administrativo y contable, incluyendo el mismo, entre otras cosas, la estructura orgánica y funciones principales de los órganos respectivos, sistema contable, procedimiento de contrataciones o compras (incluido en la ley de contabilidad), reglamentos internos y sistema de control interno. De acuerdo con el examen efectuado opinamos que la organización administrativa y contable de la AGOSN es en general aceptable teniendo particularmente en cuenta que la misma es una entidad autárquica del Estado.

2.2 Análisis de los Estados Financieros consolidados.-

Ejercicios 1959/60 a 1963/64.

Hemos efectuado un análisis de los Estados Financieros consolidados de la Institución de los ejercicios 1959/60 a 1963/64 previo ajuste y reclasificación de algunas cuentas incluidas en los mismos.

Se acompaña el presente como cuadro No. 1 dichos Estados Financieros ajustados. *

Las conclusiones principales a que hemos arribado con relación al mismo son las siguientes:

- a) Indice de liquidez y capital de trabajo: Este índice refleja que la liquidez y el capital de trabajo de la Institución fueron satisfactorios durante el período considerado. Seguidamente se mencionan los índices resultantes de la comparación entre activo y pasivo corriente:

Ejercicio 1959/60.....	1,2 : 1
" 1960/61.....	1,7 : 1
" 1961/62.....	2,2 : 1
" 1962/63.....	3,6 : 1
" 1963/64.....	2,1 : 1

- b) Indice de solvencia o grado de endeudamiento: Este índice nos indica que la solvencia o grado de endeudamiento de la Institución fue satisfactorio a partir del ejercicio 1960/61. Los índices resultantes de la relación entre deudas a terceros y recursos propios son como se indican más abajo. En deudas a terceros se incluye la deuda a favor del Gobierno Nacional que no es exigible:

<u>Ejercicios</u>	<u>Deudas terceros : Recursos propios</u>
1959/60	2,20 : 1
1960/61	1,50 : 1
1961/62	1,20 : 1
1962/63	0,75 : 1
1963/64	0,83 : 1

- c) Indice de antigüedad de la deuda: Se comentará en el punto 2.3 de este informe.
- d) Indice de rentabilidad: La rentabilidad fue negativa en el ejercicio 1959/60 y positiva a partir del ejercicio 1960/61. El resultado porcentual de la rentabilidad sobre el Patrimonio nominal (Capital Superávit y Gob. Nación. Cta. capitales) y el resultado en valores absolutos de la AGOSN son como se indican a continuación. Las pérdidas se indican en paréntesis:

* No se pudo preparar Estados Financieros en dólares, por dificultad de convertir en dicha moneda los bienes del activo fijo dada su amplitud y complejidad.

En miles m\$n

<u>Ejercicio</u>	<u>% s/Patrimonio</u>	<u>Utilidad (o Pérdida)</u>
1959/60	(21)	(505,666)
1960/61	34	1.513.499
1961/62	14	846.504
1962/63	20	2.195.476
1963/64	15	2.199.914

El cambio operado en el ejercicio 1960/61 y siguientes con relación al ejercicio 1959/60 se debe fundamentalmente a que la AGOSN recuperó la facultad de cobrar su propia facturación a partir del 1.º de enero de 1961 de acuerdo con la ley No. 15.799 promulgada el 13 de enero de 1961. Desde el año 1948/49 al 1960 rigió el sistema del Impuesto Único que incluía los Impuestos inmobiliarios y Municipales y los servicios de agua, cloacas y desagües y se cobraba por intermedio de la Dirección General Inmobiliaria, correspondiendo a la AGOSN un 35% aprox. del total. Esta proporción no era remunerativa para la misma.

Una explicación acerca de la composición de los rubros Capital, Superávit, y Gob. Nación, cta. Capitales figura en el anexo al Cuadro No. 1.

e) Activo Fijo: (Excluido Materiales y Repuesto en Stock):

Los bienes del activo fijo están valuados en base al costo de los mismos menos la depreciación correspondiente. Si se actualizaran los valores de dichos bienes con motivo del problema inflacionario los mismos aumentarían considerablemente.

Seguidamente se consignana el valor total según libros (costo) y el valor actualizado del activo fijo al 31 de octubre de 1964 calculado en base a índices suministrados por la Oficina Técnica de la AGOSN:

Al 31 de octubre de 1964 - en miles m\$narg.

	Según libros (costo)	Según valor actualizado.
Valor original	16.415.275	73.700.000
Depreciación	2.665.190	12.100.000
Valor neto	<u>13.750.085</u>	<u>61.600.000</u>

- f) Conclusión del análisis: De acuerdo con los índices y relaciones comentadas anteriormente y de otros elementos de juicio analizados opinamos que la situación financiera de la Institución al 31 de octubre de 1964 y durante el período examinado, excepto el ejercicio 1959/60, fue en general satisfactoria.
- g) Fecha cierre del ejercicio económico: A partir del ejercicio 1964 se ha modificado la fecha de cierre del ejercicio económico de la AGOSN de acuerdo con la Ley de Presupuesto No. 16662 - art. 94, siendo en lo sucesivo el 31 de diciembre de cada año en vez del 31 de octubre. Para fines de nuestro análisis hemos tomado como base los Estados Financieros del 31 de octubre de 1964 por ser más comparable con los de los ejercicios anteriores y al mismo tiempo porque los datos e informaciones de los mismos son más homogéneos.

2.3 Situación de las cuentas a cobrar y grado de morosidad de las mismas.

El saldo de las cuentas a cobrar a usuarios al 31 de diciembre de 1964 por prestación de servicios de agua, cloacas y desagües asciende a m\$ 4.473.000.000 (ajustado).

La facturación o emisión de recibos del 3er. cuatrimestre de 1964 correspondiente a Capital Federal, Distritos del Interior y Aglomerado Bonaerense asciende a m\$ 2.191.660.000.-

El monto de las cuentas a cobrar a usuarios al 31 de diciembre de 1964 representa como promedio general una antigüedad de la deuda de 8 meses aproximadamente.

La relación procuentual entre lo facturado y lo cobrado durante el año 1964 se ha estimado como sigue:

Capital Federal 89%

Aglomerado Bonaerense
y Distritos del Interior 87%

2.4 Evaluación de los préstamos Nos. 43/SF y 86/TF-DR

Por razón de que el Proyecto Avellaneda-Lanús (Préstamos Nos. 43/SF y 86/TF) está recién en la primera fase de su ejecución y no se produjo aún desembolsos por parte del BID opinamos que no corresponde efectuar en esta circunstancia una evaluación exhaustiva del mismo. No obstante hemos examinado someramente el cumplimiento de las cláusulas de carácter contable y financiero de los contratos de préstamos vigentes, encontrando las observaciones principales que se mencionan a continuación:

Sección 6.01 - Registros contables: Hemos examinado el sistema contable específico para el proyecto Avellaneda-Lanús constatando que el mismo no cubre todos los requerimientos exigidos por el BID. Se ha asesorado a los funcionarios responsables de la Institución la forma de completar dicho sistema contable, Posteriormente se nos presentó un nuevo proyecto del mismo encontrando conforme.

Sección 6.03 - a) iii) - Estados Financieros Anuales: El prestatario no ha cumplido este requisito contractual dentro del plazo previsto. Los correspondientes al ejercicio 1964 recién los enviarán a Washington dentro del presente mes de setiembre/65.

Sección 6.03 - b) - Certificación de Estados Financieros: No se ha cumplido con esta cláusula contractual dentro del plazo previsto. El informe y dictamen de auditoría correspondiente al año 1964 que está realizando la Contaduría General de la Nación, recién los enviarán a Washington en el transcurso del presente mes de setiembre de 1965.

Seguidamente pasamos a consignar el costo total actualizado y estimado del Proyecto Avellaneda-Lanús al 31 de julio de 1965 de acuerdo con informaciones que nos fueron suministradas por la AGOSN:

	Presupuesto original		Presupuesto actualizado	
	u\$s (1)	Equivalente en m\$n	u\$s	Equivalente en m\$n
<u>Costo Total Proyecto</u>	10.500	1.575.000	10.820	1.861.000
<u>Préstamos BID:</u>	5.500	825.000	5.500	946.000
a) Prést. 43/SF (x)	2.000	300.000	2.000	344.000
b) " 86/TF (x)	3.500	525.000	3.500	602.000
<u>Aportes locales</u>	5.000	750.000	5.320	915.000
a) Ley 16.437				
1. Recargos tarifarios	3.180	477.000	3.295	566.750
2. Presup. Inv. Patrim.				
(Uso Crédito Público)	1.500	225.000	1.595	274.000
b) Excedentes Explotación	320	48.000	430	74.250
(1) u\$s = m\$n 150				
(2) u\$s = m\$n 172				
(x) Incluye u\$s 5. para inspección				

2.5 Conclusiones generales:

Las conclusiones principales a que hemos arribado con relación a la evaluación financiera, administrativa y contable de la AGOSN son las siguientes:

- a) La organización administrativa y contable de la AGOSN es en general aceptable para llevar a cabo su cometido en dichos aspectos.
- b) La situación financiera de la AGOSN al 31 de octubre de 1964 y durante el período analizado (de 1959/60 a 1963/64), excepto el ejercicio 1959/60, fue en general satisfactoria.
- c) El análisis de las cuentas a cobrar a usuarios y el grado de morosidad de las mismas indica que las cuentas a cobrar al 31 de diciembre de 1964 representa como promedio general una antigüedad de la deuda de 8 meses aproximadamente, equivalente para fines de comparación a 6 meses de antigüedad aproximadamente. También indica por otra parte, que la cobranza durante el año 1964 representó en Capital Federal un 89% sobre el monto facturado y en Aglomerado Bonaerense y Distritos del Interior un 87%.
- d) El examen del cumplimiento de las cláusulas contractuales de carácter contable y financiero con relación a los Préstamos Nos. 43/SF y 86/TF, indica que el prestatario no ha cumplido con algunas cláusulas de los contratos respectivos.

3 - Pronósticos: Análisis y evaluación financiera del nuevo proyecto (proyecto global)

3.1 Costo de los proyectos específicos y del global:

Denominamos "proyecto global" para fines de nuestro análisis a los siguientes proyectos específicos:

- 1 - Aglomerado Bonaerense, que incluye: Alte. Brown, Quilmes, Forecnio Varela, Avellaneda, Lanús y Lomas de Zamora.
- 2 - Ciudad de San Miguel de Tucumán.
- 3 - Ciudad de San Salvador de Jujuy.
- 4 - Aglomerado Mendocino.
- 5 - Ciudad de Córdoba y alrededores.

El costo total estimado del proyecto global, y las fuentes de financiamiento previstas son como sigue:

Fuentes de financiamiento	Costo total estimado		Relación Porcentual
	Dólares	Equiv. en m\$ arg.	
Préstamo BID	18.500	3.182.000	41
Aportes locales	26.700	4.592.000	59
TOTALES	45.200	7.774.000	100

Tipo de cambio utilizado: 1 u\$s = 172 m\$n.

La proporción entre gastos locales y gastos en dólares estaría consignado en el informe técnico como consecuencia del análisis técnico respectivo.

- 6.03 Los aportes locales correspondiente al 59% sobre el costo total del proyecto global provendrán de las siguientes fuentes:

Para las obras del Aglomerado Bonaerense (Potabilizador Bernal):

- a) Fondo de Saneamiento Urbano creado por la ley 16.437 de 1961, que integra:
 - 1) Recargos tarifarios (10%) de la Capital Federal y del resto de las localidades del Aglomerado Bonaerense a medida que se vayan habilitando las obras financiadas con el Fondo.
 - 2) Aporte de la Provincia de Buenos Aires.
 - 3) Aporte del Gobierno Nacional por medio del crédito público (ley 16.437).
- b) Aporte del Gobierno Nacional por medio de crédito público. Partidas que se incluirán en el Presupuesto de Inversiones Patrimoniales de la AGOSN.

Para los otros proyectos (Tucumán, Jujuy, Mendoza y Córdoba)

Aporte del Gobierno Nacional por medio de crédito público. Partidas que se incluirán en el Presupuesto de Inversiones Patrimoniales de la AGOSN.

La ley 16.662 de Presupuesto General de la Nación promulgada el 19 de febrero de 1965 prevee en el art. 19 para el presente

ejercicio los créditos necesarios para atender las "contrapartidas" que requieran los préstamos internacionales que se acuerden para financiar proyectos del Sector público.

3.2 Régimen tarifario vigente y previsto.

Régimen tarifario vigente: El régimen tarifario vigente está basado en el valor locativo de los inmuebles, real o estimado, sobre el cual se aplican tarifas uniformes para todas las localidades en donde la AGOSN presta servicios de agua potable y cloacas. A partir del 10. de enero de 1960 en la Capital Federal se cobra los servicios sanitarios en base a la aplicación de una alicuota sobre la valuación física del inmueble.

Nuevo régimen tarifario: El nuevo régimen tarifario fue aprobado por el P.E. de acuerdo con el Decreto No. 9.022/63 publicado en el Boletín Oficial el 4 de marzo de 1964 y modificado por el Decreto No. 2908/64 publicado en el Boletín Oficial del 29 de abril de 1964 y el Decreto No. 3299/65 de fecha 29 de abril de 1965 publicado en el Boletín OSN el 21 de mayo de 1965.

Dicho régimen comenzará a aplicarse a partir del 10. de enero de 1964 (decreto No. 9022/63) y deberá encontrarse implantado en todo el país para el 10. de enero de 1967. (Decreto No. 3299/65). Hasta la fecha aún no fue implantado en ningún distrito o localidades del país.

El nuevo régimen está basado fundamentalmente en las superficies cubierta de edificación y terreno de cada finca y contempla, además, la aplicación de coeficientes en función de calidad, edad y ubicación de la misma.

Si las tarifas y derechos previstos en el régimen no cubrieran los gastos de explotación de la AGOSN el P.E. fijará a propuesta de la misma un aumento del coeficiente respectivo (K), en base a los elementos consignados anteriormente. El valor de dicho coeficiente a la fecha es equivalente a uno o sea $K = 1$.

Dicho régimen contempla con carácter obligatorio el uso de "medidores" para los comercios e industrias que utilicen el agua en el proceso de producción o la incorporen al producto elaborado, o en las instalaciones o casos en que no pueda establecerse una correlación entre la superficie cubierta y el consumo de agua. El nuevo régimen tarifario fue considerado para efectuar los cálculos respectivos con relación a los Pronósticos de Estados de Resultados.

3.3 Pronósticos de Estados de Resultados - Pérdidas y Ganancias
Años 1966 a 1979.

Se han preparado pronóstico de Estados de Resultados o de Pérdidas y Ganancias correspondiente a cada uno de los proyectos específicos por el período 1966 a 1979. Se acompaña como cuadro No. 2 el Consolidado General.

Dichos pronósticos fueron preparados con el fin de estimar los resultados en términos de "rendimiento" de los proyectos específicos y del proyecto global durante el período considerado. Las premisas y bases principales consideradas en la preparación de los pronósticos mencionados figuran en el Anexo al Cuadro No. 2. Las conclusiones principales a que hemos arribado en base a las premisas consideradas son las siguientes:

- a) El pronóstico del Proyecto global arroja el siguiente resultado durante el período 1966 a 1979 correspondiente al Consolidado general. Las pérdidas se indican en paréntesis:

Año	Ingresos (Servicios)	Gtos. operac. y Deprec. Act. Fijo	Ints. y Com. Prést./Aportes BID y Gob. Nac.	Resultado
1966	7376	5000	1094	1282
1967	7574	5205	1326	1043
1968	7843	5464	1662	717
1969	8213	6094	260	(45)
1970	9850	8372	551	(953)
1971	10425	8592	542	(685)
1972	11108	8886	512	(337)
1973	11633	9105	475	(20)
1974	12187	9314	437	353
1975	12706	9525	399	699
1976/79	54391	39520	1216	5497

- b) El resultado negativo del período 1969 a 1973 se debe principalmente porque a partir del año 1970 se contempló la habilitación de las nuevas plantas u obras implicando este hecho mayores gastos de operación que no son recuperables en forma inmediata; y también porque a partir del año 1969 fue considerable la incidencia en el resultado de los intereses del préstamo BID y de los aportes del Gobierno Nacional.
- c) El pronóstico nos indica también que el proyecto global, o sea los proyectos específicos considerados como un todo, serían autofinanciables desde el punto de vista de rendimiento a partir del año 1974 incluyendo los intereses correspondientes al préstamo BID y a los aportes del Gobierno Nacional. Si consideramos los proyectos específi-

cos, en forma separada notamos que no serían autofinanciables desde el punto de vista de rendimiento los siguientes: Almirante Brown y Florencio Varela del Aglomerado Bonaerense y Tucumán, Jujuy y Mendoza del interior del país. Esto implica que algunos proyectos considerados financieramente buenos compensarían y subsidiarían a los otros que tuvieran resultados negativos.

- d) Las tarifas e ingresos previstos en el pronóstico cubrirían en el "Consolidado General" (Proyecto Global) a partir del año 1974 los siguientes conceptos y rubros:
- 1 - Gastos de operación (gastos directos, administrativos e indirectos).
 - 2 - Depreciación del activo fijo.
 - 3 - Intereses de los Servicios de la deuda BID.
 - 4 - Intereses sobre aportes del Gobierno Nacional/

Si se excluyera el rubro Intereses s/aportes del Gobierno Nacional las tarifas e ingresos cubrirían en el Consolidado General (proyecto global) a partir del mismo año 1966 todos los otros conceptos mencionados o sea:

- 1 - Gastos de operación.
- 2 - Depreciación activo fijo y
- 3 - Intereses de los Servicios de la Deuda BID.

Con relación a los proyectos mencionados en el punto c) como "no autofinanciables" las tarifas respectivas cubrirían también en su mayor parte a dichos conceptos.

3.4 Pronósticos de Estados de Flujo de Fondos - Años 1966 a 1979

Con el propósito de estimar la situación financiera en términos de "fondos" con relación al proyecto "global" y a los proyectos específicos y conocer en qué forma y medida serían utilizados los fondos y recursos previstos para la financiación de los mismos se han preparado pronósticos de Estados de Flujo de Fondos correspondientes a los proyectos específicos por el período 1966 a 1979. Se acompaña el Consolidado General como Cuadro No. 3.

Las conclusiones principales a que hemos arribado con relación a los pronósticos mencionados son las siguientes:

- a) Los aportes locales previstos en los pronósticos para la financiación de los proyectos específicos y el global ascienden en total a m\$n arg. 4.592.000 (en miles) equivalente en dólares a 26.700 (en miles).

- b) Se incluyeron en los pronósticos el monto total de los servicios de la deuda del préstamo BID (intereses y amortización) durante el período considerado.
- c) El monto de los intereses sobre el saldo de los aportes del Gobierno Nacional se consideró como "pago" todo o una parte proporcional del mismo de acuerdo con el resultado estimado de cada distrito.
- d) La amortización de la deuda con el Gobierno Nacional por sumas que éste ha aportado y aportaría a la AGOSN para financiar obras se efectuaría cuando el saldo final de "fondos" resulte positivo. Si el saldo final de fondos resulta negativo el Gobierno Nacional aportaría la suma necesaria para solventar el déficit resultante.
- e) La AGOSN conforme con lo previsto en su ley Orgánica No. 13.577, art. 19, no puede, en la práctica, tener problema de "fondos" porque en los casos en que sus propios recursos no cubran los compromisos de la misma el déficit que resultare sería solventado mediante aporte del Gobierno Nacional.

3.5 Conclusiones generales.

Las conclusiones principales a que hemos arribado con relación al análisis y evaluación financiera del proyecto global y de los proyectos específicos son las siguientes:

- a) En los pronósticos de Resultados e han contemplado como Costo-Gastos a todos los elementos y rubros que tienen una incidencia directa e indirecta en la atención de los servicios, tales como: Gastos de Operación (gastos directos, indirectos y administrativos); Depreciación del activo fijo; Intereses de los Servicios de la Deuda BID, e Intereses sobre aportes del Gobierno Nacional.
- b) El proyecto global considerado como un todo sería autofinanciable desde el punto de vista de rendimiento a partir del año 1974, incluyendo los intereses sobre los aportes del Gobierno Nacional. Si se excluyera dicho concepto el proyecto global sería autofinanciable desde el mismo año 1966.
- c) Los proyectos correspondientes a Alte. Brown, Florencio Varela, Tucumán, Jujuy y Mendoza no serían autofinanciables desde el punto de vista de rendimiento si lo consideramos separadamente; pero si se excluyera los intereses sobre los aportes del Gobierno Nacional el proyecto de Mendoza sería autofinanciable y los proyectos Alte. Brown, Florencio Varela, Tucumán y Jujuy serían autofinanciables en una proporción considerable.

- d) De acuerdo con los pronósticos de Estados de Flujo de Fondos y con las disposiciones legales vigentes (Ley Orgánica No. 13.577) la AGOSN no tendría problemas financieros en términos de "fondos" durante el período considerado.

4 - Recomendaciones y conclusión final

4.1 Reccmendaciones:

Para que el proyecto global y los proyectos específicos que lo componen puedan ser factibles de realización desde el punto de vista financiero proponemos el cumplimiento de las siguientes recomendaciones:

- a) Que se exija al prestatario, con relación a los préstamos Nos. 43/SF y 86/TF, la regularización en el cumplimiento de las cláusulas contractuales de carácter financiero y contable previstas en los contratos respectivos.
- b) Que la AGOSN presente al Banco, como condición previa el primer desembolso, pruebas razonablemente fehacientes de que la misma ha adoptado y/o aplicado un procedimiento racional y efectivo para mejorar la cobranza de las cuentas a cobrar provenientes de los servicios de agua potable y cloacas.
- c) Que la AGOSN presente al Banco, como condición previa el primer desembolso, pruebas de que la misma ha implantado y aplicado todo o en su mayor parte, el nuevo régimen tarifario previsto por los Decretos del P.E. Nos. 9022/63, 2908/64 y 3299/65, como mínimo en todas las localidades correspondientes a los proyectos específicos considerados.
- d) Que la AGOSN presente al Banco constancia de que los "aportes locales" correspondientes a la financiación de los proyectos específicos (proyecto global) que ascienden estimativamente a m\$ñ arg. 4.592.000 (equivalente a Dólares 26.700.000) se concretarían en aportes a la misma en la medida y en las fechas en que los mismos requieran de acuerdo con el programa de inversiones aceptado por el Banco.
- e) Que se incluya una cláusula en el contrato de préstamo en donde se estipule que todo aumento en los costos previstos de los proyectos específicos y global, ya sea como consecuencia del problema inflacionario o por aumento natural de precio de los elementos componentes de dichos costos, será financiado sólo y exclusivamente por la AGOSN.

- f) Que la auditoría anual de los Estados Financieros y operaciones correspondientes a los "proyectos específicos" y de la AGOSN como conjunto sea practicada por la Contaduría General de la Nación, o por una firma de organismos independiente de auditores públicos o gubernamental aceptable y a opción del BID. En cualesquiera de los casos la auditoría deberá realizarse de acuerdo con los requerimientos exigidos por el Banco y dentro del plazo a prever en el contrato de préstamo.

4.2 Conclusión final

Si se cumplieran las recomendaciones formuladas en el punto anterior opinamos que los proyectos específicos considerados serían factibles de realización desde el punto de vista financiero.

ADMINISTRACION GENERAL DE OBRAS SANITARIAS DE LA NACION - A.G.O.S.N.
ESTADOS FINANCIEROS COMPARATIVOS - EJERCICIOS 1959/60 A 1963/64-AJUSTADOS
(En miles de m\$n)

	<u>1959/60</u>	<u>1960/61</u>	<u>1961/62</u>	<u>1962/63</u>		<u>1963/64</u>
				<u>Monto</u>	<u>%</u>	<u>Monto</u>
<u>AL</u>						
<u>Activo</u>						
Activo (1)	1,762.918	3,460.779	4,045.358	6.496.461	35	10.629.540
Activo de depreciación (2)	5,646.621	7,312.357	9,201.895	11,287.128	61	15,072.138
	186.009	180.503	330.639	830.458	4	1,251.623
del Activo:	<u>7,595.548</u>	<u>10,953.639</u>	<u>13,577.892</u>	<u>18.614.047</u>	<u>100</u>	<u>26,953.301</u>
<u>Activo y Patrimonio</u>						
Activo	1,404.950	2,011.675	1,803.564	1,760.283	9	4,996.659
Activo a largo plazo (Gov.Nacional) (3)	3,856.402	4,550.644	5,559.025	6,189.571	33	7,226.095
	-	-	-	39.265	1	60,998
Activo-Cta. Capitales (4)	4,752.567	5,821.435	6,645.156	7,719.928	41	8,602.882
Activo (5)	(2.418.371)	(1.430.115)	(429.853)	2.905.000	16	6,066.667
del Pasivo y Patrimonio:	<u>7.595.548</u>	<u>10.953.639</u>	<u>13.577.892</u>	<u>18.614.047</u>	<u>100</u>	<u>26.953.301</u>
<u>Resultado - Pérdidas y Ganancias</u>						
<u>Resultados</u>						
Resultados (7)	2.371.405	5.077.392	5.359.629	7.576.849	99	9.037.715
	-	-	-	80.119	1	80.000
de Ingresos	<u>2.371.405</u>	<u>5.077.392</u>	<u>5.359.629</u>	<u>7.656.968</u>	<u>100</u>	<u>9,117.715</u>
<u>Activo fijo</u>						
Activo fijo (6)	2.760.813	3.364.284	4.377.115	5.015.462	66	6.279.868
Activo fijo	116.258	199.609	136.010	97.312	1	122.207
	-	-	-	-	-	-
Activo de Gastos	<u>2,877.071</u>	<u>3,563.893</u>	<u>4,513.125</u>	<u>5,112,774</u>	<u>67</u>	<u>6,402.075</u>
Activo de Gastos:						
Activo de Gastos a largo plazo	-	-	-	285.291	4	516.360
Activo de Gastos financieros	-	-	-	63.427	1	(634)
Activo de Gastos:	<u>2,877.071</u>	<u>3,563.893</u>	<u>4,513.125</u>	<u>5.461.492</u>	<u>72</u>	<u>6.917.801</u>
Activo de Gastos (7)	(505.666)	1,513.499	846.504	2,195.476	28	2.199.914

GUIENTE HOJA

ADMINISTRACION GENERAL DE OBRAS SANITARIAS DE LA NACION

A.G.O.S.N.

Notas:

1. Se consideró como activo corriente el 90% de la cuenta Deudores por Servicios y el 80% de la cuenta Deudores Varios.
2. Está valuado al valor costo menos depreciación. Se incluyó en Activo Fijo el rubro "Materiales y repuestos".
3. Representan los déficit de explotación de los servicios solventados por el Gobierno Nacional y los Servicios Financieros impagos de los distritos liquidados sobre sumas aportadas por el Gobierno Nacional para financiación de obras.
4. Son saldos de aportes del Gobierno Nacional para financiar obras en distritos con cargo de devolución al mismo, a razón del 2% anual como mínimo. La tasa de interés que devengan dichos aportes será igual al menor nominal de los títulos de la Deuda Pública Nacional.
5. El Capital y Superávit está formado por los siguientes aportes y conceptos: Aporte del Gobierno Nacional y de Terceros, recargo Ley No. 16.437 para Fondo Saneamiento Urbano, utilidad de los servicios y fondo de seguro y subsidios.
6. Incluye gastos administrativos e indirectos.
7. Está incluido el monto de la facturación del 3er. cuatrimestre que abarca los meses de septiembre a diciembre. La parte correspondiente a los meses de noviembre y diciembre correspondería acreditar como utilidad diferida (en el pasivo), pero hemos considerado dentro del ejercicio para mantener una base uniforme con fines de comparación con relación a las cifras de ejercicios anteriores.

Cu

ADMINISTRACION GENERAL DE OBRAS SANITARIAS DE LA NACION A.G.O.S.N.
PROMOSTICO DE ESTADO DE RESULTADOS - PERDIDAS Y GANANCIAS
PROYECTO GLOBAL - CONSOLIDADO GENERAL
(en miles de US\$)

<u>1966</u>	<u>1967</u>	<u>1968</u>	<u>1969</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>
7,376	7,574	7,843	8,213	9,850	10,425	11,108	11,633	12,187	12,706	13,108	13,472
7,376	7,574	7,843	8,213	9,850	10,425	11,108	11,633	12,187	12,706	13,108	13,472
4,822 178	4,869 336	4,913 551	5,377 717	7,491 881	7,665 927	7,867 1,019	8,049 1,056	8,224 1,090	8,402 1,123	8,563 1,155	8,616 1,185
5,000	5,205	5,464	6,094	8,372	8,592	8,886	9,105	9,314	9,525	9,718	9,801
1,094	1,326	1,662	1,904	1,880	1,976	2,047	2,073	2,083	2,083	2,066	2,023
-	-	-	255	551	542	512	475	437	399	361	323
-	-	-	5	-	-	-	-	-	-	-	-
1,094	1,326	1,662	2,164	2,431	2,518	2,559	2,548	2,520	2,482	2,427	2,346
1,282	1,043	717	(45)	(953)	(685)	(337)	(20)	353	699	963	1,325

basados en la aplicación de un coeficiente "K" = 1. La AGOSN piensa subir este coeficiente a Buenos Aires, con anterioridad a la terminación del proyecto, sujeto a aprobación del Poder Ejecutivo. Se estimaría aumentos respectivos aproximados de 948, 1.308, 1.395, 1.500, 1.593, 1.692, 1.773 y 1.850 para los años 1969 a 1976 (que son los años en que las utilidades no parecen alcanzar a cubrir la amortización del BID, según el Cuadro 3).

al 3% y 1/2% de comisión de compromiso.
años, comenzando en el 4o. año. Las dos primeras cuotas de
dos siguientes de US\$ 175,000 cada una.

Pronóstico de Estado de Resultados

Bases y Premisas Consideradas

Anexo al Cuadro No. 2

INGRESOS:

- 1) Los ingresos se calculan en base al régimen Tarifario previsto por los Decretos Nos. 9022/63, 2908/64 y 3299/65.
- 2) El aumento de población y usuarios estimados está basado en el crecimiento vegetativo previsto para la República Argentina y en la incorporación de nuevos usuarios con motivo de la habilitación de las nuevas plantas.
- 3) El producto del número estimado de usuarios y la Tarifa Prevista nos da el ingreso total por servicios prestados.

GASTOS:- COSTOS

- 1) Gastos de Operación: Incluye los siguientes conceptos: Gastos Administrativos, Remuneraciones del personal y cargas sociales, y otros gastos directos e indirectos.
- 2) Base del Cálculo Para gastos de Operación: Datos históricos de ejercicios anteriores, incrementado con los gastos adicionales correspondientes a las nuevas plantas u obras que se habilitarán a partir del año 1969/70.
- 3) Depreciación Activo Fijo: Se calculó en base a la vida útil probable de los bienes del Activo Fijo. Se tomó como promedio un 2% anual.
- 4) Intereses deuda largo plazo: Son intereses sobre saldos de aportes del Gobierno Nacional que ha aportado a la AGOSN para financiar obras en distritos con cargo de devolución al mismo. La tasa de interés que devenga dichos aportes es igual al menor nominal de los títulos de la Deuda Pública Nacional (aprox. 8% anual).
- 5) Intereses sobre Préstamo BID: Se calculó en base al 3% anual sobre saldos deudores.

ADMINISTRACION GENERAL DE OBRAS SANITARIAS DE LA NACION
"AGOSN"

Estados Financieros al 31 de Octubre de 1964
 (En Miles de Dólares)

I. BALANCE GENERAL

<u>Activo</u>	
Activo Corriente	74,332
Activo Fijo Neto de Depreciación	440,014
Otros Activos	8,752
<u>Total Activo:</u>	<u>523,098</u>
<u>Pasivo y Patrimonio:</u>	
Pasivo Corriente	34,942
Pasivo a Largo Plazo (Gob.Nal.)	50,532
Otros Pasivos	426
Gob. Nación - Cuenta Capitales	60,160
Capital y Superávit	377,038
<u>Total Pasivo y Patrimonio:</u>	<u>523,098</u>

II. ESTADO DE RESULTADOS

<u>Ingresos</u>	
Servicios (devengados)	64,555
Otros Ingresos	571
	<u>65,126</u>
<u>Gastos - Costos</u>	
Gastos de Operación	44,856
Depreciación Activo Fijo	873
Otros Gastos	45,729
Gastos Financieros	3,684
<u>Total Gastos - Costos:</u>	<u>49,413</u>
<u>Ganancias (o Pérdidas)</u>	<u>15,713</u>

Bases para la conversión de los valores en dólares:

Activo Fijo: Se tomó como base el valor actualizado al 31 de octubre de 1965 y a dicho valor se aplicó el tipo de cambio de 143, o sea M\$N 61,600,000 (miles) más 1,322,053 (miles) para repuestos varios para activo fijo resulta total M\$N 62,922,053 al tipo de cambio de M\$N 143 (por US\$1) US\$ 440,014 (miles).

Otros Rubros Activo y Pasivo: Cambio 143.

Capital y Superávit: Por diferencia.

Pérdidas y Ganancias: Tipo de cambio promedio del año: 140.

ADMINISTRACION GENERAL DE OBRAS SANITARIAS DE LA NACION A.G.O.S.N.
PRONOSTICO DE ESTADO DE FLUJO DE FONDOS
PROYECTO GLOBAL - CONSOLIDADO GENERAL
(en miles de US\$)

	<u>1966</u>	<u>1967</u>	<u>1968</u>	<u>1969</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	
di	1,282	1,043	717	(45)	(953)	(685)	(337)	(20)	353	699	963	1
Fi	178	336	551	717	881	927	1,019	1,056	1,090	1,123	1,155	1
				255	551	542	512	475	437	399	361	
BID	-	-	-	5	-	-	-	-	-	-	-	
acio	1,094	1,326	1,662	1,904	1,880	1,976	2,047	2,073	2,083	2,083	2,066	2
a-	2,554	2,705	2,930	2,836	2,359	2,760	3,241	3,584	3,963	4,304	4,545	4
ID	2,936	6,270	5,995	3,299								
	4,247	8,701	8,836	4,916								
	1,899	905	1,364	1,333	2,558	2,267	1,860	1,686	1,686	1,686	1,512	1
	11,636	18,581	19,125	12,384	4,917	5,027	5,101	5,270	5,649	5,990	6,057	6
IDOS												
ID-	7,184	14,965	14,836	8,215								
	1,899	905	1,364	1,333	2,558	2,267	1,860	1,686	1,686	1,686	1,512	1
	44	183	367	250	551	542	512	475	437	399	361	
	63	62	30	3	-	-	-	-	-	-	-	
	9,190	16,115	16,597	9,601	3,109	2,809	2,372	2,161	2,123	2,085	1,873	1
	-	-	-	75	250	796	1,241	1,241	1,241	1,241	1,241	1
ON	9,190	16,115	16,597	9,876	3,359	3,605	3,613	3,402	3,364	3,326	3,114	3
en												
)	948	1,009	1,152	926	715	638	669	769	916	1,063	1,051	1
	1,498	1,457	1,376	1,582	843	784	819	1,099	1,369	1,601	1,892	2

ADMINISTRACION GENERAL DE OBRAS SANITARIAS DE LA NACION A.G.O.S.N.

PRONOSTICO DE ESTADO DE FLUJO DE FONDOS

PROYECTO GLOBAL - CONSOLIDADO GENERAL

(en miles de US\$)

- (1) Proporción de interés que se puede pagar al Gobierno Nacional.
- (2) Cuando es positivo se amortiza deuda con el Gobierno Nacional; cuando es negativo el Gobierno Nacional cubre el déficit.

TECHNICAL REPORT

IMPROVEMENT AND EXPANSION OF
WATER SUPPLY SYSTEMS FOR
5 CITIES IN ARGENTINA

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IMPROVEMENTS AND EXPANSION OF THE WATER SUPPLY SYSTEMS OF 5 CITIES IN ARGENTINA

I. INTRODUCTION

The borrower would be the Administración General de Obras Sanitarias which was organized under its present name in February 17, 1947. It is an autarchic dependency of the Ministry of Public Works, responsible for the study, design, construction, repair, extension, operation and administration of water supply and sewer systems of the cities and towns throughout the country including the Federal Capital of Buenos Aires as well as the utilization, exploration and development of ground water.

History

It had its beginning in 1898 when a Commission of Health Works was established as a dependency of the Ministry of Public Works. This Commission was to be responsible for the study and construction of sanitary works throughout the country.

Three years later laws were passed authorizing the construction of works to provide water systems for the provincial capitals.

Funds were obtained from the National Lottery and the national budget by appropriation and from bond issues.

In 1919 laws were passed to assist communities of 3,000 inhabitants to construct water supply systems and those over 8,000 inhabitants to provide complete sanitation. A distinct type of financing was established for these --that the income produced by the system, should cover the costs of operation, maintenance and service of the invested capital, guaranteeing the repayment of the bonds authorized by law to defray the costs of construction.

In 1944 the Administración Nacional de Agua (ANDA) was created, combining the General Direction of Sanitary Works with the General Direction of Irrigation. Three years later, Decree No. 3121 reorganized ANDA and gave it the present name of Administración General de Obras Sanitarias de la Nación.

Simultaneously, systems were built by provincial organizations. In 1923 a law was passed to provide water and sewer services to the cities of Gualeguaychu, Gualeguay and Victoria in the province of Entre Rios. These systems are administered by the Direction of Sanitary Works of Entre Rios.

The province of Buenos Aires passed laws to use public bonds to finance public works with the interest and amortization to be paid with the income received from charges for the services. This resulted in the creation of the Direction of Sanitation and Sanitary Works for the Province of Buenos Aires. In this way the water and sewer systems of Chivilcoy and Mercedes, water systems of Chacabuco, Necochea, Rojas, Saladillo, Bartolomé Mitre, Carlos Casares and others were built.

Private capital also was used to build sanitary works. The water and sewer systems of La Plata, Beriso, Ensenada and Punta Alta and Bahía Blanca were built by Ferrocarriles Sud and transferred to the province when the railroad was nationalized.

Private capital also financed the water and sewer systems for Rosario (Santa Fe); water system for Avellaneda (B.A.) which extends to Adrogué, Marifol, Gerli, Sarandi, Banfield, Lanus, Temperly, Remedios de Escalada and Welde, and the water and sewer system for Concordia (Entre Rios). The government acquired these systems and placed them under the administration of OSN.

The Borrower

At the present time OSN is administering water systems with direct connections to consumers in 151 communities and "reduced" water systems with public faucets in 261 localities. These systems serve 9,150,000 people or 41% of the total population.

OSN also operates sanitary sewer systems serving 4,789,000 people in 65 communities and storm sewers for 12 communities. The operations department employs approximately 17,000 people out of a total staff of approximately 30,000.

The Administración is under the jurisdiction of a Board of Directors made up of a President, Vice President and 4 Members. All are named by the Executive Power and approved by the Senate. The term of office is for 4 years.

It is composed of various departments: commercial, accounting, legal, social action, personnel, and a technical department. The technical department includes the following subdivisions: Planning and Statistics, Projects and Design, Construction, Greater Buenos Aires Operations, Interior Operations, Laboratories and Machinery and Industry. The staff is highly skilled and dedicated to the profession.

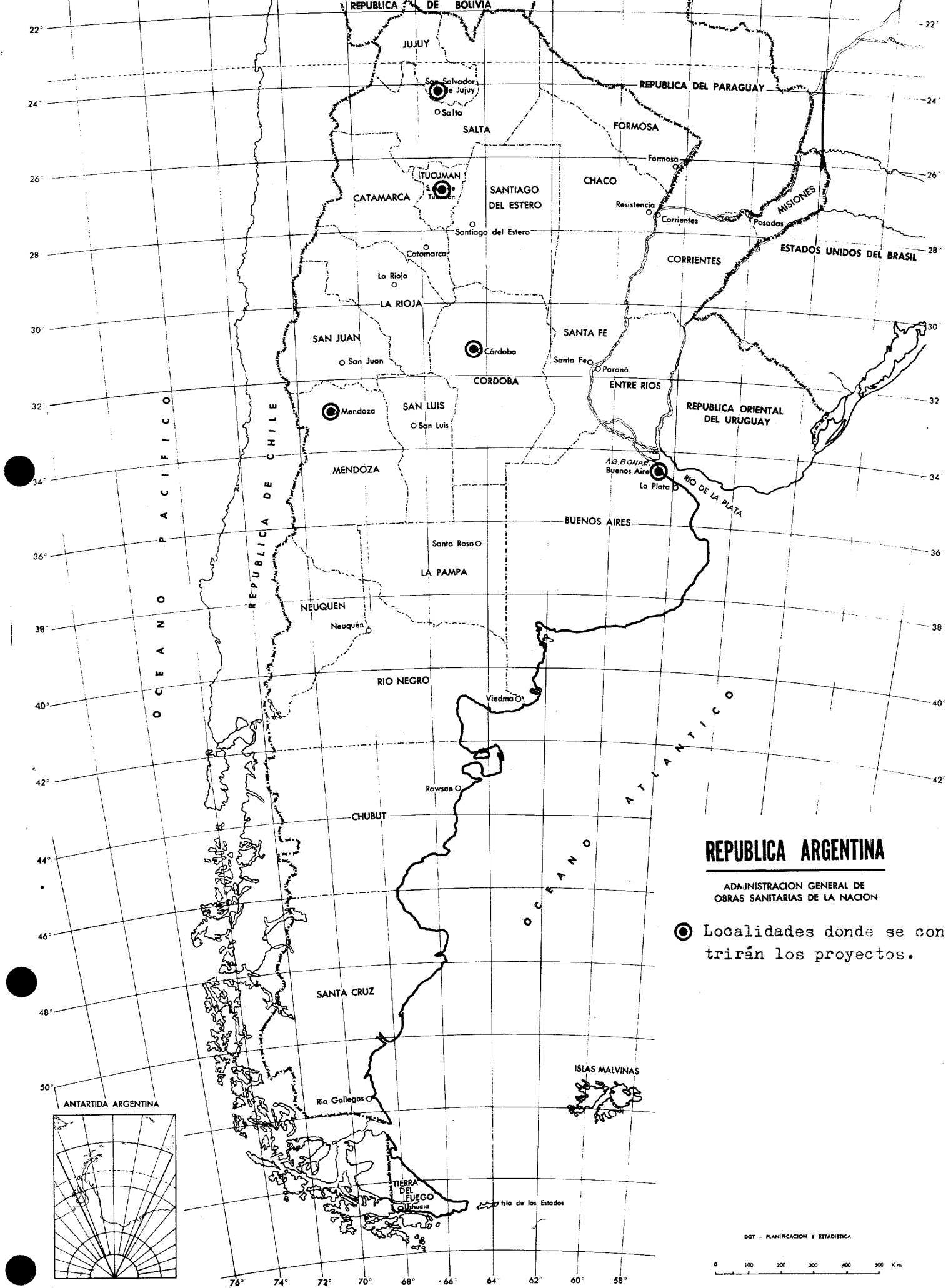
The sub-projects are part of a national program to improve and expand the water supply facilities of the provincial capitals.

<u>PROJECT COSTS</u>	US\$ Thousands Cost	Time in Years
Greater Buenos Aires: Bernal Water Treatment Plant *	28,100	5
San Miguel de Tucumán: Intake Works, Raw Water Line, Treatment Plant and Supply Line *	4,700	4
San Salvador de Jujuy: Intake Works, Supply Line and Treatment Plan *	1,200	4
Greater Mendoza: Intake Works, Supply Lines and Treat- ment Plant *	3,700	3 1/2
Córdoba and Surroundings Main Feeder Lines in the Distribution Network **	4,800	2 1/2
Contingencies (additional 5% construction cost)	1,850	--
Consulting Engineering Services (2%)	825	--
Subtotal	45,175	
Interest during construction	1,600	
TOTAL	\$46,775	
Control and Inspection IDB	25	
	<u>\$46,800</u>	

* Costs include 12% OSN supervision and 5% contingencies.

** Costs include 20% OSN supervision and 5% contingencies.

This project is to be carried out in a period of 5 years.

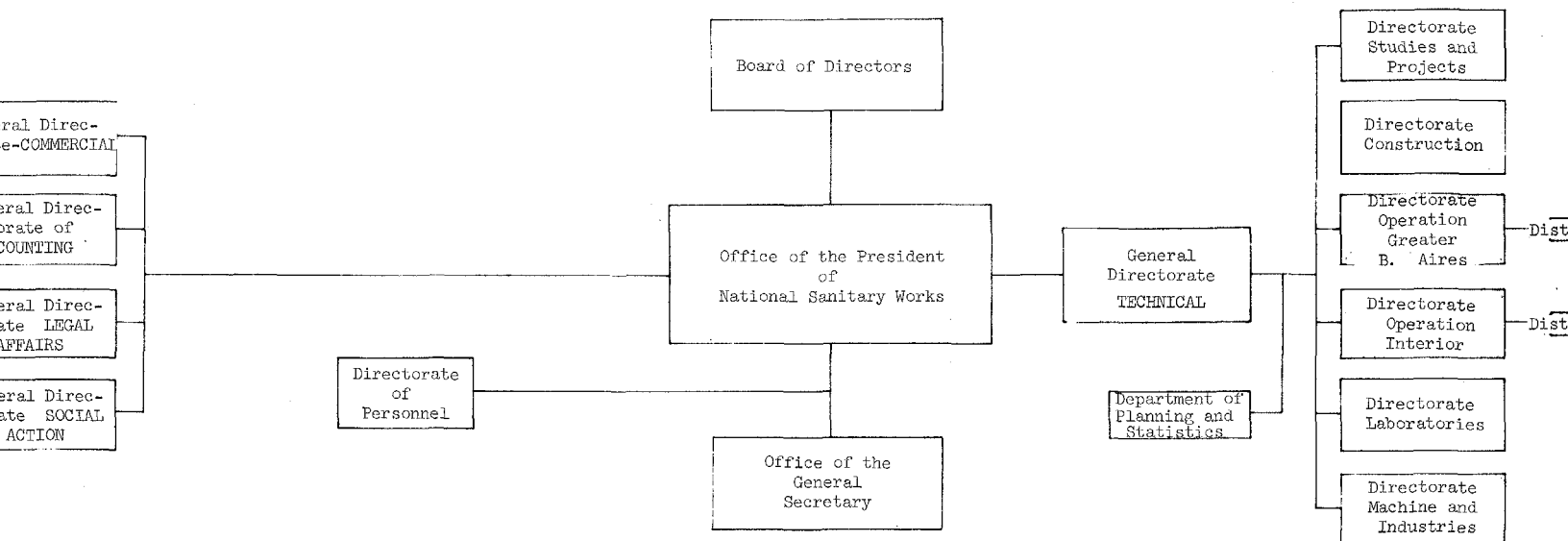


REPUBLICA ARGENTINA

ADMINISTRACION GENERAL DE
OBRAS SANITARIAS DE LA NACION

● Localidades donde se construirán los proyectos.

ORGANIZATION CHART
OBRAS SANITARIAS DE LA NACION



II. DESCRIPTION OF INDIVIDUAL SUB-PROJECTS

A. Greater Buenos Aires - Bernal Water Treatment Plant

1. Background

Greater Buenos Aires for the purposes of OSN comprises the area within a 35 kilometer radius of the San Martin Water Treatment Plant on the Rio de la Plata, the major source of water for the city of Buenos Aires and its surroundings. This area has an estimated population in excess of 7,000,000.

In order to provide adequate facilities for this area a master plan has been prepared which includes the improvement of San Martin Plant, and the construction of two new plants to supply the north and south sectors of the city and the distribution of water by large conduits or tunnels to smaller mains and pipes.

One of the new plants is Bernal with an initial capacity of 1,000,000 m³/day (260 NGD). This plant will supply water to the South Sector of the city which at present is poorly supplied.

This area cannot economically be supplied by the San Martin Plant due to its distance, limitations of the distribution system, and the limitations of the size of San Martín. This South Sector contains the following localities:

<u>Locality</u>	<u>System</u>	<u>Population</u>
Almirante Brown	OSN	137,000
Avellaneda	OSN	390,000
Lanus	OSN	430,000
Lomas de Zamora	OSN	286,000
Quilmes	X Municipal	331,000
Florencio Varela	--	<u>45,000</u>
TOTAL		1,619,000

X Does not have a public system.

2. Description of the Existing Services - Water Supply

The systems are interconnected with each other and the Buenos Aires system.

a) Almirante Brown

The water is supplied from 12 semi-artesian wells which each produce from 45 to 120 m³/hour (185 to 520 gpm).

There are 800 meters of pressure mains of 150 and 200 mm. in diameter of cast iron pipe.

Storage is supplied by means of a ground tank with a capacity of 2,500 m³ and an elevated tank with a capacity of 250 m³.

The total production of the wells reaches 6,475 m³/day and is supplemented with water from Avellaneda in the amount of 835 m³/day.

The distribution system consists of 68,000 meters of cast iron and asbestos cement pipe of 75 mm. to 150 mm. in diameter.

There are 7,800 individual connections and only 440 metered connections as follows:

	<u>Metered No.</u>	<u>Connections m³/day</u>	
Domestic	320	281	The number of metered con- nections is low.
Commercial	60	102	
Industrial	50	114	
Public	30	57	
	<u>440</u>	<u>554</u>	

The average consumption is 250 liters/person per day.

Approximately 32,000 people are served out of a total population of 137,000 people which means that 105,000 people lack service.

b) Avellaneda

The water is supplied from 55 deep wells at 35 to 110 m³/h with a total production of 67,000 m³/day.

In addition, 60,000 m³/day is supplied by the Buenos Aires system. However, from Avellaneda 3,000 m³/day are transferred to Quilmes; 910 m³/day to Lanus; and 835 m³/day to Almirante Brown - making the total for Avellaneda 122,255 m³/day.

This requires 89,000 meters of pressure mains and 4 storage tanks; one ground tank of 6,000 m³ and three elevated tanks of 1,000 m³, 4,000 m³ and 4,000 m³ each.

The distribution system contains 7,200 meters of trunk lines and 465,000 meters of connecting lines.

There are 57,000 house connections and only 2,460 metered connections. The metered connections are as follows:

	<u>No.</u>	<u>m³/day</u>	
Domestic	260	6,070	The number of metered con- nections is low.
Commercial	1,050	10,000	
Industrial	1,100	12,950	
Public	<u>50</u>	<u>13,000</u>	
TOTAL	2,460	42,000	

The average consumption is 250 liters per person per day. Approximately 340,000 people are served and 50,000 not served.

c) Lanus

Source

There are 32 deep wells of 45 to 150 m³/h producing a total of 53,000 m³/day. In addition 22,500 m³/day are supplied from Buenos Aires and 5,500 m³/day from Lomas de Zamora. This makes a total of 81,000 m³/day.

The water is conducted through 164,000 meters of cast iron pipe into 2 elevated tanks of 3,000 m³ and 1,000 m³, respectively.

The distribution system consists of 50,000 meters of large mains of 250 mm. to 1.1 meters in diameter and 450,000 meters of lines of 75 mm. to 250 mm. in diameter.

There are 52,000 house connections and only 1,800 metered connections. The metered connections are as follows:

	No.	Consumption m ³ /day
Domestic	195	186
Commercial	668	498
Industrial	850	1,903
Public	87	785
	<u>1,800</u>	<u>3,372</u>

The average consumption is 250 liters/person/day. Of a total population of 430,000, 310,000 are served by the system.

d) Lomas de Zamora

This area is supplied by 47 deep wells at a yield of 35 and 100 m³/h with a total capacity of 70,000 m³/day. Of this 5,500 m³/day is transferred to Lanus, leaving a total of 64,500 m³/day.

The pressure mains consist of 8,000 meters of cast iron pipe of 200 to 600 mm. in diameter. The water is stored in a ground tank of 6,000 m³ capacity and 2 elevated tanks each of 1,000 m³ capacity.

The distribution system includes 5,000 meters of main lines of steel and cast iron, 400 mm. and 500 mm. in diameter and 245,000 meters of lines of cast iron and asbestos cement of 60 mm. to 300 mm. in diameter.

There are 33,000 domestic connections and only 630 metered connections as follows:

	<u>No.</u>	<u>m3/day</u> <u>Consumption</u>
Domestic	255	420
Commercial	115	260
Industrial	160	534
Public	<u>100</u>	<u>302</u>
	630	1,516

The average consumption is approximately 319 liters per person per day. Out of a total population of 286,000, 166,000 people are served.

e) Quilmes

This system is operated by the municipality

It is supplied from 38 deep wells with a total capacity of 60,000 m3/day.

There are a total of 6,200 meters of pressure mains; and 530,000 meters of distribution lines of 60 mm. to 450 mm. in diameter.

There are a total of 45,200 connections using a total of 60,000 m3/day. The average consumption is 260 liters/person per day.

The system serves 165,000 people out of a total of 331,000.

f) Florencia Varela

This community has no public water system. The residents use private wells, cisterns, tank trucks or purchase water from vendors.

It has a population of 45,000 people

	<u>Summary of Conditions - Water Supply</u>					
	<u>Population</u>		<u>No. of</u>	<u>Properties</u>	<u>Not Served</u>	
	<u>Present</u>	<u>Served</u>	<u>Meters</u>	<u>Served</u>	<u>Properties</u>	<u>Population</u>
Almirante Brown	137,000	32,000	400	8,000	26,000	105,000
Avellaneda	390,000	340,000	2,460	60,000	12,000	70,000
Lanús	430,000	310,000	1,800	53,000	21,000	120,000
L. de Zamora	286,000	165,000	630	35,000	21,000	120,000
Quilmes	331,000	230,000	no data	46,000	20,000	101,000
Florencia Varela	45,000	--	--	--	10,000	45,000
	<u>1,619,000</u>	<u>1,077,000</u>		<u>202,000</u>	<u>100,000</u>	<u>561,000</u>

3. Existing Facilities - Sewer System

These areas are served by the Greater Buenos Aires Sewer System.

The system consists of 3 large trunk sewers with their corresponding branches to collect the wastes from distinct zones of Greater Buenos Aires, pumping stations, and discharge in the Rio de La Plata at Berazategui.

The number of people served are shown in the following chart:

	<u>Population</u>		<u>Properties</u>		<u>Population Not Served</u>
	<u>Present</u>	<u>Served</u>	<u>Served</u>	<u>Not Served</u>	
Almirante Brown	137,000	--	--	34,600	137,000
Avellaneda	390,000	95,000	13,000	59,500	296,000
Lanús	430,000	10,000	1,500	62,500	420,000
L. de Zamora	286,000	35,000	6,000	50,000	251,000
Quilmes (1)	331,000	70,000	15,000	51,000	261,000
F. Varela	45,000	---	---	10,000	45,000
	<u>1,619,000</u>			<u>267,600</u>	<u>1,400,000</u>

(1) The sewer system of Quilmes connects into the Greater Buenos Aires System.

4. Operating Conditions

Water System

These areas require the operation of 184 deep wells and the transfer of 82,500 m³/day of water produced at the San Martín Water Treatment Plant. This water is brought through the Buenos Aires distribution system and into these areas by means of large supply lines crossing the Riachuelo. (A small stream that separates these areas from Buenos Aires). A total of 1,077,000 people are served at an average of 300 liters/person/day and an additional 561,000 people need to be provided with service.

Service to this area will be improved by the Avellaneda-Lanús water tunnel now under construction and partially financed with an IDB loan. It is 3.80 meters in diameter and 9.39 kilometers in length and will have a capacity of 700,000 m³/day (182 MGD). It is an extension of the Buenos Aires water tunnel and when additional sections are completed will form a part of a feeder loop around the city, from the San Martín water plant to the proposed Bernal plant.

Although the Avellaneda-Lanús water tunnel will improve the service in the area it actually serves and provide service for an additional 200,000 people, there will still remain approximately 561,000 people to be served.

The Bernal plant will have an ultimate capacity of 2,000,000 m³/day and together with the San Martín plant which is being expanded to 4,000,000 m³/day will be able to supply water to an estimated population in Greater Buenos Aires of 12,000,000 people.

Sewer System

The present facilities are inadequate and long range plans have been prepared to solve this problem.

The plans include a new outfall at Berazategui, a fourth trunk sewer, improvement and remodeling of the central pumping station "Wilde", and treatment plants - Southeast, North and East. The estimated cost of these works is \$3,500,000.000 M/N.

5. Actual Sources of Income

The major source of revenue is from rate charges. As of December 31, 1964 the results were as follows:

	M/N Fixed Income Rates	%	M/N Income from other Sources	%
Almirante Brown	20,762,500	92	2,014,566	8
Avellaneda	264,174,600	94	16,477,511	6
Lanús	136,288,200	90	13,995,020	10
Lomas de Zamora	121,527,500	92	10,010,683	8
TOTAL	542,752,800		42,497.780	
GRAND TOTAL	\$ 585,250.580 M/N			

When this is compared with the consumption below, the charges from rates are equivalent to M/N \$ 4.64/m³. For a family of 5 consuming 300 liters/person/day this averages \$210/month. (US\$ 1.25/month)

6. Consumption

The total consumption in the South Sector is 324,600 m³/day or approximately 300 liters per person per day.

The metered consumption is as follows:

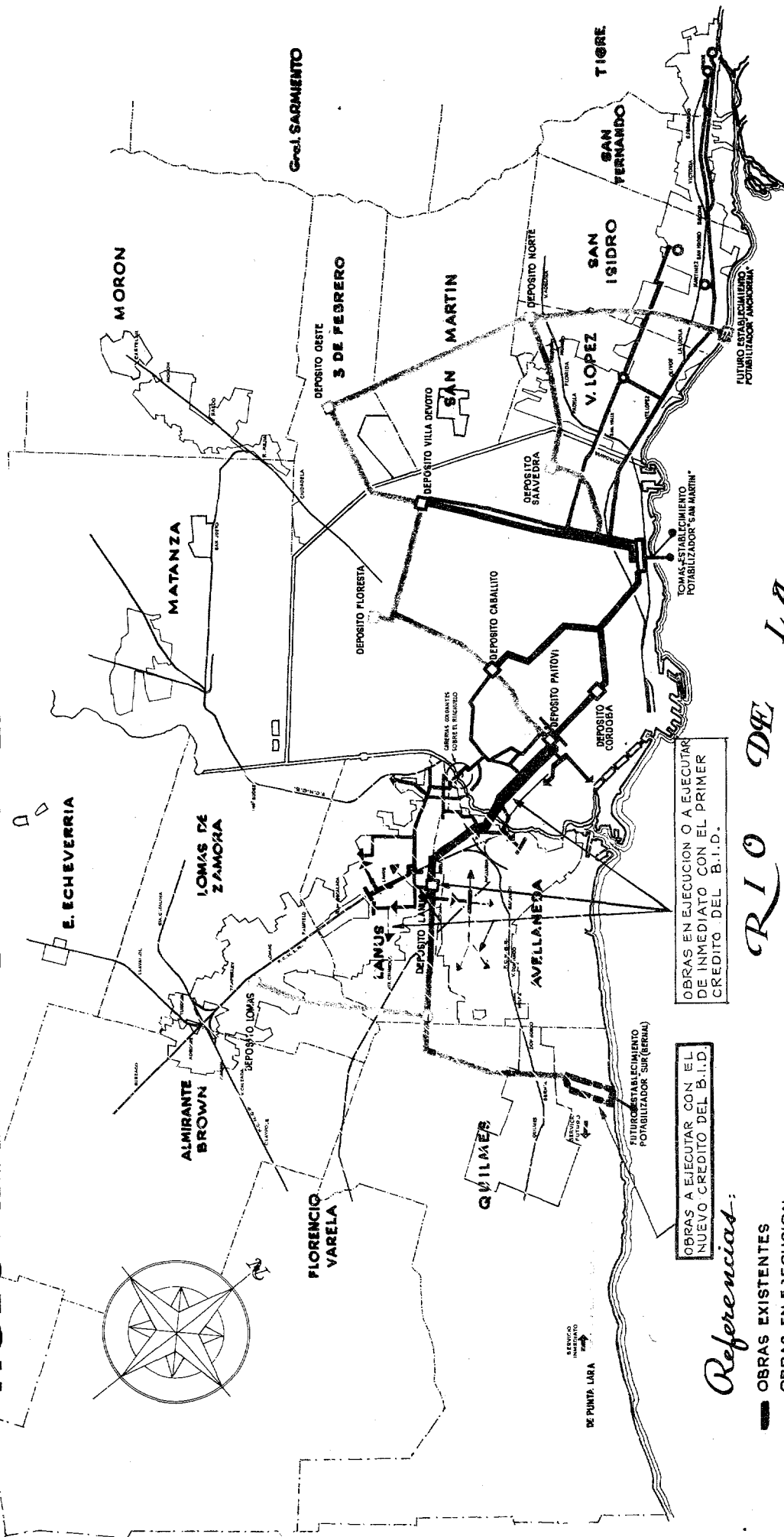
	<u>m³/ month</u>	<u>m³/day</u>
Domestic	208,620	6,954
Commercial	325,810	10,860
Industrial	464,530	15,484
Public	424,360	14,144
	1,423,320	47,442

The unmetered domestic consumption is 284,102 m³/day.

Suministro del **AGLOMERADO BONAERENSE**

PROVISION DE AGUA

*Plan de ampliación de las
 obras básicas*



Referencias:

- OBRAS EXISTENTES
- OBRAS EN EJECUCION
- OBRAS DE EJECUCION INMEDIATA
- OBRAS DE EJECUCION MEDIATA
- TANQUES EN EJECUCION
- ACTUAL RADIO SERVIDO

— ZONAS A ALIMENTAR DIRECTAMENTE CON EL ESTABLECIMIENTO
 POTABILIZADOR BERNAL A FINANCIAR CON EL NUEVO PRESTAMO DEL B.I.D.

OBRAS A EJECUTAR CON EL
 NUEVO CREDITO DEL B.I.D.

OBRAS EN EJECUCION O A EJECUTAR
 DE INMEDIATO CON EL PRIMER
 CREDITO DEL B.I.D.

RIO DE LA PLATA

7. Metering

The number of metered connections is in the order of 2.4%, which is very low.

	<u>Existing Metered Connections</u>	<u>Existing Connections Without Meters</u>	<u>Required Meters to Achieve 80% Metering</u>
Almirante Brown	440	7,800	26,000
Avellaneda	2,460	57,000	12,000
Lanús	1,800	52,000	21,000
L. de Zamora	630	33,000	21,000
Quilmes (1)	no data	no data	20,000
F. Varela	---	---	10,000
TOTAL	5,330	220,000	110,000

- (1) Total number of connections is 45,200, but no data as to metered connections is available.

From the above table it can be seen that approximately 300,000 water meters would be required to achieve an 80% metering which for large cities is considered reasonable.

The installation of water meters reduces the careless use of water and lowers the capita consumption. The City of Philadelphia, for example, with a population of 2,000,000 reduced its per capita consumption from 177 gallons per day in 1955 to 113 gallons per day in 1965 by instituting a leak prevention program and installing 180,000 meters in 1956. This actually resulted in a saving of 128 MGD or enough for a plant half the size of the proposed Bernal Plant.

The cost of the meters and their installation as well as their use and maintenance must also be considered. If the cost of installing meters is assumed to be \$30 per connection, it would require for 200,000 connections an investment of US\$ 6,000,000.

8. The Sub-Project - Bernal Treatment Plant

a) Description

This consists of the construction of a new water treatment plant to provide 1,000,000 m³/day (260 MGD) located at Bernal. The plant will take water from the Rio de La Plata and supply water to Almirante Brown, Avellaneda, Lanús, Lomas de Zamora, Quilmes, and Florencia Varela and indirectly help the city of Buenos Aires and its surroundings by relieving the water plant San Martin from supplying water to the South Sector of Greater Buenos Aires.

OSN has prepared a long range plan to provide water supply to all the communities within a 35 km. radius of the San Martin water treatment plant. An essential part of this plan is the new water treatment plant "Bernal" due to the fact that the great improvements required by the South Sector could not be met by further development of the groundwater.

Consequently 97 hectares of land along the banks of the Rio de La Plata at Bernal were expropriated and engineering work started on the overall plans.

The rapid population growth of this South Sector of Greater Buenos Aires from 960,000 in 1950 to 1,620,000 in 1965 has required immediate action.

b) Design

The improvements have been designed for the estimated population in the year 2,000 as follows:

	<u>Present</u>	<u>Design</u>
Avellaneda	390,000	553,000
Lanús	430,000	684,000
L. de Zamora	286,000	539,000
Almirante Brown	137,000	270,000
Quilmes	331,000	622,000
F. Varela	45,000	
Federal Capital	--	5,000,000
East and North of Greater B. Aires	--	<u>4,242,000</u>
		12,000,000

Where the groundwater developments can be used economically and without endangering the yield of the aquifer or producing poor quality water, they will be incorporated into the system. The major part of the water will be supplied by the San Martín treatment plant and the new plant at Bernal as follows:

	<u>Capacity m3/day</u>	
	<u>First Stage</u>	<u>Ultimate</u>
San Martín treatment plant	3,000,000	4,000,000
Bernal	<u>1,000,000</u>	<u>2,000,000</u>
Total Surface Water	4,000,000	6,000,000
Groundwater	<u>180,000</u>	<u>to be determined</u>
GRAND TOTAL	4,180,000	6,000,000

In addition to this, many industries have their own wells. The majority of water produced will be for human consumption.

Consumption and Requirements South Sector											
Population	Population in 1,000	Supply lpcd	Total 1,000 m3/day	Domestic 1000 m3/day	%	Industrial 1000 m3/day	%	Commercial 1000 m3/day	%	Public 1000 m3/d	%
Present Served	1,077	300	322	279.3	86.8	16.5	51	11.3	3.4	14.8	4.6
Present to be Served	1,619	420	680	577.6	82	47.6	7	27.2	4	34	5
1970 *	1,900	500	950	764.8	80.5	95	10	40.8	4.3	49.4	5.2
2000	2,758	500	1,380	1,120.9	80.5	138	10	59.3	4.3	71.8	5.2

M First stage of Bernal put into service at 1,000,000 m3/day.

c) Costs

The estimated cost of this project is M/N 4,831,000,000 (US\$28,095,000). It will serve a population of 1,900,000.

The per capita cost of the first stage of the plant is M/N 2,542 or US\$ 20.

The additional works for transmission of the water, pumping stations, storage facilities, aqueducts are sized for the future capacity of the plant 2,000,000 m3/day and raise the per capita cost M/N 3,600 or \$21.

The capacity cost is M/N 4,831,000,000 per million cubic meters/day, equivalent to US\$ 108,000 per MGD.

The cost of producing water is estimated at M/N 0.97/m3 or US\$ 0.02 per 1,000 gallons.

The major parts of the project are as follows:

	%	US\$ in millions
Intake works and pumping station	41.4	11.63
Treatment plant and auxiliary works	52.0	14.6
Sulfuric acid and alum plants	6.6	1,865
TOTAL COSTS	100.0%	28.095

The product of the sulfuric acid plant will be used to treat native bauxite to produce alum, the basic chemical used to remove suspended solids and bacteria from the raw water. The borrower states that this is necessary to have an assured source of supply and not be subject to price variations.

The legislation establishing OSN provides for the manufacture of materials required to carry out their functions. The borrower has built and operated similar plants in the past.

d) Detailed Description

The Bernal Water Treatment Plant will be located in an area of 97 hectares in Quilmes and on the banks of the Rio de La Plata.

The ultimate capacity of 2,000,000 m³/day (520 MGD) makes it one of the largest water treatment plants in the Americas. In the table below, it is compared with other plants.

To transmit water from the plant additional works not included in this project are required. These would consist of approximately 13 kilometers of water tunnels to transmit water to the South Sector and to connect with the Paitovi-Lanús tunnel from the San Martín Plant, thus forming a continuous feeder loop.

The Paitovi-Lanús tunnel from San Martín is now under construction and is being financed by OSN with IDB assistance under previous loans 86/TF and 43/SF.

Major Water Systems in U.S. Cities ^{1/}

	<u>Population Served in Millions</u>	<u>Water Consumption GPCD</u>	<u>Plant Production MGD</u>	
Bernal (1970)	1,9	132	260	
Bernal (2000)	2,5	189	520	
Chicago (1964)	4,5	231	1,050	heavy industry
Los Angeles (1964)	2,7	171	446	industry
New York City (1964)	7,8	160	1,250	commerce
Philadelphia (1964)	2,0	113	227	industry

^{1/} Data taken from Engineering News Record August 15, 1965.

The first stage, includes the following:

Intake Tower

This will be hexagonal in shape, constructed on shore, floated into the river, and sunk in place 2,300 meters from the shore. It will be provided with 6 intake ports, screens and shutoff gates, and have an intake capacity of 2,000,000 m³/day.

Underwater Conduit

Consists of precast sections 4.60 meters in diameter floated into the river and sunk into a previously dredged trench.

Junction Chamber

This is a chamber between the underwater conduit and the tunnel. It will have shut-off gates and laminated forms and provide ventilation for the conduits.

Tunnel Conduit

It will be 4.60 meters in diameter and 1,850 meters in length from the junction chamber to the shut-off gate chamber. The gate chamber will permit working in the dry on the suction well for the pumps. It will contain screens and shut-off gates the same as the junction chamber.

Pumping Station

Junction wells for six pumps, each provided with individual shut-off gates, operating room containing motors, control panels, and auxiliary equipment.

These electric motor driven pumps with a capacity of 22,500 m³/hour (97,500 GPM) each will be installed in this stage, and 3 more in the future of the same capacity.

A siphon system will provide water for washing rotating wire-mesh drum screens, 1 cm. openings; 3 units to be installed now, and 3 in the future.

Raw Water Conduits

Two of reinforced concrete, 2.50 meters diameter, with built-in Venturi meters. The meters will have the throats made of stainless steel. These conduits supply water to the treatment plant.

Treatment Plant

Coagulation and Settling

Fourteen basins in two rows of 7 each. Each provided with a compartment for rapid mix and rapid dispersion with adjustable weirs and individual shut-off gates; slow mix chamber with electric motor driven equipment; sludge recirculation by means of pumps. The basins will be cleaned mechanically, being collected transversally on the side and conducted by piping to a drainage sump.

The water from each row of basins flows into a settled water collection channel that leads to the filters, where it is distributed individually by special control devices.

Filtration

There will be 48 filters in 2 batteries of 24 each. Each battery will be in 2 rows of 12 each.

The filters will have Wheeler bottoms, surface wash, supply by means of siphons and weirs, flow regulators, loss-of-head regulators with direct float controlled butterfly valves, and wash water tanks. The wash water tanks will occupy the entire length of the operating gallery.

Filtered Water Conduits

Two each equipped with weir type measuring devices.

Clear Well

This will have a first stage capacity of 280,000 m³.

Pumps

Wash water pumps with a capacity of 1,800 m³/h (780 GPM). General plant service pumps 1,000 m³/h (435 GPM).

Waste water will be removed by a pump with capacity of 3,600 m³/h and a waste conduit 1.80 m. in diameter from a collection sump to the river.

Chemical House

Equipment for receiving, slaking and feeding of lime.

Equipment for storing, transferring and feeding chlorine gas.

Lift pumps and feeders for the coagulants (alum).

Storage, dilution, activation and feeding of sodium silicate.

Storage of sodium chlorite, generators and feeders for chlorine dioxide.

Distribution piping for these chemicals.

Elevated tank for filtered water for general use in the chemical house.

Operators' rooms, laboratories, and auxiliary installations.

Plant for Manufacturing Coagulant

Consists of storage areas for bauxite ore with facilities for crushing and grinding.

Hot air for drying the raw material; blowers, dust collectors, etc.

Silos to form bauxite pellets agitators, feeders and storage.

Chamber of 4 m³ volume to produce aluminum sulfate by a continuous process.

Settling basins to separate the liquid from the suspended solids and later storage in tanks.

The production capacity will be 120 metric tons/day with 18% useful oxides.

Sulfuric Acid Plant

This is a complete installation to produce 60 metric tons per day.

It consists of storage areas for the sulphur reaction chambers.

Acid storage tanks.

Auxiliary Works

There will be a separate building containing a dining room, first aid station, garage, and warehouse.

Administrative offices.

Maintenance shops.

Dressing room and bicycle storage.

4 houses for operators.

Collection system for storm water and sewage.

Pumping station for sewage.

Distribution system for potable water.

Landscaping, paving, sidewalks, and fences.

f) Status of Design

The borrower has submitted general plans for the alum plant, intake tower, conduit, pumping station and water treatment plant layout. Drawings have not been submitted for the proposed sulfuric acid plant.

Soil borings, streamflow data, and water analyses have not been supplied.

To carry out this project detailed construction drawings and complicated equipment lists will have to be prepared.

g) Method of Execution

The work will be done by contract through public bidding. Inspection of the work, and financial technical control including the period for testing and guarantee will be done by the permanent staff of OSN.

The construction time has been estimated at 46 months, but additional time will be required for completion of the engineering plans and specifications as well as for invitation to bid, award and the contracting of the works.

The project costs include 12% for direction and inspection and 5% for contingencies. It is believed that the contingencies should be increased another 5% due to status of design, the long execution time, and the increase in construction costs.

The costs for administration, planning and studies connected with the project are taken care of by the general budget of OSN.

h) Justification and Feasibility

This project is part of an integral plan to improve and extend the water services in the Greater Buenos Aires area (Sanitary District of Buenos Aires). The integral plan is being developed by stages.

The plan will provide adequate water up to the year 2.000 to the provincial part of Greater Buenos Aires by means of two water treatment plants, North and South, (the central plant being the existing San Martín plant of the Federal Capital).

These two proposed plants will be located on the banks of the Rio de La Plata at Bernal and Anchorena respectively. In addition, especially for the Western Zone, groundwater will be used when it is technically and financially advantageous.

At the present time the North Zone, despite occasional local water shortages, does not constitute an immediate problem since it will be strengthened by the expansion of the San Martín plant now under construction.

The West Zone also has adequate local sources which can be supplemented as necessary from the San Martín plant.

The South Zone, comprising Avellaneda, Lanús, Lomas de Zamora, Almirante Brown and Florencia Varela is in difficulty. These areas are supplied chiefly from deep wells with some water from the Federal Capital. Because of the increased rate of extraction the groundwater table is falling and not all the water is fit for consumption due to increasing salinity.

The areas closer to the Federal Capital are being supplied in a precarious manner from the Capital distribution system by means of supply lines put across the Riachuelo, but this does not permit the extension of water supply services to new urban developments. The water tunnel and pumping station Paitovi-Lanús under construction will ameliorate the problem in Avellaneda and Lanús.

However, the rest of this South Zone will still lack water --estimated population of 1,570,000-- of which approximately 1,000,000 have a deficient public water supply and the rest, 570,000 use private wells not always sanitary; public faucets, where they must form long lines; or tank trucks.

ADMINISTRACION GENERAL DE OBRAS SANITARIAS DE LA NACION
SAN MIGUEL DE TUCUMAN
 (PROVINCIA DE TUCUMAN)

ESQUEMA GENERAL DE PROVISION Y DISTRIBUCION DE AGUA

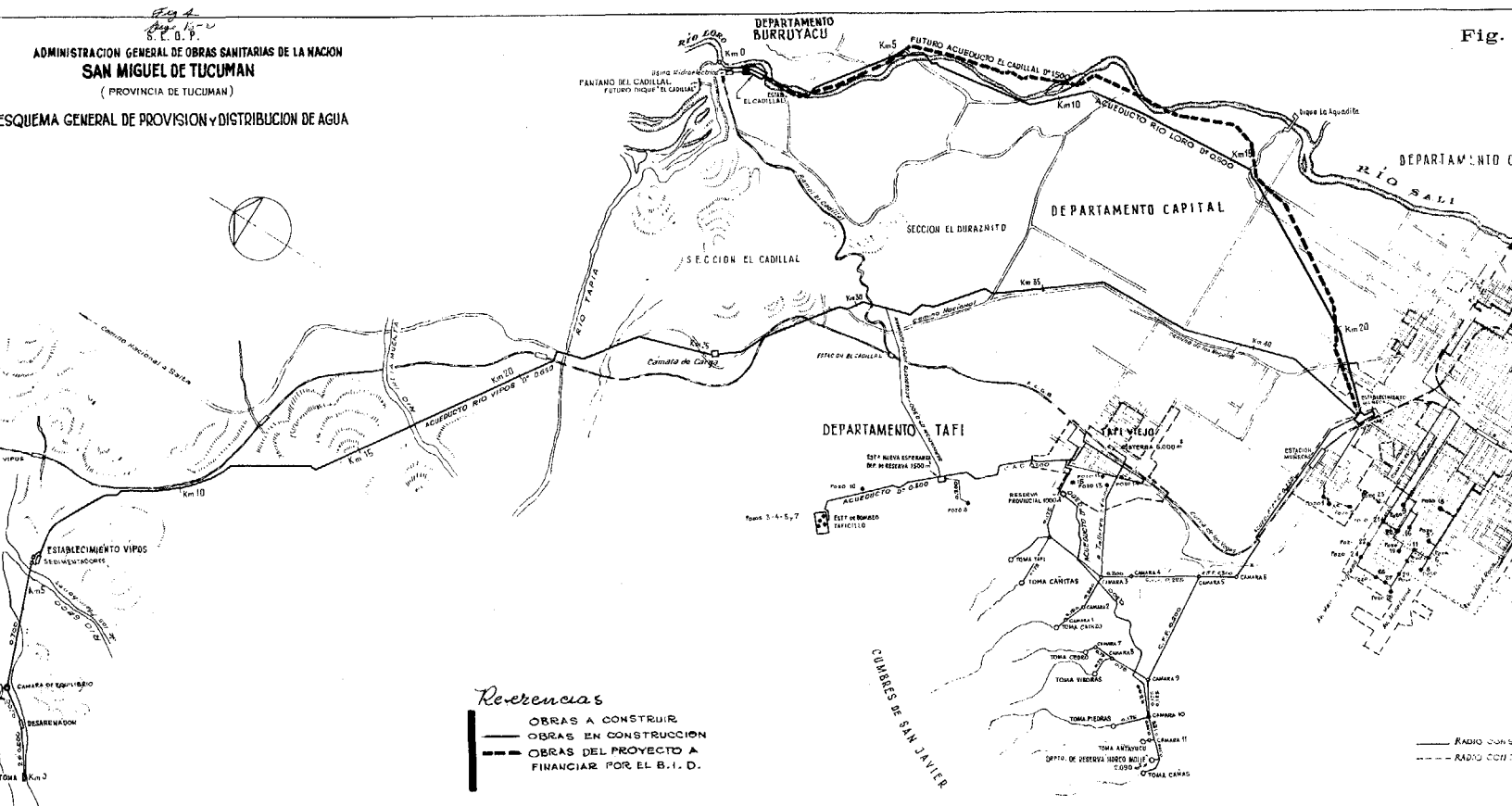


Fig.

B. San Miguel de Tucuman

1. Background

This city is the capital of the province of Tucuman. It is one of the 5 largest cities of the country with a population of 300,000 inhabitants.

It has a hot climate with temperatures rising above 40° C and low temperatures of 4 to 6° C. The average rainfall for the past 5 years was 100 mm. (800 to 1,100 mm. per year).

It is connected by highways and railroads with all the principal cities of the country. It is an important commercial and marketing center for agricultural products, particularly sugar.

The present water system is administered by OSN and comprises several sources: San Javier springs, Rio Loro, Rio Vipo and semi-artesian wells. The total supply is 1,000 lps (22.5 MGD). It is all treated in the Muñecas Treatment Plant by means of coagulation, sedimentation, filtration and chlorination.

The regimen of these unregulated rivers close to the city does not permit adequate use during the dry season without reducing the water available for irrigation and affecting the provincial economy.

At the present time the provincial government is building the "El Caldillal" dam on the Rio Sali which will provide a new source of water, since a flow of 1,500 lps has been allocated for domestic water supply.

This project is part of a program to develop a new source of water and improve the Tucumán water supply system. The program includes an intake located in the tailrace of the "El Caldillal" dam and hydroelectric plant, a raw water conduit, treatment plant, treated water conduit, and improvements to the distribution system.

The project will finance the construction of a water treatment plant with an initial capacity of 1,500 lps and a treated water conduit with a capacity of 3,000 lps. Construction has been started by OSN on the intake works and the raw water conduit.

2. Existing Facilities - Water

The water supply system obtains water from several sources with a maximum capacity of 89,000 m³/day:

Rio Vipo Intake - Circular intake chamber, bar screens, 2 settling tanks, grit chamber.

Rio Loro Intake - Infiltration gallery, direct intake, bar screens.

Rio Sali Intake - Direct intake

San Javier Hills System - 8 infiltration galleries 15 to 20 kms from the city are interconnected and led to the city, providing water for the town of Tafi Viejo enroute.
(These 4 sources provide 75% of the supply).

Groundwater - 22 wells (provide 25% of supply)

The water is conducted by long supply lines to the Muñecas treatment Plant as follows:

From Rio Vip 42 kms of cast iron pipe, 650 mm. diameter, capacity 540 lps.

From Rio Loro, 20 kms. of cast iron pipe 600 mm. diameter.

From San Javier, 5,800 meters of cast iron pipe 450 mm. in diameter.

The Muñecas Treatment Plant with a capacity of 65,000 m³/day has settling basins, rapid and slow sand filters, and storage tanks with a capacity of 54,300 m³. With the exception of the storage tanks, the plant facilities are outmoded and inadequate and their use will be discontinued.

The Distribution System has 38,000 meters of main lines and 537,000 meters of secondary lines. There are 37,000 house connections and 720 metered connections.

The average consumption is 300 liters per person. The system serves 256,000 people and 44,000 are not served. The total consumption is 75,000 m³/day.

3. Existing Facilities - Sewer System

The sewer consists of a collector system and a main discharge line into the Rio Sali. The sewage is untreated.

There are 12,000 connections, 132,000 meters of sewers, 300 mm. to 150 mm. in diameter, of vitrified clay and plain concrete. The main discharge line is 2,100 meters in length.

The maximum capacity of the system is 34,000 m³/day.

4. Operating Conditions

Water System

The present sources of water supply approximately 800 lps which is inadequate to meet the needs of the city.

This supply cannot be increased from the surface sources now used, because they also supply irrigation. Since the river is unregulated the dry weather flow severely limits the amount of water available.

The closest available source of water is from the "El Caldillal" dam now under construction.

Utilization of this source will permit supplying 44,000 people now unserved and a future population of 200,000 people.

Sewer System

The existing system is overloaded and treatment is required. The estimated costs of improvements are \$500,000,000 M/N. These improvements include a new main discharge line, collectors and a treatment plant. It is programmed for 1965/69 as funds are made available to OSN.

Only 112,000 people in an area of 950 Has. are served by the system. The rest of the population (190,000) use private methods of disposal.

5. Actual Income for 1964

M/N <u>Fixed Income</u> (Rates)	M/N <u>Income from Other Sources</u>
117,165,100	13,750,464
89,6%	10,4%

The average income per connection was M/N 3,180 per year which is equivalent to US\$ 1.54 per month.

6. Consumption

The average consumption is 300 liters per person per day. However the unmetered connections (37,000) use 70,893 m³/day or 1,914 m³/connection/day whereas the metered house connections (139) use 177 m³/day or 1,272 m³/connection/day. This means that the unmetered house connections use 50% more water.

7. Meters

The number of metered connections is less than 2%. In a region where water is needed for irrigation a metering program can reduce waste of water significantly. In this case the unmetered house connections use 50% more water than the metered house connections.

The installation of approximately 35,000 meters would be required to produce a significant effect on water consumption.

8. The Sub-Project

a) Description

The supply of water is reduced in the dry season in accordance with the the unregulated flows of the rivers and the demands for irrigation. Furthermore, under the present conditions there are 41,000 people not served by the system.

The nearest reliable source of water is the "El Caldillal" dam to develop hydroelectric power. It is being built by the provincial government. The dam will create a storage reservoir and regulate the flow of the river. This project will take water from the tailrace of the power plant, treat it, and transport it to the city. The tailrace of the power plant is high enough to permit gravity flow to the treatment plant and the city. The project consists of the following works:

Water Treatment Plant:

4 sedimentation basins
 16 rapid sand filters, 84 m² each
 Clear well capacity 500 m³
 Elevated tank 1,000 m³
 Chemical feed house
 Ancillary works
 Capacity first stage 1.500 lps. (35 MGD)
 Capacity second stage - double

Treated Water Conduit:

Prestressed reinforced concrete
 1.50 m. diameter x 21.78 m length
 Capacity 3.000 lps. (70 MGD)

This conduit will bring water from the new plant to the existing Muñecas Plant storage tanks with a capacity of 54,000 m³. The tanks will be maintained in service and the rest of the plant dismantled.

b) Design Bases

The average per capita consumption is taken at 500 lpcd. (132 GPCD). This is considered high and should be reduced, particularly since the majority of water will be for domestic consumption, the local industries having their own sources of water

Consumption in Thousands

<u>Population</u>	<u>Domestic</u>			<u>Industrial</u>		<u>Commercial</u>		<u>Public</u>	
	m ³ /day	m ³ /day	%	m ³ /day	%	m ³ /day	%	m ³ /day	%
Present (300,000)	75	70	94.5	1.5	2	1.5	2	1.1	1.5
1st stage (300,000)	130	120	94.3	5.7	4.4	2.3	1.8	2	1.5
Long range (600,000)	260	239	92	13	5	4.4	1.7	3.4	1.3

c) Costs

This project is part of a program to improve and extend the water supply system now serving 256,000 to 600,000 people. It includes the water treatment plant and the treated water conduit at a cost of US\$ 4.68 million, including 12% for inspection and control and 5% for contingencies. The contingencies should be increased to a total of 10%.

No imported materials are required.

		<u>Thousands</u>	
		<u>M/N</u>	<u>US\$</u>
Intake Structures and Raw Water Conduit (1)	4.28	45,000	262
Water Treatment Plant (capacity 130,000m3/day) (3)	19.05	200,000	1,162
Treated Water Conduit (3)	57.62	605,000	3,520
Improvement of Distribution System (2)	19.05	200,000	1,162
TOTAL COST	100.00	1,050,000	6,106

- (1) In construction by OSN.
 (2) To be financed independently by OSN as required.
 (3) This Sub-Project.

The per capita cost of the overall program is US\$ 24 per person.

The construction cost of this sub-project (capacity 35 MGD, 40 year life of works, including capital cost of M/N 805,000,000 interest and amortization) is 0.68/m3 or 1.5 cents/1,000 gallons. (U.S.)

The operating cost of the first stage is US\$.11.6 cents/1,000 gallons.

Total cost per 1,0000 gallons is US\$.13 cents. This should be the basis for the rates.

Plant Capacity Cost = US\$ 33,300/MGD

<u>Zone</u>	<u>Economic Capacity</u> No. of <u>Inhabitants</u>	<u>1964 Data</u> Monthly Income per Family Unit		
		<u>Less than 15,000</u>	<u>15,000 to 25,000</u>	<u>Over 25,000</u>
Population Served	256,000	24%	65%	11%
Population to be Served	44,000	40%	52%	8%

According to the borrower the new rate system will result in a monthly charge of \$260 M/N per family, living in a modest house recently built, located in an area of low cost housing, for a family earning M/N 15,000 per year. This is equivalent to 6 days wages per year, which is too low.

e) Status of Design

The borrower has presented general plans which must be complemented with detailed construction plans before construction can begin.

Moreover, the specific data as to hydrologic conditions, sub-soil conditions, and water quality required to prepare the final plans has not been submitted.

Since the source of water is from the discharge of a hydro-electric plant the borrower should furnish adequate legal and technical data to demonstrate the reliability and adequacy of the source.

f) Method of Execution

The work will be done by contract through public bidding and the contractor will provide all the materials and equipment necessary.

Inspection and control will be done by OSN personnel in accordance with established practice.

Final design work will be done by the appropriate technical department of OSN.

g) Feasibility and Justification

This project will provide public service to 351,000 people who must now obtain their water from tank trucks, public faucets or private supplies that are in the majority contaminated. The present sources are unreliable and during the dry season the output is reduced requiring rationing in certain areas served by the existing system.

C. San Salvador de Jujuy

1. Background

The city of San Salvador de Jujuy, capital of the province of Jujuy is located in the extreme northwest of the country. The present population is approximately 70,000 people and its annual rate of increase 27.7 per 1,000.

It is 1,200 meters above sea level, has a temperate climate with temperatures ranging from a minimum of 4° to a maximum of 39°C. The average annual rainfall is 1,000 mm. (40").

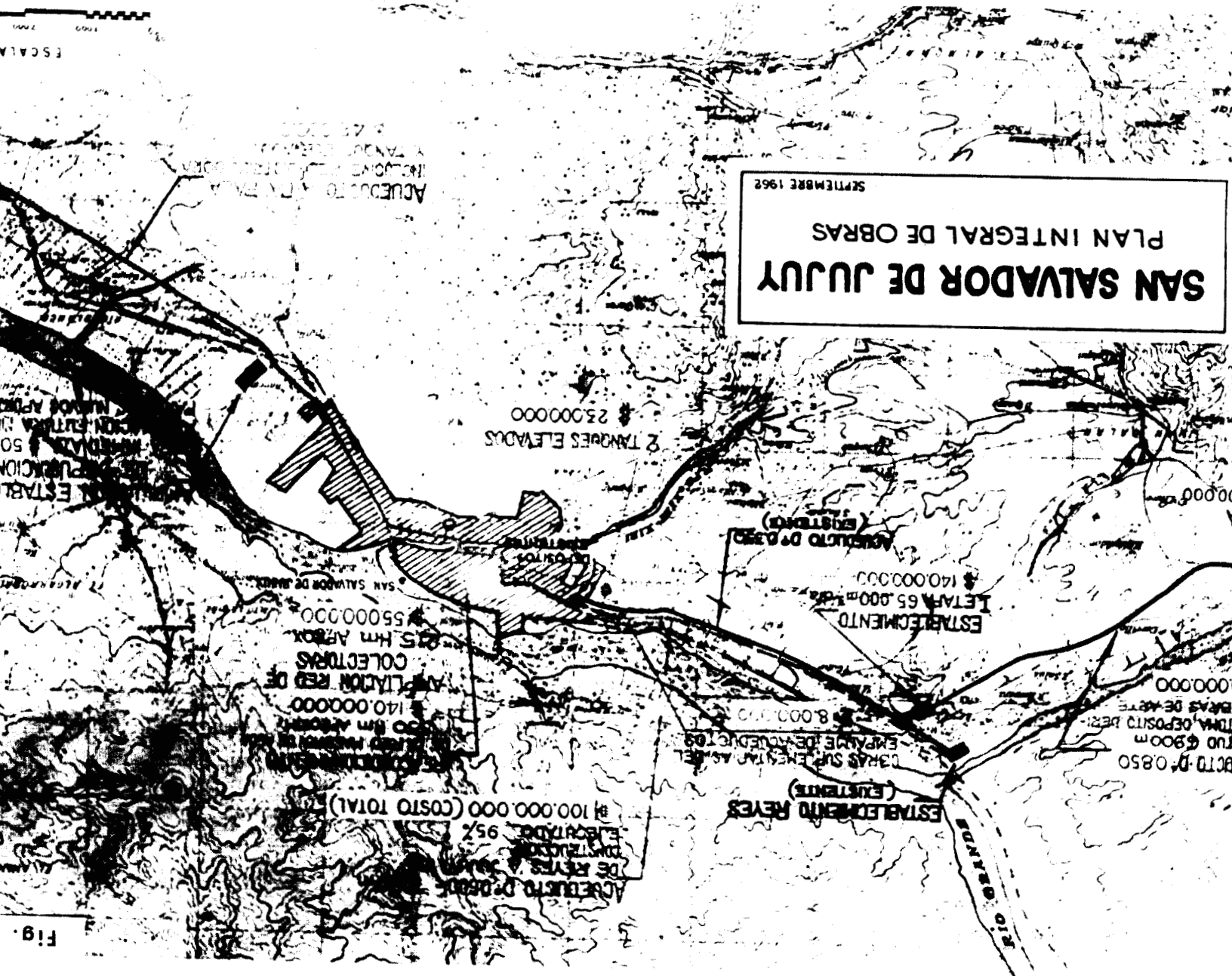
It is the commercial and political center for a mining and agriculture area and certain amount of industries. Two smelters have recently been built in the area.

Approximately 75% of the population is served by the present water supply system.

The system consists of an infiltration gallery and a surface intake in the Rio Reyes, a water treatment plant with coagulation, settling, slow sand filters and chlorination.

The plant is old and of too small a capacity. It is located on the banks of the river in a precarious position. The river bed has been built up by sedimentary deposits until the plant is subject to being washed away. The defensive works that have been built are not adequate to protect the plant in case of flood waters.

Based on extensive studies it has been decided to develop a new source with less turbidity, the Rio Guerrero, and bring the water by gravity to a new treatment plant at a suitable location.



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Cost of the Project

	<u>M/N</u>	<u>\$US(1)</u>	<u>%</u>
Surface Intake in the Rio Guerrero and Desilting Basin	7.000.000	40.000	3.38
Raw Water Conduit from the intake to a new treatment plant 7 kms. in length	60.000.000	348.000	29
New Treatment Plant to produce 65.000 M ³ /day (17 MGD) and pipeline to connect it to the supply lines of the existing distribution system	140.000.000	812.000	67.62
	207.000.000	1.200.000	100%

(1) Rate of exchange 172 = 1 April 1965

The project will benefit the city of Jujuy and the town of Palpata 8 kms away where a steel industry is developing.

The project has a capacity to serve a future population of 140.000.

2. Existing Facilities - Water

The existing system serves a population of 51.500 in Jujuy and 10.000 in Palpata (the total population is 70.000).

Water is supplied from the Rio Reyes by means of an infiltration gallery with a capacity of 5.000 M³/day and by direct intakes from the Rio Reyes and Rio Guerrero. The water is led into ditches 500 meters and 6.700 meters in length respectively and conducted to an existing treatment plant. The surface water flows into a settling tank of 4.000 M³ capacity and then to a head tank where it is combined with water from the infiltration gallery. The plant has a capacity of 36.000 M³/day (9.5 MGD).

The water is chlorinated and then conducted into 2 ground storage tanks, 5.000 M³ capacity each.

The supply line from the plant to the city is 21.000 meters in length, cast iron pipe, and 150 to 300 mm. in diameter.

The distribution network consists of 10.000 meters of main lines and 66.000 meters of secondary lines of 350 mm. to 650 mm. in diameter.

There are 5.500 house connections and only 450 metered connections, of which 280 are metered house connections.

The total consumption is 21.000 M³/day. The average is 340 liters per person per day.

3. Existing Facilities - Sewer System

The sewer system has 2,400 connections serving 28,000 people. (42,000 are not served). Its capacity is 10,000 M³/day.

The collection system consists of 28,000 M of vitrified clay pipe and concrete pipe 150 mm. in diameter.

The trunk sewer is of cast iron, vitrified clay, and concrete pipe of 200 mm. to 500 mm. in diameter and 17,000 meters in length.

45% of the sewage is treated before final discharge.

The treatment plant has a capacity of 4,500 M³/day or 45% of the total flow. It has two settling-digestion tanks (Emscher) of 315 M³ each, 8 trickling filters with a total surface area of 1,650 M², and the effluent is discharged into the rio Guerrero. The sludge is dried on 4 drying beds, 67 M² each. The rest of the sewage flow (55%) is discharged into the river.

4. Operation of the Existing Facilities

Water -

The capacity of the present sources of supply are less than that of the treatment plant. The plant is in an area subject to flooding and river damage and is inadequate to meet the demands. The intake works and supply ditches require constant repair. The required improvements will cost \$ 207,000,000 M/N.

Sewer -

The present plant is too small and needs to be increased in size. The collectors and mains need to be extended. The estimated cost is \$250,000,000 M/N.

5. Sources of Income

In 1964 the income from the system was as follows:

<u>Fixed Income</u>	<u>Income from other sources</u>
(Rates)	(Various Charges)
29.436.400	2.371.034
92%	8%

The average rate per connection was M/N \$495 or US\$ 2.88/month.

The connections are paid by the users who also contribute to finance the water and sewer mains that pass the property.

The meters are supplied by Obras Sanitarias and a rental fee of M/N \$7.00/month is charged.

6. Consumption

The present average consumption is 450 lpcd or 23.000 M³/day.

The unmetered domestic consumption is 19.120 M³ per connection per day; the metered consumption is 1.96 M³ per connection per day which is 30% less.

7. Financing

The existing works were financed with funds from the National Plan for Public Works (Bond Issue) except for the distribution and collection system financed since 1965 with the assistance of the users.

The only debts incurred are those of the Municipality to the National Government for the study and construction of works.

8. The Sub-Project

a. Description

This project is to improve the water supply system of Jujuy, provide adequate water to the community of Palpala and build a new water treatment plant in a safe location. It will improve the service to 61,500 people and provide service to 9,500 people.

The project includes the following

Surface Intake in the Rio Guerrero and a desilting chamber close to the intake.

Raw Water Conduit of reinforced concrete, 7.000 meters long and 700 mm. in diameter. Capacity of 750 lps.

Water Treatment Plant, capacity 65.000 M³/day (17 MGD)

4 rectangular settling basins, 5.000 M³ each, horizontal flow, including mechanical flocculation chambers.

Chemical feed house for receiving, handling, storing and dosing: coagulant, lime, chlorine, ammonia and fluoride.

16 rapid sand filters - 162 M² each

Clear well - 20.000 M³

Effluent Piping - 600 mm. diameter to connect with existing distribution system.

Buildings and ancillary works.

b. Design Basis

The basis for design is 500 liters/capita/day and the following

estimates:

In Thousands of M³/day

Consumption	M ³ /day	M ³ /d	%	M ³ /d	%	M ³ /d	%	M ³ /d	%
Present	23	19.1	83	1.2	5.2	1.2	5.5	1.3	5.7
Immediate	40	31.7	80	3.5	8	2.4	6	2.4	6
Future	65	52.0	80	6.5	10	3.6	5.6	2.9	4.4

c. Costs

The cost per person benefitted is M/N 1.478 (US\$ 8.5)

The cost of construction is M/N \$ 0.15/M³

The cost of operation and maintenance is M/N \$1.53 M³ or US\$ 0.034/1000 gallons.

The cost per MGD is US\$ 71.300.

d. Economic Capacity

The estimate of the amount that families will be charged seems to be quite low.

Monthly Income per Family Unit

		Between		
		Less than	15.000	Over
		15.000	& 25.000	25.000
Population served	51.200	26%	64%	10%
To be served	28.800	45%	49%	6%

Under the new rates, a user with a modest home in a low cost housing zone will pay approximately \$240/month. This is equivalent to \$1.35/month or 4 days wages/year.

e. Status of Design

More complete general plans and some details have been presented for the intake works, supply lines, and water treatment plant. Hydrologic data, soil borings, and water quality analyses have not been submitted. Final plans and specifications and the complementary data are required.

f. Method of Execution

The final plans and specifications will be prepared for the project by the staff of OSN. No imported materials are required.

The works will be done by contracts awarded through public bidding. Inspection and supervision will be done by the staff of OSN. The costs include 15% for supervision and 5% for contingencies.

The amount for contingencies seems low and should be increased to 10%.

g. Feasibility and Justification

This is part of an overall plan to improve and enlarge the water supply service of Jujuy. It will complement the work which has been started on the supply lines between the treatment plants and the first stage of large diameter mains, the estimated cost of which is US\$ 880,000.

A new plant is actually not needed to provide water service since by metering and conservation the per capita consumption can be reduced sufficiently so that additional people can be served. However, due to its location, the existing plant is in danger of being washed away and for this reason a new plant in another location is needed. But the new plant possibly can be of a smaller size than that proposed if more realistic design criteria and water meters are used.

D. Mendoza

1. General Description

The city of Mendoza, is the capital of the province of the same name. Together with the Departments of Godoy Cruz, Guaymallen and Las Horas, makes up Greater Mendoza with a population of 380.000 people, 75% of which is served by the public water supply system.

It is in the western part of the country at the foot of the Andes. The temperature ranges from 36° to 0°C and the average rainfall is quite low, 140 mm/yr (6"). However, being near the Andes, it has access to two large rivers, Rio Blanco and Mendoza which are fed by melting snows. These rivers make possible irrigation in the neighboring zones and other parts of the country.

The region has a good economy based chiefly on the raising of fruit, sheep, and the production of wine. It is the commercial, industrial, and administrative center of the region.

The water and sewer systems for this area are administered as single systems by OSN.

The purpose of the project is to develop a new source of water and provide water treatment facilities to serve a population of 400.000 people and which can be expanded to serve a future population of 800.000 people.

2. Description of Existing Facilities - Water

The water is obtained from surface intakes in the Rio Blanco and Rio Mendoza and brought to 3 treatment plants by means of 2 aqueducts from the Rio Blanco (51 Kms.each) and one from the Rio Mendoza (12 Kms.)

The Alto Godoy Plant provides complete treatment with slow sand filters and has a capacity of 40.000 m³/day. (10.5 MGD) The Benegas Plant (Godoy Cruz) provides slow sand filtration and has a capacity of 15.000 m³/day. (4 MGD) The Portrerillos Plant has complete treatment with rapid sand filters and a design capacity of 100.000 m³/day. (26 MGD)

The water is obtained from two sources as follows:

Surface intakes in the Rio Mendoza and Rio Blanco.

Old Supply Line from the Rio Blanco, 51.900 meters in length, cast iron pipe, 275 and 375 mm in diameter.

New Supply Line from the Rio Blanco, 50.200 meters in length, reinforced concrete, 700 and 900 mm in diameter.

New Supply Line from the Rio Mendoza, 12.500 meters in length, 1.2 meters in diameter.

The water is treated in 3 plants as follows:

Alto Godoy Plant -

Capacity 40.000 m³/day (10.5 MGD)

This plant receives water from the old and new supply lines from the Rio Blanco and from Lujan-La Puntilla as well as from the Avil and Jarallil Canals.

It has mixing basins, 6 settling basins with a total capacity of 14.200 m³, 8 slow sand filters with a total area of 4000 m², 1 rapid sand filter of 670 m², 5 storage tanks with a total capacity of 54.000 m³, and auxiliary buildings and works.

Benegas Plant (Godoy Cruz) -

Receives water from the Portrerillos Plant, from the Rio Mendoza by means of the Jarillal Canal and the new supply line from Rio Blanco supplemented with water from the Lujan-La Puntilla line 1.10 m diameter.

Capacity 15.000 m³/day (4 MGD)

8 slow sand filters, 324 m² area each, ground storage tank of 5.000 m³ capacity and buildings and auxiliary works.

Portrerillos Treatment Plant

Capacity 100.000 m³/day (26 MGD), in the dry season, production is reduced to 9.3 MGD

Diversion dam on Rio Blanco

Desilting chamber of 425 m³ capacity

Conduit to settling basins, 942 meters and 0.70 x 0.55 m.

4 settling basins in series, 40.000 m³ total capacity

14 rapid sand filters, 68 m² each

Underground storage 3.000 m³ from which water is distributed to the Benegas and Alto Cruz Plants

Auxiliary buildings and works

Lujan de Cuyo Settling Works

These are built to take water from Caudal 1 (Nestalla) and 2° Dique Cipolletti and transport them to La Puntilla at the junction of the new Rio Blanco Supply Line and the Lujan-La Puntilla line to go to Benegas and Alto Godoy.

Consist of the following:

Canal 553 meters long, lined with concrete

2 desilting basins, 470 m³ and 490 m³ each

Settled water line from basins, 1130 meters in length and 400 mm in diameter auxiliary works

The distribution system has 17.000 meters of main lines and 581.000 meters of secondary lines, of reinforced concrete, cast iron, and asbestos-cement pipe of 50 mm to 800 mm in diameter.

The water is distributed through 42.400 house connections and 2.060 metered connections (4.6%).

The average consumption of water is 135.000 m³/day by the 300.000 people served. This is equivalent to 450 liters per person per day (119 gpcd).

3. Sewer System

The sewer system has a capacity of 64.000 m³/day.

It has a treatment plant with a settling tank with a surface area of 500 m², two screens and auxiliary works.

The trunk line is 850 mm in diameter and has a total length of 15.800 meters in length.

The collection system is made up of 890.000 meters of cast iron and reinforced concrete pipe.

There are 18.700 connections.

4. Operation of the Facilities

Water Supply.-

The Rio Blanco intake and Portrerillos Plant which produce good quality water are reduced to a production of less than 35.000 m³/day (9.3 MGD) during the dry season because of the reduced flow of the river, which cannot be regulated at this point. This results in serious water shortages during the summer.

The Rio Mendoza, however, has an abundant and uniform flow of good quality water except for a high degree of hardness. Water from this source is treated by means of outmoded works (settling basins and slow sand filters) in the Alto Godoy Plant by means of slow sand filters whose capacity is inadequate to simultaneously treat settled water from Lujan de Cuyo.

In addition, almost 100.000 people are without a public supply.

Sewer system.-

By the existing system, 101.000 people are served, while the rest of the population, 300.000, must use septic tanks, cesspools, and other private methods of disposal. To solve this problem OSN has contracted work on a second main outfall and additional trunk sewers. These improvements will provide adequate service to the present areas and extend it to new areas. The estimated cost of these works is \$ 210.000.000 M/N.

5. Sources of Income

During 1964 the income was as follows:

<u>Fixed Income</u> Rates	<u>Income from Other Sources</u> (Various Charges)
MN\$ 208.500.000 93.3 %	MN 16.002.929 6.7 %

6. Consumption

The average consumption per person is 450 lpcd.

The total consumption of all types is 135.000 m³/day of which only 12.610 m³/day is by 42.400 metered connections and the rest through 2.060 un-metered connections. The consumption by metered connection is as follows:

	<u>No. of</u> <u>Connections</u>	<u>Consumption</u> <u>m³/day</u>
Dwellings	685	1.010
Hotels	81	473
Garages	90	494
Gardens	29	24
Industrial	865	3.177
Public Services	<u>310</u>	<u>7.432</u>
	2.060	12.610

The consumption per metered house connection is 1.475 m³/day while the consumption per unmetered house connection is 2.91 m³/day, approximately twice as much.

7. Financing

The present installations were financed by the issuing of government bonds under the National Public Works Plan, except for the distribution and collection network which from 1955 have been paid by the users.

8. The Sub-Project

a) General Description

The project is to provide an assured amount of good quality water to the Greater Mendoza area. It will improve the service to approximately 300.000 people in an area of 2.600 hectares and provide service to 100.000 people in an area of 8.400 hectares.

The people that lack public service must obtain their water from public faucets, cisterns, shallow wells, and irrigation canals and ditches.

A new source will be developed on the Rio Mendoza and a new treatment plant built at Luján de Cuyo.

The project includes the following:

Intake works at "Cipolletti Dam" on the Rio Mendoza, including a pumping station and desilting chamber.

Raw Water Supply Line from the intake works to the Rio Mendoza Treatment Plant, reinforced concrete pipe, 1.20 and 1.30 meters in diameter, and 3.400 meters long.

Water Treatment Plant, Rio Mendoza-Luján de Cuyo

Capacity 200.000 m³/day (53 MGD) - future, double

Mixing Chamber

4 settling tanks 4000 m³ capacity each

2 batteries of rapid sand filters, total surface area of 1500 m²

Elevated tank 1000 m³ for backwash and general service

Clear Well, 15.000 m³ capacity

Chemical house

Auxiliary buildings

Provision for future water softening equipment

(Engineering drawings are being prepared)

Treated Water Supply Line, La Puntilla-Alto Godoy

Reinforced concrete pipe, 1.10 meters diameter and 9 kms. in length. It is an extension of the recently built line from the site of the proposed plant to "La Puntilla" and will conduct the water to the existing Alto Godoy distribution tanks. From the tanks the water will enter the existing distribution network. The rest of the Alto Godoy Plant will be put out of service due to its inefficiency.

Cost Summary

	In Millions		
	\$US	M/N	%
Intake Works and Supply Line	.505	87	13.7
Water Treatment Plant	2.15	370	58.1
Filtered Water Conduit	<u>1.048</u>	<u>180</u>	<u>28.2</u>
	3.703	637	100

b) Design

The project has been designed on the basis of 500 lpcd and for future populations as follows:

<u>Consumption</u>	<u>M³/d in Thousands</u>									
	<u>Domestic</u>			<u>Industrial</u>		<u>Commercial</u>		<u>Public</u>		
	<u>M³/d</u>	<u>M³/d</u>	<u>%</u>	<u>M³/d</u>	<u>%</u>	<u>M³/d</u>	<u>%</u>	<u>M³/d</u>	<u>%</u>	
Present	135	123	91.4	3.1	2.4	1.	0.7	7.4	5.5	
1st stage ¹	200	182	91.3	5.8	2.9	1.2	0.6	10.4	5.2	
Future ²	400	365	91.2	11.6	3.2	2.4	0.6	20.2	5.	

(1) Population of 400.000 people.

(2) Population of 800.000 people.

If the present consumption is applied to the projected population of 400.000 people, a plant with a capacity of 180.000 m³/day would be required instead of the 200.000 m³/day plant proposed. If metering is done extensively the plant size might be reduced proportionately. (The borrower's data indicates that unmetered domestic connections consume almost twice as much water as metered ones).

c) Costs

The construction cost is M/N 0.22/m³, equivalent to US 8.5 cents/1000 gallons.

The operating cost is M/N 0.74 per m³ equivalent to US 3 cents/1000 gallons. The rate base should be 12 cents/1000 gallons.

The cost per person served is US\$ 9.3 for 400.000 people.

d) Capacity of PaymentMonthly Income per Family Unit

		Between		
		Less than <u>\$15.000</u>	15.000 & <u>25.000</u>	Over <u>25.000</u>
Population Served	300.000	23%	67%	10%
Population to be Served	400.000	40%	54%	6%

The new rate will be approximately \$240 per month for a dwelling unit of economical construction located in a low cost housing zone and is equivalent to 1/3 of a days wages. This rate seems to be too low.

e) Status of Design

General plans and some details have been furnished for all parts of the system. Hydrologic data and soil studies have not been supplied.

Since the source of water will be a dam that will be used for irrigation and possibly other uses, legal evidence as to water rights should be supplied by the borrower.

f) Method of Execution

Final plans and specifications will be prepared by the staff of OSN. The construction will be done by contract through public bidding.

It is estimated that 6 months will be required to prepare the final documents and effect the bidding and that 36 months will be required to complete the construction.

g) Feasibility and Justification

This project is part of an overall plan to improve and extend the water supply services to all of Greater Mendoza with an estimated future population of 800.000. OSN has already begun work on this plan by building a conduit from Luján de Cuyo to La Puntilla which will bring water from the new treatment plant and the first stages of improvement to the distribution system.

It is believed that the development of additional sources of water is justified but on a smaller scale than proposed.

The present sources of water and treatment plants do not provide adequate water throughout the year for the present population and there are close to 100.000 people without service. Two of the existing treatment plants and intake facilities are outmoded and inefficient.

However, the third plant, Portrerillos, has a firm production capacity of 35.000 m³/day, good intake works and adequate transmission lines to the city.

This plant should be maintained in service unless the borrower can justify otherwise and the proposed plant built to the resulting capacity required.

E. Cordoba

1. General Information

The provincial capital of Cordoba is one of the largest cities of Argentina with a population of 600.000.

It is 435 meters above sea level and located in the center of Argentina. It has a temperate climate with temperatures ranging from 41° C to 4° C. The average rainfall is 30" per year.

It has automobile manufacturing and other industries and acts as the commercial center for a great agricultural area.

The water supply is administered by OSN and serves slightly more than 60% of the population. The service cannot be extended because the production facilities are inadequate.

In order to solve this problem a new water treatment plant "Suquia" with a capacity of 2 m²/sec. is being built. Part of the plant has been placed in operation. From this plant, a large conduit, North Feeder has been built. It is of prestressed concrete 1.5 m in diameter and will supply enroute, the communities of Argüello, Villa Belgrano, La Tablada, Cerro de las Rosas y Talleres and improve the service to the High, Central and Low Sectors of Cordoba. Another line (prestressed concrete 1.5 m diameter) has been built to bring raw water from Alto Alberdi to the Suquia Plant. From the plant, another large conduit (reinforced concrete 1.10 m in diameter) to feed the South part of the city, has been built. These works are planned for a population of 700.000 people at 500 lpcd.

The first stage of construction of the main distribution lines has been contracted. It includes the installation of 12.820 m of CIP, prestressed concrete and A-C pipe of 250 mm to 1.00 m in diameter.

The basic documents to carry out the 2nd stage of work to improve the distribution system by force-account have been prepared and require a period of 5 years. It will extend the service to an additional 200.000 people.

2. Description of Existing Facilities - Water

Sources:








The present system uses the following sources:

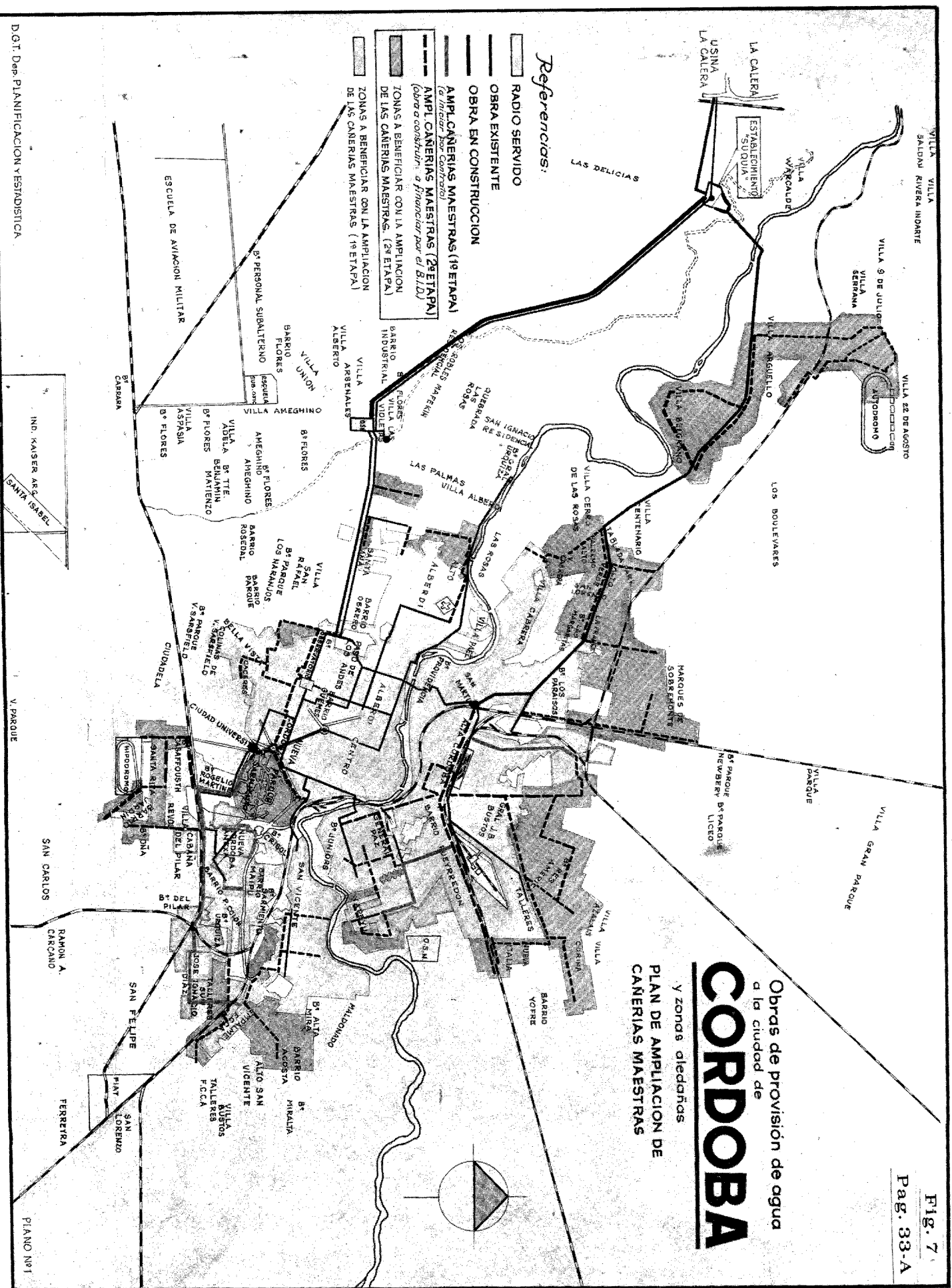
An Old Intake located in the trailrace of the La Calera hydro-electric plant with a capacity of 1.1 m³/sec. From the intake the water is conducted through a tunnel 1.3 m in diameter and 12.000 m in length to the Alto-Alberdi Treatment Plant.

A New Intake located close to the old one with a capacity of 2.2 m³/sec. From there a new tunnel 1.7 x 1.8 x 3.100 meters conducts the water to the new Suquia Plant.

Obras de provisión de agua a la ciudad de **CORDOBA** y zonas aledañas PLAN DE AMPLIACION DE CANERIAS MAESTRAS

Referencias:

-  RADIO SERVIDO
-  OBRA EXISTENTE
-  OBRA EN CONSTRUCCION
-  AMPL. CANERIAS MAESTRAS (19 ETAPA)
(a financiar por el G.O.)
-  AMPL. CANERIAS MAESTRAS (2ª ETAPA)
(obra a construir, a financiar por el G.O.)
-  ZONAS A BENEFICIAR CON LA AMPLIACION DE LAS CANERIAS MAESTRAS. (1ª ETAPA)
-  ZONAS A BENEFICIAR CON LA AMPLIACION DE LAS CANERIAS MAESTRAS. (2ª ETAPA)



An Emergency Intake located on the main South Canal with a capacity of 1.1 m³/sec. It supplies water to the Alto Alberdi Plant.

The old intake has been well maintained and is expected to have a reasonable period of usefulness. The total flow is 4.4 m³/second.

The water is treated in two plants:

Alto Alberdi Treatment Plant -

This plant has a capacity of 172.800 m³/day.

It consists of 9 circular settling tanks with a capacity of 16.400 m³; 26 rapid filters with a total area of 1.332 m² surface area, 2 chemical feeders for adjusting the pH, 6 pumps, 4 ground storage tanks with a capacity of 70.500 m³, 3 elevated tanks with a capacity of 11.400 m³ and one flow meter.

Suquia Treatment Plant -

The first stage of this plant with a capacity of 99.000 m³/day has been completed.

It consists of 8 settling basins with a capacity of 1.700 m³ each, 10 rapid sand filters of 160 m² surface area each, elevated storage tank of 1000 m³ capacity, chemical storage area, and auxiliary structures.

The second stage when completed will raise the capacity to 180.000 m³/day.

Supply Lines

From the Suquia Plant, a line, the "North Feeder" of prestressed concrete 1.50 meters in diameter, capacity 2 m³/second has been built. This line will go to Cordoba and supply enroute the localities of Argüello, Villa Belgrano, La Tablada, Cerro de las Rosas, and Talleres.

A line of prestressed concrete, 1.50 diameters is being built from Suquia Plant to carry additional raw water to the Alto Alberdi Plant.

From the Alto Alberdi Plant a finished water line has been built to improve the supply to the south side of the city. It is of prestressed concrete and 1.10 meters in diameter.

Distribution System

The distribution system consists of main and secondary lines from 400 mm to 600 mm in diameter with a total length of 175.000 meters.

There are 68.600 house connections and 1.120 metered connections of which only 98 are metered house connections.

There are 360.000 people served by the system and 240.000 not served.

Consumption

The average consumption is approximately 145.000 m³/day or 400 liters/person/day.

3. Sewer System

The existing sewer system consists of the following:

Treatment Plant -

- 3 bar screens 3.80 m²
- 1 grit chamber 80 m³ capacity
- 2 grinders
- 1 sedimentation basin, rectangular, 3.766 m³ capacity
- 8 oxidation ponds 20.000 m²
- 20 drying beds
- ancillary works

Trunk Sewers and Mains

11.200 meters in length, 229 mm. to 1.5 meters in diameter.

Collection System and Connections

- 224.000 meters of collector pipes
- 19.600 connections

The existing works have a capacity of 24.000 m³/day.

4. Operating Conditions

Water System -

The existing intake works and treating facilities have a capacity greater than the distribution system.

When the new main lines are installed, the present services can be improved and extended into areas that are not served. An additional 240.000 people will be benefitted.

These improvements will also provide for an additional future population of 100.000.

Sewer System -

The service in the area served is not adequate (983 ha. and 150.000 people) and it is to be extended to the developed areas of the cities. It is planned to enlarge the sewage treatment plant to provide for a population of 600.000.

The unserved population presently uses individual methods of disposal.

5. Sources of Income

The income comes from the payment of rates and various charges.

In 1964 the following occurred:

Fixed Income
(Rates)

M/N 313.740.200

Income from Other Sources
(Miscellaneous)

22.660.747

Considering that the total number of connections was 68.600, the average income per connection was \$380 M/N per month (US\$ 2.20/month).

Also the average consumption of water is 145.000 m³/d, M/N, so the cost per m³ of water is \$ 6/m³ M/N. This is equivalent to US\$ 13.4 cents/1000 gallons.

6. Consumption

The average consumption is 400 lpcd.

However, the data furnished shows that in the case of Cordoba, the metered connections use more water:

	<u>Consumption</u>		
	<u>No. of Connections</u>	<u>Total M³/day</u>	<u>Per M³/day Connection</u>
Metered Houses	98	287	2.93
Unmetered Houses	68.600	134.690	1.96

This may be explained by the fact that meters are installed for the heavy users, who in Cordoba may have gardens, swimming pools, etc.

7. Financing

The existing facilities were financed with Federal funds through the sale of bonds except for the distribution system, which since 1955 has been paid for by the users.

8. The Sub-Project

a) General Description

This project is to install main distribution lines to improve and extend the distribution network and improve the pressure. The estimated cost is M/N 830.000.000 or US\$ 4.830.000.

It consists of the supply and installation of the main distribution lines including transition pieces, gate valves, iron covers and frames, building of masonry junction boxes and chambers.

List of Pipe

	<u>Diameter (m)</u>	<u>Quantity (m)</u>
Prestressed concrete	1.00	6.500
" "	.80	2.130
Cast iron pipe, B & S	.70	400 *
Asbestos cement, Class 5	.60	3.100
" " "	.50	10.300
" " "	.40	18.800
" " "	.30	8.300
" " "	.25	10.000
" " "	.20	14.500
" " "	.15	3.300
" " "	.10	560

* The borrower has indicated that the value of this material is \$ 8.600.000 M/N or US\$ 50.000.

b) Basis for Design

The design is based on a per capita consumption of 500 lpcd:

	<u>M³/day in Thousands</u>								
	<u>Domestic</u>			<u>Industrial</u>		<u>Commercial</u>		<u>Public</u>	
	<u>M³/d</u>	<u>M³/d</u>	<u>%</u>	<u>M³/d</u>	<u>%</u>	<u>M³/d</u>	<u>%</u>	<u>M³/d</u>	<u>%</u>
Actual	145	134.7	93	3.2	2.2	3.7	2.5	3.4	2.3
Immediate Future(1)	270	245.7	91	12.1	4.5	6.2	2.3	5.9	2.2
Future(2)	360	327.2	90.9	17.3	4.8	7.9	2.2	7.6	2.1

- (1) Basic production facilities built
- (2) Includes additional settling basins and filters for Suquia Treatment Plant.

c) Costs

The cost of this sub-project is US\$ 4.825.000. This represents an investment of \$US 14.2 per capita for the present population served.

This sub-project and the other works of the overall plan intake, supply lines, treatment plant, distribution mains, represent a total investment of US\$ 23.2 per capita for the present population served.

d) Economic CapacityMonthly Income per Family Unit

	<u>No. of People</u>	<u>Less than 15.000</u>	<u>Between 15.000 and 25.000</u>	<u>Less than 25.000</u>
Population served	360.000	22	68	10
Population to be Served	240.000	38	57	5

For a modest home in a low cost residential area the monthly rate is M/N 324 (\$1.88) which is equivalent to 6 days wages per year.

e) Status of Design

Plans and details adequate to execute the project by administration have been presented. A list of materials including labor and transportation has been supplied. There will be problems due to other underground utilities, maintaining adequate service when connecting existing mains to the new mains, and traffic.

No imported materials will be required except for some cast-iron pipe (700 mm diameter) which has been in stock for several years. This pipe was purchased in France and is valued at \$ 50.000 by the borrower.

f) Method of Execution

The project will be done by the permanent staff of the construction department of OSN with its own equipment.

Because of this, the budget includes 20% for inspection and direction as well as 5% for contingencies. It is recommended that the contingencies be increased to 10%.

g) Feasibility and Justification

This sub-project complements an expansion and improvement program for the water supply system of Cordoba already contracted. It will provide improved distribution facilities for the increased supply of water and improve pressure in the city.

III Observations

A. Status of Design

General and preliminary plans have been presented for the proposed works in the different cities. Complementary information as to soil conditions, which is very important for the large structures planned, has not been furnished. The soil conditions are an important factor in determining the type of structure and method of construction and thus the cost of the projects.

Adequate hydrological data to demonstrate the reliability of the sources and the quality of the water has not been included in the data presented. The projects cannot be prepared in final form until the source is proven. As has been mentioned in the case of Mendoza, a water treatment plant was built with a capacity of 100,000 M³/day at a location where the river flow is reduced to 35,000 M³/day in the dry season and in order to meet this deficiency, the borrower built another plant at a location where storage was available.

In every city except Cordoba the sub-projects include intakes, supply lines, water treatment plants and auxiliary buildings. In order to build such works detailed plans for the installation of mechanical and electrical equipment as well as construction drawings must be prepared. These 4 plants range in size from 17 MGD to 260 MGD which are large plants. (The Bernal Plant alone will serve 2,000,000 people).

Consequently, all the sources of water, design bases, and plans and specifications, should be reviewed by a consulting engineering firm with successful experience in the design and construction of plants of this magnitude. The number of firms with such experience is limited. However, experienced design will effect considerable savings in the cost.

The intake works for the Bernal Plant require another specialized type of knowledge, a firm specializing in this type of work is needed to review and approve the proposed design and construction methods.

In addition, facilities to manufacture sulfuric acid and bauxite will be built in conjunction with the Bernal Plant. The plans submitted are limited to general layout plans and detailed plans are needed, also requiring specialized consulting services for review and approval.

OSN states that their technical department will complete the necessary plans within a few months, but in some cases will permit the contractor to present his own design for the project to be built. The latter is not desirable and is against bank policy. The borrower should prepare the designs and specifications adequate for public bidding.

To evaluate the contractors bids and equipment to be supplied, extensive experience in heavy construction, chemical processes, and specialized equipment is required and the services of a qualified consulting firm would be useful here also.

For the Cordoba sub-project, consisting of improvements to the distribution system, location plans and details of major connection have been presented as well as a complete budget showing excavation, transportation, labor, materials, backfill and repaving costs. In work of this type there are problems such as interference of other underground utilities, interference with traffic, and providing uninterrupted service to the public during the interconnecting of the new mains to the old mains and distribution network. In this case, OSN proposed to do the work with its own staff, which is satisfactory.

B. Metering and Consumption

The practice has been to install meters principally for industrial, commercial and public users and occasionally for heavy domestic users. The number of metered services in this project is approximately 2%. The design figures are 500 lpcd (132 gallons per capita per day) and the consumption figures are among the highest in South America and even exceed those of Philadelphia and other cities.

Consumption in Gallons per Capita per Day

	<u>1960</u>	<u>1964</u>	
Chicago	233	231	Obtained from August 15, Engineering News Record
Los Angeles	186	171	
New York City	157	160	
Oklahoma	92	94	
Philadelphia	164	113	"
Detroit	151	-	Obtained from American Waterworks Association - "A Survey of Operating Data for Waterworks", 1960
San Francisco	111	-	
Cleveland	162	-	

Chicago, Los Angeles, Philadelphia, and Cleveland are all more heavily industrialized than New York City and require more water. However, the data available shows that from 1960 to 1964 the per capita consumption decreased for the first 3 cities due to leak control programs and metering. The most remarkable decrease is for Philadelphia where a huge metering program was carried out.

In general, the data furnished by the borrower, indicates that unmetered connections consume 30 to 50% more water and that the overall average consumption is actually 300 to 400 liters per person per day (80 to 105 GPCD). Consequently, more realistic design consumption should be adopted and metering programs should be initiated in the cities included in this project.

At the present time Buenos Aires has a large reserve available from the Río de La Plata but the other cities are not so fortunate. In every sub-project, new sources of water are being developed and large diameter mains are being installed. These other cities are located in areas where large quantities of water are required for other uses such as irrigation and the supply of water is limited. Unless a conservative policy for water consumption is adopted, there will be a constant deficiency of supply and costly expansion program. Eventually even Buenos Aires must control its consumption.

C. Rates

The rate structure is based on property evaluation and, in a few cases, the use of meters. The charges for sewer services are proportional to the water charges and included in the billing.

The rates may be readjusted to meet the variation in the costs "explota ion". The rates and their readjustments are prepared by OSN and subject to approval of the Executive Power.

The property evaluation rates are derived from the size of the lots, area and age of the buildings, and relative value as determined by OSN. They take into consideration socio-economic factors and could be readjusted to produce desired revenues. The property owners are billed for the water and they in turn include this charge in the rent. However, there are several problems:

The great amount of work required to obtain and process the necessary data for the existing and new consumers. The previous date for compiling this data has already been extended twice to January 1967, although the legislation provides for contracting of the required professional services.

The difficulty of preventing wasteful use of water and discovering losses from leakage.

The consumer is not directly charged for the water and when rates are raised, the property owners will tend to raise the rents.

The metering rates are derived from the actual consumption and the type of use; i.e., domestic, industrial, commercial and various. OSN may install meters for domestic users, but the installation of meters for other types of use is compulsory and at the owner's expense.

These rates are applied when the meter readings are in excess of the minimum consumption permitted by the property valuation rates. A table of rates is shown at the end of the report.

The proposed charges are considered too low and should be readjusted within a reasonable period of time. In order to do this with the existing legislation the property studies must be greatly accelerated.

IV Conclusions:

The project engineer concludes the following:

1. The intention indicated by OSN to reduce its operating functions and concentrate on providing policy, planning, and advisory services is advisable. It will require the development of local responsibility to operate and maintain the systems and permit OSN to devote more attention to problems on a national level. A management study should be made to assist OSN in developing this concept.
2. The design criteria of 500 liters per capita is too high and results in large structures at corresponding costs. A reduction to a reasonable figure similar to that used in other Latin American countries would save on storage and plant facilities.
3. In areas where the supply of water is limited, evidence of legal rights to certain of the sources is needed. Adequate hydrologic data as to the availability and quality of water is also required to substantiate the designs.
4. The present consumption of water although less than 500 lpcd is excessive. It is due to the inadequate rate system and the lack of water meters. If the rates are properly established to pay for the actual costs of service then the quantity of water consumed can be reduced.

An addition to this provision must be made for metering, especially in the areas where there is competition for a limited source of water.

5. The tariff system proposed will require time and expense to be put into effect. It needs to be revised and technical assistance to do so would be helpful.
6. The execution of the Cordoba sub-project by administration is justified. Careful cost controls should be applied.
7. The intake works proposed for the Bernal Water Treatment Plant need to be carefully reviewed as to design and construction methods. The final designs for the sulfuric acid plant and the alum plant require careful attention for the adequacy of design criteria and specifications. Since the project includes 4 water treatment plants of varying sizes, it may be possible to simplify the designs so that standard equipment will be used and thus savings in design, materials, and spare parts effected.

A consulting engineer firm acting for the Bank to review and approve plan specifications, etc. and to assist the OSN in the execution of the project is required.

V Recommendations

The project engineer recommends:

1. That OSN have a management study made of the Greater Buenos Aires Water and Sewer System since it has indicated it intends to follow a policy of decentralizing its operations. It would be paid from loan resources.
2. That for Greater Buenos Aires a comparative study of the feasibility of the use of water meters and the proposed rate system based on property values be made. The purpose of the study would be to determine the most adequate program for obtaining revenue from the system and conserve water. It would be paid from loan resources.
3. That for the cities of Jujuy, Tucuman, Mendoza and Córdoba, a water metering program should be established with a goal of metering 80% for domestic and 100% for other uses. This program ~~should be~~ completed during the execution of the project. To facilitate the metering program a revolving fund should be established from loan resources. Within 6 months of signing the loan agreement, the borrower should present a program for meter installation satisfactory to the Bank.
4. That in order to establish the amount of the OSN contribution for the Córdoba projects, the borrower should submit a complete inventory of pipe in existence, present value, and information as to its origin.
5. That legal documents demonstrating the right of OSN to receive adequate amounts of water for the life of the system be supplied to the Bank prior to the approval and disbursement of funds for each sub-project.
6. That the execution of the Córdoba project by administration be approved subject to proper cost controls.
7. That the borrower supply hydrologic and chemical data to demonstrate the reliability and adequate quality of the sources to the satisfaction of the Bank.
8. That a consulting engineering firm be employed to act for the Bank as project engineers. The firm will review and approve within criteria established by the Bank sources of water, soil studies, design criteria, plans and specifications, unit costs, budgets, proposed construction methods, requests for bids, purchases, award of construction contracts and other technical and financial matters pertaining to the project. This will be paid from loan resources.
9. That prior to the disbursal of funds for the construction of any sub-project, the consulting firm must have been hired, and the approval of the Bank given for that sub-project.
10. That rate structures satisfactory to the Bank must be established to cover the costs of operation, maintenance, depreciation and service of the loan within 18 months after the date of first disbursement. These rates should be in full effect by the time construction of each sub-project is completed.

Figure 8Summary of Rate Structure

The new rates are based on the size of lots, built-up area, and its relative value or the consumption as measured by meters.

The rates may be readjusted annually to meet the variations in the costs of "explotación". The rates and their readjustments are proposed by OSN for the approval of the Executive Power.

A. Property Evaluation

1. The general monthly rates are as follows:

	<u>Water</u> <u>M\$N per M²</u>	<u>Sanitary</u> <u>Sewer</u> <u>M\$N per M²</u>	<u>Storm</u> <u>Sewer</u> <u>M\$N per M²</u>
Lot	0.20	0.10	0.05
Built-up area	2.00	1.00	0.50

2. These unit charges are applied to the respective areas and the sum multiplied by E, below to determine the total charges:

<u>Coefficient E</u>	<u>Age of Building</u>					
	<u>Prior</u> <u>to</u> <u>1923</u>	<u>1923</u> <u>to</u> <u>1932</u>	<u>1933</u> <u>to</u> <u>1941</u>	<u>1942</u> <u>to</u> <u>1952</u>	<u>1953</u> <u>to</u> <u>1962</u>	<u>1963</u> <u>to</u> <u>1970</u>
<u>Type of building</u>						
Luxurious	1.55	1.62	1.68	1.75	1.82	1.90
Very Good	1.40	1.47	1.52	1.58	1.65	1.72
Good	1.19	1.25	1.29	1.34	1.40	1.46
Good, Economical	1.02	1.07	1.10	1.15	1.20	1.25
Economical	0.85	0.89	0.92	0.96	1.00	1.04
Very Economical	0.62	0.64	0.66	0.70	0.72	0.75

3. This product is further modified by another coefficient "Z" determined by the location of the property and value of the land. This factor is to be determined by OSN and will range from 0.5 to 1.5.

In order to annually adjust the rates to pay the "explotación" there will be applied another coefficient "K" which OSN will determine and propose to the Executive Power for approval.

Consequently the rate charge is as follows:

$$\frac{((\text{Water Charge} + \text{Sewer Charge} + \text{Sewer Charge}) \text{ Area of Building} + (\text{Water Charge} + \text{Sewer Charge} + \text{Sewer Charge}) \text{ Area of Lot})}{\text{EZK}} = \text{Monthly Rate}$$

B. Metering

OSN can install meters as needed to charge for its services.

The installation of meters for commercial, industrial and similar establishments is compulsory and is done by the owner.

1. For determining the charges the properties are classified as follows:

Category A - General - where water is used for drinking and hygiene such as: homes, offices, hospitals, schools, persons, libraries, museums, etc.

Category B - Commercial

Class I - Establishments where water is used for drinking and hygiene.

Class II - Establishments where water is basic to the processing.

Class III - Establishments where water is a part of the product.

Category C - Special - Uses not included under A and B or where no correlation can be established between the area, water consumption, or disposal of waste water.

Class I - Where all the water goes to sewers.

Class II - Where none of the water or a small part goes to the sewers.

2. For categories A and B the following consumption is used:

<u>Built-up Area</u>	<u>Basic Monthly Consumption</u>
Up to 250 M ²	.300 M ³ per M ² of building (75 M ³)
251 to 500 M ²	75 M ³ + 0.275 M ³ per M ² of building over 250 (144 M ³)
501 to 750 M ²	144 M ³ + 0.275 M ³ per M ² of building over 500 (206 M ³)
751 to 1000 M ²	206 M ³ + 0.225 M ³ per M ² of building over 750 (262 M ³)
More than 1000 M ²	262 M ³ + 0.200 M ³ per M ² of building over 1000 -

For buildings less than 50 M² the basic monthly consumption is 15 M³.

For buildings in Category C there is no minimum consumption.

3. The following charges are applied to each class:

<u>Category</u>	<u>Class</u>	<u>Price per M³ excess</u>	<u>Price per M³ registered</u>
A	-	6.00	--
B	1	8.00	--
B	11	10.00	--
B	111	15.00	--
C	1a(Sanitary Sewer)	-	8.00
C	1b(Storm Sewer)	-	7.30
C	11a(Sanitary Sewer)	-	6.70
C	11b(Storm Sewer)	-	6.00

Note: The cost per M³ of excess ranges from US\$.13 to .325 per 1000 gallons.

For Categories A and B if the consumption by meter is less than the basic monthly consumption the charges are

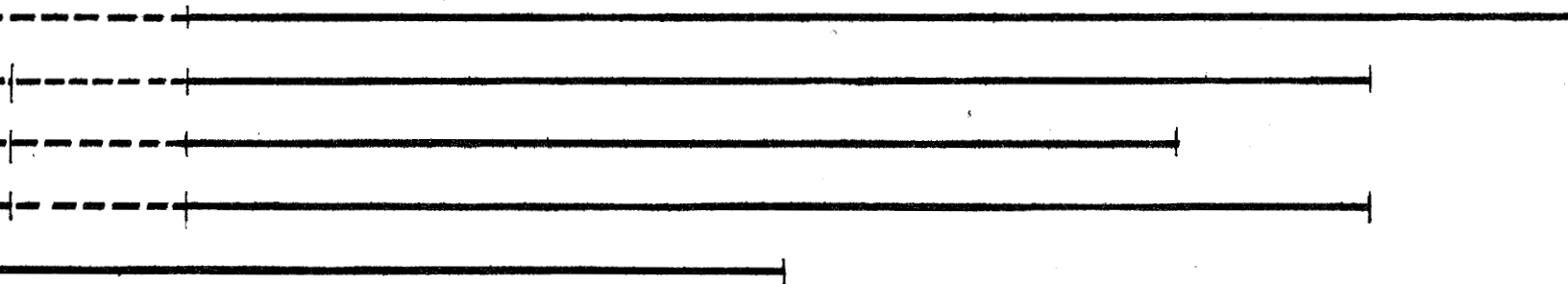
those for unmetered connections. If the meter reading exceeds the minimum consumption the charges are in accordance with the above table.

For Category C the charges are those based on the meter readings and on area and property values.

Sewer charges for A and B are in accordance with the area and property values; and for C, in accordance with the area of the property.

C O N S O L I D A T E D W O R K S C H E D U L E

8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54
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of studies and preparation of projects

of budget and bid documents

ed for invitation to bid, award of bids, and signing of contract

construction