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PROJECT REPORT

COLOMBIA

PROJECT FOR THE REGULATION OF THE CAUCA RIVER IN SALVAJINA

(CO0133)

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COLOMBIA

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ACRONYMS

CVC	Corporación Autónoma Regional del Cauca
OECF	Fondo de Cooperación Económica a Ultramar (Japón)
ISA	Interconexión Eléctrica, S.A.
CHIDRAL	Central Hidroeléctrica del Alto Anchicayá
EMCALI	Empresa de Servicios Municipales de Cali
CORELCA	Corporación Eléctrica de la Costa Atlántica
CONPES	Consejo Nacional de Política Económica y Social
INGETEC	Colombian Consulting Firm
ICEL	Instituto Colombiano de Energía Eléctrica
EEEB	Empresa de Energía Eléctrica de Bogotá
EPM	Empresas Públicas de Medellín
DNP	Departamento Nacional de Planeación
CHEC	Central Hidroeléctrica de Caldas

EXCHANGE RATE

41 Colombian pesos = 1US\$

EQUIVALENTS

kw =	Kilowatt	= 1,000 watts
MW =	Megawatt	= 1,000 kilowatts
KWh =	Kilowatt-hour	= 1,000 watt-hours
MWh =	Megawatt-hour	= 1,000 kilowatt-hours
GWh =	Gigawatt-hour	= 1,000 MWh
V =	Volt	
kv =	Kilovolt	
VA =	Volt-ampere	
KVA =	Kilovolt-ampere	= 1,000 volt-amperes
Km =	Kilometer	= 0.6214 miles
Km ² =	Square kilometer	= 0.386 square miles

TERMINOLOGY OF ECONOMIC ANALYSIS

CC =	Common cost
SA =	Agricultural subproject
SH =	Hydroelectric subproject
B =	Benefits
Ys =	Net income without the project
Yc =	Net income with the project

COLOMBIA

PROJECT FOR REGULATION OF THE CAUCA RIVER IN SALVAJINA

I. INTRODUCTION

A. Background

- 1.01 In 1968 the Bank granted the Corporación Autónoma Regional del Cauca (CVC) and the Compañía Central Hidroeléctrica del Río Anchicayá (CHIDRAL), as co-borrowers, Loans 175/SF-CO for US\$43.3 million and 13/CD-CO for the equivalent of US\$15.5 million to build the Alto Anchicayá Dam, the hydroelectric works necessary to generate 340,000 KW and the transmission lines and substations required for interconnection of the system. The total project cost was estimated at the equivalent of US\$88.5 million, the CVC served as executing agency for the works and CHIDRAL was responsible for operation of the hydroelectric plant. The project analyzed in this document calls for construction of a dam with technical characteristics similar to those of Alto Anchicayá. It would permit hydroelectric generation in addition to flood control in the Cauca Valley and maintain low-water flow to ease river pollution.
- 1.02 The Government of Colombia, through the CVC, has negotiated some of the financing required for the project with the Japanese Government through the Overseas Economic Cooperation Fund (OECF). The loan would be for a fixed amount of 12.3 billion yen, approximately US\$55.9 million, at the exchange rate of 220 yen per US\$1.
- 1.03 The OECF loan would be used basically for construction of civil works. Countries eligible for procurement would be members of the Organization for Economic Cooperation and Development (OECD) and the developing countries indicated in the memorandum of understanding on unification of bilateral development loans, which includes all regional members of the Bank.

B. Application

- 1.04 In January 1977 the CVC explored the Bank's interest in financing a project to regulate the Cauca River. Following completion of the studies it presented a loan application on July 5, 1979, in the amount of US\$35.5 million, through a letter from the CVC Executive Director explaining the preliminary negotiation with the OECF of Japan and proposing the packages to be financed by the two agencies.

C. Priority

- 1.05 The Government of Colombia, through the Departamento Nacional de Planeación, assigns high priority to the project, as stated to the Bank in official communications dated November 18, 1977, and August 8, 1978. In addition, the Ministry of Finance and Public Credit, through Resolution 01891 of February 28, 1979, authorized the CVC to contract the loan cited with the OECF and other external long-term loans for up to the amount of US\$59 million.

D. Missions

- 1.06 In May 1977 the Bank sent an orientation mission consisting of specialists in energy, agriculture and irrigation to review available information and determine the status of preparation of the proposed project. At that time it was decided that conception of the project was adequate from the technical standpoint. However, since the Cauca Valley has one of the greatest agricultural potentials in Latin America, the extent of protection proposed against flooding at a recurrence interval of 10 years (probability 1:10 annually) was found to be insufficient.
- 1.07 In September 1977 a special technical mission was sent, supported by two consultants in hydraulic resources, to decide with the CVC on an adequate degree of protection for the plain. This protection, in addition to providing protection against flood damage, should encourage increased productivity in the protected areas. Various alternatives and combinations of dike designs, dam height, supplementary impoundment downriver and operation of the Salvajina Dam to obtain greater protection were studied. Alternatives were proposed to the CVC and its consultants with a view to protecting against flood tides recurring every 20 years (probability 1:20 annually).
- 1.08 In May 1979 a special mission was sent to Colombia to participate in technical consultations with the OECF and CVC mission. At that time it was decided to divide the project into two groups of works: a) the dam and hydroelectric installations at Salvajina, which is the project studied in this document, and b) protection for the plain consisting of various independent systems each composed of dikes protecting against flooding of the Cauca and its tributaries, drainage canals, interceptor canals, pumping stations and supplementary works. These would be executed in a later stage.
- 1.09 From August 1 to 15, 1979, an analysis mission studied in the field the technical, financial, economic and institutional aspects of the project to be built by stages, compiling the basic information required for analysis.

E. Conclusions

- 1.10 This report is the result of the work of the project committee that analyzed information presented by the CVC on the Salvajina dam and hydroelectric works to be built during the first phase of the project, within the framework for multiple-use regulation of the Cauca River. The recommendations contained in this document have been accepted by the CVC authorities, and it is believed that the operation presented here, for a total equivalent to US\$242.5 million, of which the Bank would finance US\$44 million, is feasible from the technical, economic, legal and financial standpoints.

II. FRAME OF REFERENCE

A. General Situation of Colombia's Economy

- 2.01 1978 was a good year for the Colombian economy. The real growth rate of the gross domestic product (GDP) was 7.9%, which was the highest in the last 20 years. During the period from 1974 through 1977, it grew at an average rate of 4.8%. The change was due to a significant recovery in agricultural production, favorable industrial development and the high level of coffee exports. Preliminary estimates show that the pace of economic activity has held steady during 1979 and the growth in the GDP is expected to be similar to that of the previous year.
- 2.02 The industrial sector, which generates one-fifth of the GDP, grew by 8.9% in 1978 and was the most dynamic of the productive sectors. Sales of industrial products abroad reached 22% of total exports. The mining sector, whose share in the GDP is small, dropped by 4% in 1978; thus the downward trend noted since 1971 continued. Mining of crude oil dropped to 4.8% and estimates are that the deficit for the external balance for hydrocarbons is on the order of some 100 million dollars. The Government has stepped up its programs in hydrocarbon and carbon exploration and has increased hydroelectric investments in order to replace oil with other sources of energy.
- 2.03 The construction sector, which in 1975 and 1976 experienced a real decline, began to recover in 1977 and grew by around 7% in 1978 as a result of building activities in urban zones. Other productive sectors such as transportation and business also grew faster in 1978 than during the 1974-77 period.
- 2.04 The agricultural sector had a real growth rate of 6.8% in 1978, which contrasts with the 1974-77 period, when it expanded at an average annual rate of 4.1%. Despite its declining share in the GDP, it still generates 24% of the GDP and continues to be very important to the Colombian economy because it employs 30% of the economically active population. Its exports generate 70% of the foreign exchange that enters the country. Coffee production increased by 5.4% in 1978, and climbed to around 10 million 60-kg. sacks. Production of the majority of the other crops was favored by the good weather conditions and stimulated by the increase in relative prices. Livestock, which represent 35% of the agricultural product, was also favored by the increase in domestic prices.
- 2.05 The development over recent decades shows that the sector is characterized by an efficient entrepreneurial agriculture and a traditional agriculture exploited in rudimentary form where the poorest people in the rural sector are to be found. The first situation is noted especially in the Cauca Valley, where commercial agriculture has developed, and has been exploited in an entrepreneurial fashion, with intensive use of capital and machinery. This has meant that the production costs for most of the crops are substantially less than the country's average production costs.

- 2.06 As for the GDP, the Central Government's cash revenues increased from 8% in 1974 to 9.3% the following year, and gradually dropped to 8.8% in 1978. Cash expenditures dropped from 6.1% in 1975 to 5.8% in 1977. This drop was a result of austerity measures in the public sector adopted by the Government in order to slow the pace of the inflationary process. Such measures were also reflected in a gradual reduction in the ratio of capital expenditures to GDP, from 3.4% to 2.3% in the period 1974-77. The positive balance in the Central Government's current account, together with the slower rate of investment expansion, made possible favorable fiscal balances during the last three years.
- 2.07 Inflation in 1978 was 19.7% in comparison with 27.5% in 1977. The slowdown in the inflation spiral was attributed to the recovery experienced in the agricultural sector. The real salary ratio, which showed a persistent decline from the first quarter of 1976 to the third quarter of 1977, has recovered as a result of five different readjustments in the legal minimum daily wage, between January of 1977 to January of 1979. The last increase to 115 Colombian pesos means an increase of 33.7% over the minimum wage of May of 1978.
- 2.08 The monetary system's international reserves increased by US\$638 and US\$586 million in 1976 and 1977, respectively. These figures compare favorably with the increase of US\$95 million in 1975. In this process, the net reserves of the Bank of the Republic increased from US\$430 million at the end of 1974 to US\$1.83 billion in 1977; estimates are that net reserves reached approximately US\$2.836 billion in May of 1979.
- 2.09 The external public debt climbed to US\$3.641 billion as of December 31, 1977, which includes the nondisbursed portion which rose to US\$2.622 billion. The structure of that debt continues to be favorable since approximately 70% of it does not fall due for five years or more. The ratio of service of the debt to exports of goods and services improved, 8.9% in 1977 as opposed to 9.8% in 1976.

B. Development Planning

- 2.10 According to the Government's statements, the following lines for State action are planned: (a) to integrate the regions of influence of the country's various centers of development by improving the transportation network and communications system; (b) to affirm and strengthen the expansion of those centers and to stimulate regional economic decentralization through new investments made outside already existing centers; (c) to intensively develop the country's energy resources; (d) to step up mobilization of sources of internal financing now being under-utilized, in order to have available counterpart funds to back up external credit, as for example: through tolls and real estate appraisal, increasing rates on public services and the fuel consumption tax. The Salvajina Project, which is analyzed in this document, is framed precisely within these last three lines of the State's action policy.

C. The Electricity Sector at the National Level

1. Evolution

- 2.11 Colombia's electricity sector has developed rapidly in recent years. The installed generator capacity went from 1,681 MW in 1967 to 4,000 MW in 1978, which represents an average annual increase of approximately 9%. However, per capita installed capacity is only 140 W, a figure below that of other Latin American countries of a similar level of development. In 1977, installed hydroelectric capacity was 72% of the total, while the remaining 28% came from thermoelectric sources.
- 2.12 Until 1946, electricity service in the cities was provided by national and foreign private businesses. In that year the Instituto de Aprovechamiento de Aguas y Fomento Eléctrico (ELECTRAGUAS) was established. Its duties included: to study, finance and construct hydroelectric works. In 1948, it began to establish and organize the first departmental affiliates, now known as Electrificadoras, to be responsible for operating the electricity services in areas within their jurisdiction. In some cities, municipal companies were established, such as: La Empresa de Energía Eléctrica de Bogotá (EEEB), Empresas Municipales de Cali, (EMCALI), and Empresas Públicas de Medellín (EPM).
- 2.13 In 1954, the Corporación Autónoma Regional del Cauca (CVC) was established and later attached to the National Planning Department (DNP). Its purpose was to meet regional needs and develop the natural resources in the departments of El Valle and Cauca, which include the upper basin and the valley of the Río Cauca, by covering, among other things, generation and distribution of electricity, regulation of rivers, irrigation reforestation and conservation of basins. Its functions are described in paragraph 5.03 of this Report.
- 2.14 In 1967, the Corporación Eléctrica de la Costa Atlántica (CORELCA) was established in order to generate and transmit electrical energy in seven departments in the North and to sell to the Electrificadoras in bulk. That same year, the Sociedad Anónima de Interconexión Eléctrica (ISA) was established, now composed of the EEEB, EPM, CVC, ICEL and CORELCA, to generate electricity and interconnect the country's electrical systems in order to: meet deficiencies where generating capacity is unable to satisfy demand, place the excess electricity produced in some regions, establish priorities in the construction of new generator plants and improve the reserve capacity extended to the entire interconnected electric system.
- 2.15 In 1968, Electraguas was given a new name, which was the Instituto Colombiano de Energía Eléctrica (ICEL), and was given a larger role in formulating the National Electrification Program and in coordinating the existing agencies in the Sector; moreover, it maintains its responsibility for electrical development of areas not served, by the aforementioned municipal or regional companies. ICEL is attached to the

Ministry of Mines and Energy, which is responsible for formulating the general policy on generating, transmitting and distributing electrical energy at the national level.

2. Current State

- 2.16 At the end of 1978, Colombia had around 2.11 million subscribers, of which 87% were residential; the electricity service handles 57% of the population. It should be pointed out that it serves a very high percentage of urban inhabitants (85%) and inhabitants of the most important cities (98%); on the other hand, in rural areas, very little of the population is served (13% in 1978). In recent years, the Government granted high priority to extending services in the rural area, as demonstrated by the Electrification Subproject, which is being executed through the Integrated Rural Development Project (DRI) to construct 450 works which would benefit 40,000 families. The project is being financed with Loan 475-CO from the Bank, ^{1/} from the IADC and the World Bank. Other projects are the following: the Chocó, the coffee areas and the loan request submitted to the Bank by ICEL, which is now being analyzed, for a US\$150 million program for construction of 29,600 kilometers of medium and low-tension lines, which would serve 148,000 subscribers in rural areas.
- 2.17 In Colombia the generating and transmitting system of the electricity system is made up of five major companies which are: EEEB, EPM, CVC, CORELCA and ICEL. Combined these form the Sociedad de Interconexión, ISA, which is responsible for large-scale power production and for interconnecting the above five systems. As for the country's power system, at present it is divided into two subsystems: the Atlantic Coast Subsystem, operated by CORELCA with its affiliates, and the Central System, operated by ISA, EEEB, EPM, CVC and their affiliates. Plans are to join the two systems in 1982. An explanatory diagram of the Institutional Organization of the Electricity Sector in Colombia appears in Appendix A.

3. Development Plans

- 2.18 The Plan for Development of the Electricity Sector 1979-82, has the following major objectives: (a) to meet short-, medium-, and long-run energy needs; (b) to expand service in urban and rural marginal zones; (c) to optimize energy resources, and (d) to achieve gradually financial self-sufficiency. The measures to be adopted to achieve the last of these objectives are as follows: an adequate rate structure, a search for financing alternatives, and organization of the sector to avoid duplicated efforts and the consequent waste of economic and human efforts.

^{1/} The Bank's financing, in an amount equivalent to US\$48 million, for a Project of US\$105 million, provides for a Rural Electrification Sub-Project costing \$6.8 million to finance 1,500 kilometers of distribution lines and serve 12,000 subscribers.

- 2.19 The Plan's goals in terms of satisfying energy needs basically involve: (a) increasing current national coverage from 57% to 67% by 1982; (b) in that same period, expanding coverage in rural zones from 14% to 27% and (c) increasing current per capita energy consumption by 33% from the current figure of 720 KWh/per capita to 964 KWh/per capita in 1982. To these ends, before 1983 ten new generator projects will go into operation having a total capacity of 2,288 MW, thereby increasing by 57% the 1978 installed capacity which, as indicated, was some 4,000 MW.
- 2.20 The Plan for Development of the Electricity Sector sets 1984 as the year in which the Salvajina Project will go into operation, which will have a generator capacity of 180 MW. A list of the other projects provided for in the Plan, to go into operation by 1988, appears in Appendix B. Projections on the demand for energy and installed power up to the year 2000, as provided in the Plan, are as follows:

<u>Year</u>	<u>Energy GWh</u>	<u>Power MW</u>	<u>KWh/Per Capita</u>
1980	17,580	3,350	802
1985	33,800	6,400	1,190
1990	51,770	9,820	1,640
1995	79,460	15,200	2,209
2000	107,900	23,600	2,949

- 2.21 The amount of medium-range investments required in the sector climbs to the equivalent of US\$3.8 billion (159.1 billion Colombian pesos), approximately half of which are in foreign exchange. These investments break down over the 1979-82 period as follows:

INVESTMENTS IN THE ELECTRICITY SECTOR
(in billions of Col\$ at 1978 prices)

<u>Year</u>	<u>Currency Foreign</u>	<u>Currency Local</u>	<u>Total</u>
1979	16.3	15.0	31.3
1980	21.0	19.2	40.2
1981	20.3	19.7	40.0
1982	25.5	22.1	47.6
TOTAL	83.1	76.0	159.1

- 2.22 For that same period, service of debt climbs to 45.1 billion Colombian pesos, of which 28.9 billion correspond to external debts and 16.2 billion to the internal debt. On the basis of the above figures, total monetary requirements are 204.2 billion Colombian pesos, which is equal to US\$4.8 billion.
- 2.23 Financing for the foreign currency component will for the most part be done with international financial agencies and to a lesser extent

through loans from commercial lenders and/or banks. The amount of loans contracted during the period has been estimated in millions of US\$, as follows:

<u>Year</u>	<u>Millions of US\$</u>
1979	779.3
1980	780.4
1981	341.0
1982	<u>221.5</u>
TOTAL	<u>2,122.2</u>

- 2.24 Financing of the local currency component for the 1979-82 period has been estimated, and would be as follows:

SOURCE OF FINANCING OF THE LOCAL CURRENCY
COMPONENT OF THE INVESTMENT
(in billions of Colombian pesos)

<u>Year</u>	<u>ISA's Own Resources</u>	<u>Domestic Credit</u>	<u>National Budget</u>	<u>ISA Associates and Affiliates</u>	<u>Total</u>
1979	7.8	1.7	1.6	3.9	15.0
1980	9.8	1.6	2.1	5.7	19.2
1981	7.8	1.6	2.4	7.9	19.7
1982	<u>6.5</u>	<u>1.4</u>	<u>2.7</u>	<u>11.5</u>	<u>22.1</u>
TOTAL	<u>31.9</u>	<u>6.3</u>	<u>8.8</u>	<u>29.0</u>	<u>76.0</u>
%	42.0	8.3	11.6	38.1	100.0

- 2.25 In conclusion, the internal financial needs for medium-range investment in the electricity sector are 76 billion Colombian pesos, 80.1% of which is expected to be financed with its own resources (including ISA associates and ICEL affiliates), 8.3% of which is expected to be financed with domestic credit and 11.6% through the national budget.
- 2.26 In the past, the lack of adequate coordination among the agencies participating in the sector and the low electricity rates have been factors contributing to the poor utilization of Colombia's abundant hydroelectric resources. The measures taken in recent years by the Government: (a) to create ISA, with direct participation on the part of other companies in the sector; (b) centralize planning of the energy sector, and (c) allow rate adjustments that are in excess of the rates of inflation, have been positive in helping the sector to achieve the development that it has planned. In effect, during the 1971-74 period, the electric rates at the national level rose at an average annual rate of only 8%, while inflation was 18% per annum. Since 1975, rates have been adjusted to a level higher than the rate of inflation (see paragraph 5.42).

D. The Electricity Sector in the Cauca Valley

2.27 In the Cauca Valley, there are three established electricity systems, with specific functions, as shown in Appendix C. They are:

- (a) The CVC System, which includes: CHIDRAL (Central Hidroeléctrica del Río Anchicayá Ltda.), 13 energy distributors, 25 municipalities, and the Compañía Electricidad de Tulúa, S. A.
- (b) The EMCALI System (Empresa Municipal de Cali) which distributes energy in the municipalities of Cali and Yumbo.
- (c) The EMCARTAGO System (Empresa Municipal de Cartago) which generates and distributes energy in the town of Cartago.

1. The CVC System

2.28 Among others, the CVC was assigned responsibility for the following: generating, transmitting and distributing electrical energy, and inter-connecting the electrical systems of the Cauca Valley. The energy sector of the CVC does perform these functions, as the Corporation is the:

- (a) Representative of the Cauca Valley as a regional stockholder in the ISA (Interconexión Eléctrica, S. A.). It owns 98% of Cauca Valley stocks, which represent 20% of the Company. The remaining 2% are owned by CHIDRAL. 1/
- (b) Owner and builder of the plants at Calima (120MW) and Alto Anchicayá (340MW); it will build any future additional generating plants in the Cauca Valley.
- (c) Owner of 65% of CHIDRAL's stocks, which in practice makes CHIDRAL a subsidiary of the CVC.
- (d) Owner and builder of the regional 115 KW transmission system, except for the link-ups of the Anchicayá and Umbo plants to the system, which belong to CHIDRAL.
- (e) Distributor of electrical energy in 39 of the 42 municipalities in the Cauca Valley and operates the corresponding subtransmission system. In 25 of those 29 municipalities there are distributor companies where the CVC has a share of more than 80%, with the balance being the property of the respective township. It is also the owner of more than 70% of the stocks of the Compañía Electricidad de Tulúa and the 13 remaining municipalities are served directly by the CVC.

1/ CHIDRAL's ownership of a small percentage of ISA stocks is because when ISA was formed more than 4 members were needed for it to be established as a corporation.

2. The EMCALI and EMCARTAGO System

- 2.29 EMCALI and EMCARTAGO are municipal companies. EMCALI distributes electrical energy in Cali and Yumbo while EMCARTAGO distributes electrical energy in Cartago. EMCALI purchases, in block, 100% of its needs from CHIDRAL, while EMCARTAGO purchases practically 100% of its needs from the CVC.

3. The Relationship of the CVC to CHIDRAL

- 2.30 The objectives of the Company "Central Hidroeléctrica del Río Anchicaya, Ltd." (CHIDRAL), established in 1950 (before the CVC was established), in some cases coincide with those of the CVC in areas of generation and transmission of electrical energy. In practice and because of the proprietary relationship between the institutions, the spheres of action of the two agencies are clearly defined. CHIDRAL alone may operate its system of generation and transmission at 115 KW. In this regard, CHIDRAL operates the Anchicayá and Yumbo plants, which it owns, and the Calima plant which belongs to the CVC. It operates its transmission system at 115 KW, even though most of the lines belong to the CVC.
- 2.31 For using the property of the CVC, CHIDRAL pays the CVC a fee equal to the accountant depreciation on the goods and the corresponding interest for their service; further, as a long-term, no-interest loan, it contributes the necessary funds to make up the quota for amortization of the loans entered into to finance those assets.

4. The Relationship of the CVC-CHIDRAL to EMCALI

- 2.32 CHIDRAL is a limited liability company, where 65% of the property belongs to the State and 35% to the town. Its owners are the CVC, EMCALI and the Municipality of Cali, broken down as follows: the CVC owns 65%, EMCALI owns 18% and the Municipality of Cali owns 17%. EMCALI is a municipal company that provides services for electrical lighting, telephones, potable water and sewerage system in the cities of Cali and Yumbo. The CVC sells approximately 60% of its energy output to CHIDRAL, which, supplemented by the power generated by plants operated by CHIDRAL, is sold to EMCALI, which purchases approximately 70% of CHIDRAL's supply.
- 2.33 With the agreement of the competent national agencies, the CVC sets the sales price of the power that it sells to CHIDRAL; however, CHIDRAL must establish the rate at which it will sell power to EMCALI under circumstances where the vote of its minority members is required. EMCALI, in turn, sets its rates for sale to the final consumers. Thus, the municipal group is in a position to regulate the rates on both the sale and purchase of electricity. Further, it should be pointed out that the CVC's collection flow is regulated to a large extent by sales to EMCALI (via CHIDRAL) which is ultimately the party that first receives the revenues from sales to final consumers.

5. Institutional Reorganization

- 2.34 The problems in the electricity sector of the Cauca Valley are based on the existence of two major entities, CVC-CHIDRAL in generation and primary transmission, and EMCALI in distribution. There have been conflicts in establishing the rates for block sales to EMCALI and in timely payment of those rates. Although this conflict has not had any direct effect on deferment of the required investments, it produced a high level of indebtedness for the CVC. In effect, CHIDRAL rates were frozen from 1968 to 1974 by a veto of EMCALI as a stockholder in CHIDRAL. As a result of this freezing of CHIDRAL rates, the CVC needed to ensure its own operating resources and decided to take over operation of the Alto Anchicayá plant and of the exchanges with ISA, an action which the Bank was advised of in April of 1974.
- 2.35 The Bank had to be informed of the CVC's decision by virtue of loan contracts 175/OC and 13/CD of September 1969, Article III, Sections 5.07 and 5.08, which provide that the CVC-CHIDRAL (codebtors on the loan) has to present, for Bank approval, a plan whereby CHIDRAL, before the works constructed under the project (Alto Anchicayá) went into operation, would assume responsibility for their operation and maintenance and the procedures proposed for their transfer. On June 5, 1974, the CVC sent to the Bank and the Bank accepted, the organization planned in the CVC for operation of the Alto Anchicayá, which has been carried out satisfactorily to date. See paragraph 2.70 on compliance with this clause.
- 2.36 The aforementioned institutional problems, which gave rise to a difficult financial situation, are being gradually resolved. First, the problem of establishing rates was resolved in 1974 by eliminating the requirement of 4 affirmative votes on the CHIDRAL Board to establish new rates. This has made it possible to double the rate structure during the 1974-78 period and to present a joint request (CVC-CHIDRAL) to the National Rates Board for rate increases up to 1982. The request was approved in August 1979 and it authorizes automatic rate increases of 2.2% per month, for both institutions.
- 2.37 The institutional reform has moved more slowly, as a number of alternative solutions involving the formation of new companies have been explored. Those alternatives have been the following:
- (a) EMVALLE Solution. Creation of a new single company in the regional electrical sector. This alternative resolves the financial conflicts between producing and distributing electricity, but is not acceptable for EMCALI, as it seriously affects EMCALI's global financial situation.
 - (b) ENELVALLE Solution. Creation of a company that unifies the energy-producing sector (joining the energy sector of the CVC to CHIDRAL), in which the interests of the CVC and EMCALI are balanced

out. This does not resolve the problem of business relations with EMCALI and would mean a higher rate for the final consumer since EMCALI must purchase 50% from the energy sector of the CVC.

- (c) ENELVALLE in CVC Alternative. In this alternative, the CVC would purchase EMCALI's share and the Municipality of Cali's share in CHIDRAL (approximately US\$5.9 million). This alternative does not resolve the problem of business relations with EMCALI, but would mean a lower final rate for the consumer. EMCALI's final position on this alternative is not known.
- (d) To continue with the "Present Situation". This alternative would generate cash excesses in CHIDRAL as the rates for bulk sales are calculated so as to be profitable for CVC-CHIDRAL together, while CHIDRAL's resource needs are much less than those of the CVC. This system has turned out to be operational in recent years and has made it possible to generate the funds needed for investments.

2.38 From the conversations held during the mission, the conclusion is that the present situation will prevail even in the medium-run (the next 3 years).

E. The Area of the Project

1. Location

2.39 The Cauca River runs from South to North in the Eastern Region of Colombia, for more than 1,000 kilometers. The Cauca River basin extends over 69,600 square kilometers, the topography of which is varied and can be divided into four major zones:

- (a) The upper basin, located in the Department of Cauca; the topography is uneven; along this stretch, the river runs from its source at an altitude of 4,000 meters up to the Paso de la Bolsa, which is at an altitude of 1,000 meters. In this zone, some 19 kilometers south of this pass, the Salvajina dam and the hydroelectric works would be constructed.
- (b) The Cauca Valley, located in the Department of El Valle, between El Paso de la Bolsa and La Virginia, is an immense alluvial plain of more than 400,000 hectares, which is subject to flooding. The floods, which vary in intensity, affect some 100,000 hectares, and flood some 60,000 hectares at a frequency of once every ten years. The climate in this zone is excellent for agriculture (see Appendix D), with uniform monthly average temperatures throughout the year of some 24° Centigrade, given its latitude. Average precipitation is between 1,000 and 1,500 mm. per year, according to the part of the Valley, distributed into two dry seasons and two wet seasons; this makes possible two harvests per year. Along this stretch, the river drops from 1,000 meters to 900 meters above sea level.

(c) The Middle Cauca, located between La Virginia and Cáceres in the departments of Caldas and Antioquia, where the River winds again and drops from 900 meters above sea level to less than 100 meters above sea level.

(d) The lower Cauca, located to the north of the Department of Antioquia and the departments of Bolívar and Sucre, until it opens into the Magdalena River. Here again it opens up into an alluvial plain that floods, and is used extensively for grazing cattle.

2.40 The agricultural area partially protected through the project is located in the Cauca Valley. It is now being farmed intensively, except for an area subject to flooding where the use of the land has been adjusted to hydrological risks.

2. The Floods

2.41 Approximately 10% of the plain is subject to flooding, which occurs annually when the volume of water in the river is greater than the capacity of the river bed and overflows the natural dikes. (See Appendix F). The floods are more serious when the river's tributaries swell and the Cauca River bed is full, in which case the tributaries spill out on to the plain, unable to release their waters into their natural drain. The basic problem of controlling floods from the river has been in the process of solution for some 20 years: public and private initiative has led to the construction of dikes (jarillones) along the banks of the river and its tributaries, which are supplemented by drainage works, land preparation and, in some cases, irrigation at the local level.

2.42 The first project "Agua Blanca", which protects some 5,000 hectares of farmland and 1,600 hectares of urban land in the vicinity of Cali, was completed in 1961 by the CVC. In 1958, the CVC began construction of the project "Roldamillo, Unión, Toro" (RUT) which, in 1964 was turned over to the Instituto Colombiano de Reforma Agraria and completed in 1968. The project was financed in part with funds from Loan 92/SF-CO and provides protection against flooding to a net area of 10,000 hectares.

2.43 The success achieved in flood control through the projects mentioned above prompted the initiative taken by farmers, especially producers of sugar cane, to conduct similar projects. By 1978, some 15,000 more hectares had been protected, with dikes approved by the CVC; further, there were 30,000 hectares being protected by dikes that had not been approved. At present there are some 400 kilometers of dikes that provide a certain degree of protection to 60,000 hectares, half of which are protected against the crestings of the Cauca which recur every ten years.

- 2.44 The method of protection, which is low dikes measuring 2 to 3 meters in height above the river's natural dike, is effective because of the drop in the crest of the Cauca river when it floods unprotected areas. If these relief areas were not present, the crest's volume of water would overflow the existing dikes. In effect, the studies conducted by the CVC and other interested agencies, which include the Sociedad de Agricultores y Ganaderos del Valle del Cauca, ^{1/} conclude that in order to protect the entire plain (against crests of a thirty-year period of return) the dikes should be made an average of 2.5 meters higher than the existing design. However, such high dikes would create a number of problems in terms of construction and maintenance, are much more costly than those now being constructed, and constitute a greater risk in case of rupture.

3. Evolution of Agriculture

- 2.45 In the last 20 years, agriculture in the Cauca Valley has developed rapidly by replacing broad areas once used for pasturage first with corn and then with sugar cane. In effect, until 1958, less than 10,000 hectares were planted for corn; by 1964, 70,000 hectares were planted. This remained constant until 1970, when it began to drop because corn was being replaced by sorghum and soya, which have a better economic return. Sugar cane, which began its area expansion in 1964 when there was some 65,000 hectares planted, by 1978 reached 137,000 hectares. Moreover, the per hectare return increased by 20% during that same period. In 1977, the Cauca Valley produced 65.5% of the value of Colombia's sugar cane production.
- 2.46 Sorghum began to replace corn in 1964, at which time there were 11,700 hectares planted for sorghum; by 1977 there were 43,000 hectares planted, which produced 27.5% of the country's sorghum. Soya increased dramatically from 1958, when 6,000 hectares were planted, to 1969, when 61,000 hectares were planted. In recent years the planted area has been slightly smaller. Returns from soya rose from some 1,100 kilograms per hectare to 2,100 kilograms per hectare in the last 20 years. In 1977, 85% of the soya that Colombia produced was harvested in the Cauca Valley. Rice is yet another crop that increased considerably in terms of its per hectare yield, as it went from 2,300 kilograms to 4,300 kilograms in the last 20 years. The surface area used for rice has varied, but is around 12,000 hectares and getting smaller. Kidney beans also doubled their productivity in the last 20 years, and went from 600 to 1,200 kilograms/per hectare. There are some 8,000 hectares used for kidney beans, a figure that varies greatly from year to year. In 1977, the Valley produced 6.3% of Colombian kidney beans.

^{1/} Study conducted by J. Saldarriaga, Ph.D, Consultant in Hydrology and Development of Water Resources, in 1978.

- 2.47 Cotton is one of the most profitable crops in the Cauca Valley. Because of prices, the amount of area planted for cotton dropped from 30,000 to 7,000 hectares between 1963 and 1965. It gradually recovered and by 1977 there were some 33,000 hectares planted for cotton. Per hectare productivity has held itself steady in the last 20 years at around 2,000 kilograms, which was one of the highest in the world. The quality of the long fiber cotton is excellent.
- 2.48 The agricultural support services are very adequate. In the Cauca Valley there are experimental stations run by the Instituto Colombiano Agropecuario. At Palmira is the headquarters of the Inter-American Tropical Agriculture Center (CIAT), which conducts agricultural research. The Valley has the infrastructure necessary for storing and primary processing of the crops that are produced there. The installed sugar mills work without interruption, thanks to the region's climatic conditions which make year-round sugar making possible. Small investments could increase their milling capacity.
- 2.49 The Agricultural Financial Fund (FFAP) in 1977 granted loans to cover 153,500 hectares of crops in the Cauca Valley, in an amount in excess of 1 billion Colombian pesos (US\$25 million). These loans were largely for annual crops (85%) because sugar cane, the crop which has the largest planted surface area, has financing from other bank sources and the funds of the sugar plants themselves. Customarily, the FFAP has covered the agricultural credit in the Cauca Valley; in fact, in previous years it financed the following surface areas:

<u>Year</u>	<u>First Six Months (Hectares)</u>	<u>Second Six Months (Hectares)</u>	<u>Total (Hectares)</u>
1973	58,672	124,212	182,884
1974	46,556	148,080	194,636
1975	45,251	174,728	219,979
1976	59,690	67,461	127,151
1977	73,617	79,901	153,518

- 2.50 In the Cauca Valley, the levels of agricultural productivity for most crops have been high, which shows that farmers are willing to accept the technology and that they have the support services, such as: credit, agricultural extension, supplying of inputs and adequate marketing channels. Further, the producer's unions function well in the Valley and provide their members a number of services that make their work easier.

4. Use and Tenure of the Land

- 2.51 The present usage of the land in the zone to be benefitted by the Project was as follows, according to CVC estimates for 1978:

	Thousands of Hectares	%
Seasonal crops <u>1/</u>	66.3	57.7
Sugar cane	27.4	24.7
Pasture	15.0	13.1
Others <u>2/</u>	<u>6.3</u>	<u>5.5</u>
TOTAL	115.0 =====	100.0 =====

2.52 It is obvious that land that is susceptible to flooding can be used for agriculture but there is a risk that flooding will occur and lead to losses. For example, land that floods once every ten years and has two seasonal crops per year, will run the risk of losing one crop out of every 20. If this land is flooded once every two years, the risk would be a loss of one out of every four crops, in other words, the theoretical risk would be five times greater. This phenomenon explains why land use in areas subject to flooding is less intensive than in the rest of the Valley, except for the area planted with sugar cane, which is protected by dikes along the banks.

2.53 Land tenure in the zone to be benefitted by the Project is typical of the Cauca Valley and Colombia as a whole. The census conducted by the CVC in 1979 for the Assessment Study, which covers an area somewhat larger than that of the zone protected by the Project and which is representative of land tenure within the Project area, appears in Appendix H, broken down according to municipality. The results can be summarized as follows:

Land Tenure in the Benefitted Zone

<u>Farm Area (Hectares)</u>	<u>No. of Farms</u>	<u>%</u>	<u>Occupied Area (Hectares)</u>	<u>%</u>
0.1 to 3	4,455	60.3	3,677	2.4
3.1 to 5	623	8.4	2,037	1.3
5.1 to 25	1,139	15.5	13,426	8.6
25.1 to 100	838	11.3	44,880	28.9
100.1 to 500	302	4.1	59,805	38.5
Over 500	33	0.4	31,552	20.3
	<u>7,390</u>	<u>100.0</u>	<u>155,377</u>	<u>100.0</u>

2.54 The preceding Table shows that 60.3% of the agricultural holdings are minifundios less than 3 hectares in size and occupy only 2.4% of the area to be protected by the Project. Some 35.2% of the farms occupy 38.8% of the land; on the other hand, 4.5% of the agricultural holdings

1/ The principal seasonal crops are soya, 31,600 hectares, and sorghum, 19,300 hectares; what remains is planted for cotton, corn, rice and kidney beans.

2/ These are banana, coffee and cacao, as interpolated.

occupy 58.8% of the land. It should be pointed out that the Project does not include activities involving redistribution of the land. However, the beneficiaries will pay a proportional part of the works. Paragraph 5.66 explains how the beneficiaries of the Project will contribute to its financing and makes recommendations in this regard.

5. Urban Evolution

- 2.55 In the last 27 years, the population of the Cauca Valley has evolved as follows, expressed in thousands of inhabitants:

Population	YEAR			
	1951	1964	1973	1978
Urban population	550.6	1,219.8	1,784.0	2,203.5
Population of Cali	(284.0)	(620.0)	(903.0)	(1,200.0)
Rural population	556.4	513.2	569.3	585.8
TOTAL	<u>1,107.0</u>	<u>1,733.0</u>	<u>2,353.3</u>	<u>2,789.3</u>

- 2.56 Rural population has remained constant in contrast to the dramatic increase in the urban population. This process of urbanization is common in the developed areas of the country, where the rural population migrates to the large cities. In 1978 Cali had 1,200,000 inhabitants, in other words half of the population of the Valley. Its population doubled every 13 years in the period in question.
- 2.57 The per capita domestic product and the average productivity of labor in the Cauca Valley have increased steadily since 1971 (at constant 1970 pesos) as demonstrated in the following table:

Year	CAUCA VALLEY		COLOMBIA	
	Per Capita Product	Labor's Average Productivity	Per Capita Product	Labor's Average Productivity
1970	9,003	29,744	6,584	22,945
1972	10,254	33,981	7,202	25,292
1974	15,424	55,154	7,523	27,746
1976	21,226	77,289	7,408	28,305

- 2.58 From 1970 through 1976, the per capita product for the Valley increased by 144%, while for Colombia as a whole it increased by 8.59%. The phenomenon is explained by the increase in labor's productivity. In 1976, the economic activities that contributed most to the Cauca Valley's GDP were the following: the manufacturing industry, 30.6%; business, 18.5%, and agriculture, 14.5%.
- 2.59 Development of the urban sector and of the manufacturing sector in Cali and its industrial zone at Yumbo, which made possible that rapid growth in labor's productivity, has led to the problem of pollution of the environment and of the waters of the Cauca River, especially during the

region's dry months when the volume of water in the River is at its lowest. The problem of contamination of the Cauca River was first identified in 1963. In 1967, the Empresas Municipales de Cali (EMCALI) conducted a study on contamination of the Cauca and Cali rivers. Since 1968, the CVC has been conducting a program to measure the quality of the waters through out the Basin.

- 2.60 These studies have been able to determine the amount of contamination expressed as the biochemical oxygen demand (BOD₅) ^{1/} that the Cauca River has received in recent years. It is as follows:

BIOLOGICAL OXYGEN DEMAND (Kg/day)

Year	URBAN SECTOR CALI	INDUSTRIAL SECTOR 2/			TOTAL Kg/Day BOD ₅
		Mills	Paper Mills	Others	
1938	4,000	-	-	-	-
1951	11,000	-	-	-	-
1964	26,000	35,000	46,000	5,000	112,000
1979	80,000	60,000	53,000	10,000	203,000

- 2.61 As can be seen, the biological oxygen demand, to oxidize the contaminating organic material, has increased very rapidly. As a consequence, the River's waters now lack dissolved oxygen (DO).
- 2.62 The amount of DO in the waters of the Cauca River before being contaminated by organic wastes from Cali is around 6 milligrams per liter; it should be pointed out that when the level of DO is below 1 milligram per liter for a prolonged period, most of the fish begin to die; when the DO reaches zero, the effect upon the natural species in the River is disastrous. This occurs in waters below the Yumbo industrial zone, when the volume of water in the river is less than 130 cubic meters per second.
- 2.63 In order to achieve the goal of a water quality of 1 mg./liter of DO in the River, alternative means of reducing contamination have been studied. These include: (a) treatment of contaminants; (b) dilution by using dams to regulate the volume of water, and (c) a combination of both. Regulation of the Cauca, by increasing the volume of water in the River during dry spells, would make it possible to postpone investments into pollution treatment plants; moreover, it would eventually make possible solutions (c), mentioned above, that is, combining water treatment with dilution.

^{1/} Biological oxygen demand at five days and 20°C.

^{2/} Data are not available for 1938 and 1951.

6. Erosion of the Salvajina Basin

- 2.64 During its stay, the Analysis Mission visited the Salvajina Basin by land and by air. Special attention was devoted to the erosion caused by improper agricultural methods and the construction of secondary roads in the Basin. In various places, principally along the left bank of the Cauca River, there are large ditches that are a permanent source of moving matter and sediment in the nearby waters. Trees and shrubs have been cut down indiscriminately since the farmers are not adequately trained in reforestation and crop selection. Some time ago, the CVC initiated an educational program for the Basin's inhabitants, designed to improve the overall situation and reduce the rapid process of erosion now underway.

F. Evaluation of Previous Loans

- 2.65 In December 1968 the Bank approved Loans 175/OC-CO and 13/CD-CO, to provide partial financing for the project Central Hidroeléctrica Alto Anchicayá, at an estimated cost equal to US\$88.5 million. The amount of the loans was the equivalent of US\$58.8 million, of which US\$43.3 million was in foreign exchange from Ordinary Capital; the difference (C\$16,740,000) came from funds from the Canadian agreement. The borrowers were the Corporación Autónoma Regional del Cauca (CVC) and the Central Hidroeléctrica del Río Anchicayá Ltda. (CHIDRAL); the guarantor was the Republic of Colombia. The purpose of the project was to construct a dam on the upper Anchicayá River, equipped with the hydroelectric facilities necessary for an installed capacity of 340 MW, with four 85 MW generators, to construct a 100 kilometer, 220 kilowatt transmission line from the point of generation through the Yumbo and Pance substations near Cali, and to expand the 115 kilowatt transmission system by approximately 53 kilometers of lines.
- 2.66 The loan contracts were signed on September 4, 1969, after the Executive Board approved, on August 25, 1969, an amendment in the original resolution that clarified that the rates for providing electricity services must yield a profit. The first disbursement was made in March of 1970, and the last disbursement was in September of 1976, two years after the date provided in the original contract. Extensions were granted for the last disbursement in order to be able to settle differences with equipment suppliers who had to replace part of the equipment. The delay in the disbursements had no effect on the project's execution; in fact, commercial production scheduled for May of 1974 began in October of 1974, a delay of only six months, due to changes in the project necessitated by unfavorable geological conditions.
- 2.67 The investment for the various categories and currencies broke down as follows:

(in thousands of US\$)

	Original			Final		
	ME	ML	Total	ME	ML	Total
1. Engineering and Administration	3,500	3,220	6,720	7,111	8,617	15,728
2. Direct Costs	42,585	21,635	64,220	53,263	31,989	85,252
2.1 Generation	37,635	17,510	55,145	46,324	29,694	76,018
2.2 Transmission	4,850	1,995	6,845	5,873	2,112	7,985
2.3 Auxiliary works	100	2,130	2,230	1,066	183	1,249
3. Financial Costs	10,960	-	10,960	13,643	2,512	16,155
3.1 Interests	7,685	-	7,685	9,526	2,512	12,038
3.2 Commissions	2,685	-	2,685	3,529	-	3,529
3.3 IDB Inspection	588	-	588	588	-	588
4. Contingencies	5,087	1,513	6,600	-	-	-
TOTAL	61,852	26,648	88,500	74,017	43,118	117,135

- 2.68 The funds from both loans were used in their entirety and the borrower's contribution was made at the appropriate time, including the additional cost that the project had incurred (as a result of inflation and contingencies), as the loans did not have an item for cost escalations. The source of the funds was as follows:

(in thousands of US\$)

	Foreign Exchange	M.L.	Total	Foreign Exchange	M.L.	Total
Loan 175/OC-CO	43,300	-	43,300	48,179 1/	-	48,179
Loan 13/CD-CO	15,500	-	15,500	16,461 1/	-	16,461
Local contribution	3,052	26,648	29,700	9,377	43,118	52,495
TOTAL	61,852	26,648	88,500	74,017	43,118	117,135

- 2.69 The additional cost of the project was US\$28,635,000, which was 32% of the original estimate. The additional cost in foreign exchange was compensated for in part by the revaluation of the currencies. The customary contract clauses were complied with satisfactorily, except for Section 5.11 of the Contract which reads: Transfer of the Project's works: (a) Within four years following the signing of this Contract, the Debtors shall present to the Administrator (or the Bank) for approval the procedure being proposed for transferring ownership of the Project's

1/ This includes the revaluation.

works to CHIDRAL, including the respective liabilities; (b) Once approved by the Administrator (or the Bank) the procedure in question is to be implemented within the time periods set forth therein.

- 2.70 The borrower did not comply with part (b) of the clause and the Bank authorized a waiver without any deadline until the institutional situation of the electricity sector in the Valley was resolved, in order not to weaken the CVC's position. Such action was justifiable when it is borne in mind that: (i) the reasons for the Bank's recommendation no longer apply; (ii) the institutional reorganization of the Cauca Valley has not been definitely settled; (iii) to transfer Alto Anchicayá to CHIDRAL would alter greatly the company's capital make-up by eliminating, for all practical purposes, the participation of EMCALI and the Municipality of Cali; (iv) to alleviate institutional and financial problems, it is prudent that operation of the assets be in the hands of the entities that invest in them; and (v) CVC is running that plant satisfactorily with the Bank's authorization.
- 2.71 During execution of the project's works, the Executing Entity (CVC) demonstrated administrative, technical and financial efficiency. Outside consultants were contracted for the engineering and surveillance of the construction, who were assisted by engineers from the CVC. Further, a group of consultants, composed of three specialists with international experience, were responsible for supervising the project; they made periodic visits to the construction works and recommended the technical measures necessary for execution thereof.
- 2.72 The project was completed in 1974 and went into commercial operation in March of that year. To date, no major difficulties have arisen with regard to operation and preservation of the works. The Analysis Mission visited the facilities and found them to be functioning adequately.
- 2.73 In addition to the loans already mentioned, the CVC/CHIDRAL have received 4 loans from the World Bank for electrical development. These total US\$44.6 million, and were for execution of the following projects: Anchicayá - 44 MW hydroelectric capacity, Yumbo - 53 MW thermoelectric capacity, and Calima - 120 MW hydroelectric capacity. All these works, like those at Alto Anchicayá, are operating properly, which demonstrates the CVC's capacity to execute projects in the electricity sector.
- 2.74 The CVC is the Executor of Loan 520/SF-CO authorized by the Bank on October 20, 1977, through Resolution DE-145/77. The loan was for an amount of up to US\$41.0 million, and its purpose was to cooperate in the execution of the Buenaventura Integral Urban Development Plan, at a cost equivalent to US\$78 million. This project will be composed of subprojects in the following areas: education, urbanization transportation terminals, sewerage, water mains, city streets, markets, electrification, industrial promotion and institutional strengthening. Physically speaking, 13% of the project has been executed, which represents a delay of 9 months with respect to the original plan. It is expected that when

the local counterpart contribution required by the project is assigned, the time that has been lost can be recovered (see Appendix I, Six-Month Progress Report).

G. Previous Studies and Reports

- 2.75 The idea of controlling the Cauca River in order to generate electrical energy and control floods has been under study in the region, with differing emphasis, for more than 30 years. There are various studies on flood control, generating energy and irrigation. In chronological order these are the following:
- (a) Hydraulic Development of the Cauca Valley, 1947, by the firm Pearson, Brinckerhoff, Hogan and McDonald of New York.
 - (b) Unified Development of Energy and Hydraulic Resources in the Cauca Valley, 1956, prepared by OLAP of Bogotá, G and H of New York and KTAM of New York.
 - (c) Multiple Salvajina Project, 1965, prepared by ACRES INTERNATIONAL Ltd. of Canada, for the CVC, with emphasis on generating energy.
 - (d) Cauca River Regulation Project, 1970, prepared by the Firm Electric Power Development Co. Ltd., EPCD of Japan.
 - (e) Project on Controlling the Cauca River, 1975 Technical Report prepared by INGETEC of Bogotá and INESCO of Cali for the CVC.
 - (f) Review of the Cauca Valley Regulation Project, Colombia, 1977, by Amalio Gómez, Consultant Civil Engineer for the Inter-American Development Bank.
 - (g) Hydrological Study of the Upper Cauca River Regulation Project, 1978, by Jaime Saldarriaga Sanin, for the Sociedad de Agricultores y Ganaderos del Valle del Cauca.
- 2.76 In preparing the aforementioned reports, attention was given to the Dam alternatives (Salvajina or Timba); to differing dam heights for Salvajina; to differing types of dam (concrete, earth, rock-filled with a clay center, and rock-filled with concrete surface) and to different combinations of a dam and dikes to protect that part of the valley's plain that is flooded.
- 2.77 The INGETEC-INESCO studies, which are the basis for the project's analysis, seek a combination of a dam at Salvajina and dikes, to meet the following purposes:
- (a) Levels on the Cauca River similar to those recorded (in order to avoid changing the height of the dikes built thus far).

- (b) Regulation using a dam to control crests and reduce contamination.
- (c) Production of electric power.
- (d) Minimum cost.

III. THE PROJECT

A. Objetives

- 3.01 The purpose of the Salvajina Project is to promote the economic and social development of the Cauca Valley by regulating the Cauca River in order to: (a) make it possible to project the flat area of the geographic valley of the Cauca River, which is affected by periodic flooding caused by that river and its tributaries, in order to increase agricultural production by a surface area of approximately 100,000 hectares; (b) generate electricity using a 180 MW power plant that will be constructed at Salvajina and will increase primary generation by 890 GWh/year, which will help to meet the country's demand beginning in 1984; (c) reduce the present contamination of the Cauca River during low-water periods, by maintaining minimum flow above 130 m³/sec at the site of dumping of sewage and industrial waste from Cali and Yumbo.
- 3.02 To fully achieve these purposes, two groups of works are planned. The first is the project under study at the site known as Salvajina, where a dam would be constructed with a machinery plant to generate electricity, having a peak capacity of 180 MW, with the possibility of expansion with another 90 MW unit. During the second stage, a series of dikes to protect against floods would be completed on the level ground area, to include interceptor canals, drains, pumping stations and soil adaptation works (see Appendix F).
- 3.03 The dam works must be executed before completion of the level-ground works. There are properly completed studies, plans and designs for the dam and the period planned for execution is five years. The purpose of the level ground works is to protect crop areas against the floods caused by the tributaries of the Cauca that unload their waters to the north of Salvajina and hence would not be regulated by the proposed dam. Because these would be the complementary works, they will be completed within five years following completion of the dam.

B. Description of the Project

- 3.04 The Salvajina dam will be multipurpose and will be located in the Department of Cauca on the Cauca River, at a distance of approximately 65 Kilometers south of Cali. It will be of crushed stone, 154 meters high and will be protected by a concrete slab. It will close in a narrow valley thereby creating a reservoir having a total volume of 773 million cubic meters, the useful volume of which will be 620 million cubic meters of water from a drainage area of 3,960 square kilometers. In the zone to be flooded, around 2,200 hectares of poor land of an uneven topography, there are no roads nor any sizable settlements, although there are isolated rural houses. (See a plan of the parts that comprise the dam in Appendix G).

- 3.05 The total volume of fill for the dam is 4,000,000 cubic meters and most of the material will come from excavation of the spillway located along the left bank of the river. The rerouting of the river to permit excavation of the dam will be accomplished through two reroute tunnels each measuring 8.2 meters in diameter and 920 meters in length, located along the right bank. Both tunnels will be equipped with bottom outlets and concrete plugs. The spillway will be made of concrete and will have a design capacity of 3,550 cubic meters per second. Excavation of the spillway will provide approximately 1,800,000 cubic meters of gravel and rock, while the volume of concrete will be 26,000 cubic meters. The flood waters will be released through 3 openings measuring 12 meters in width and 14 meters in height, controlled by radial valves. The discharge channel and the deflector structure will be finished in concrete.
- 3.06 The volume of water to be propelled by turbine engines is 223 cubic meters per second. It will be channeled through the outlet and a tunnel measuring 8.2 meters in diameter and 320 meters in length, partially covered in concrete and iron plated, up to the distributor and two turbines in the machinery plant, located on the left bank of the Cauca River. The machinery plant will be a concrete structure 35 meters wide and 64 meters long and initially would house two vertical Francis units, with a minimum space of 20 meters between the units. The major design features are: turbine velocity of 180 r.p.m., synchronous salient poles generators, frequency 60 Hz, tension 13.8 kilowatts, power factor 0.9, height of gross nominal load 90 meters.
- 3.07 To complement the generator works, two triphasic transformers will be installed, along with a crane and auxiliary electrical and mechanical equipment as well as control and telecommunications equipment. Further, the project also includes 50 kilometers of transmission lines on a 115-kilowatt double circuit, which will carry the power from the connections yard to the Pance substation to the south of Cali.
- 3.08 The infrastructure works now under construction are as follows: (a) the access roads from Timba to San Francisco (9.8 kilometers); to Botadero No. 2 (1.5 kilometers), and to the Detour (1.1 kilometers); (b) the San Francisco-Suárez Highway (11.8 kilometers); (c) the camps and offices for the technical personnel of the borrower, consultant and contractor; (d) the line to supply energy for construction of the work.
- 3.09 An integral part of the project is the plan to increase the services of the CVC considerably so as to promote the construction of works to protect against erosion of the upper basin of the Cauca River, in order to reduce the flood peaks and the sedimentation in the Salvajina dam; furthermore, a hydrological data system will be set up which, when rains occur, will immediately make it possible to predict the flood risk along the rivers and waters above and below the dam, sufficiently in advance to increase or reduce the volumes released at Salvajina which will increase its regulation potential.

C. Cost of the Project

- 3.10 The project is estimated to cost a total of US\$242,500,000, broken down into the categories of investment shown on the following page.
- 3.11 The category for "Engineering and Administration" includes: (a) the cost for contracts the CVC concludes with the firm INGETEC, for engineering works and final designs for the project; (b) the cost of the contract to be concluded with the consulting firm that will advise the CVC on supervision of the work's construction; and (c) the cost of contracting the high-level consulting group that will advise the CVC on special aspects during the construction process.
- 3.12 The construction cost (not including the allowance for escalation and financial expenditures during the project's period of execution) is estimated at US\$175,614,000, and is shown in Appendix J. The construction cost is based on a detailed estimate of unit costs, which was done in January of 1979. To convert the component in local currency to its equivalent in foreign exchange, the exchange rate existing as of that date was used (US\$1 = Col\$41). The unit cost of the civil engineering works, calculated by the consulting firm of INGETEC, have been compared with the cost of the contracts on recently completed hydroelectric projects or ones currently under way, as for example: Mesitas, Chingaza, Alto Anchicaya and Chivor I, and turned out to be adequate.

Total Cost of the Project
(in thousands of US\$)

	<u>Total</u>	<u>%</u>
1. <u>Engineering and Administration</u>	12,500	5.2
2. <u>Civil engineering works</u>	105,729	43.7
2.1 Reroute Tunnels	15,140	6.2
2.2 Dam and Reservoir	63,478	26.2
2.3 Hydroelectric Plant	17,271	7.2
2.4 Infrastructure	9,840	4.1
3. <u>Equipment</u>	25,074	10.3
3.1 Reroute Tunnels	2,100	0.8
3.2 Dam and Reservoir	1,200	0.5
3.3 Hydroelectric Plant	21,774	9.0
4. <u>Transmission Lines and S/E</u>	3,334	1.4
5. <u>Concomitant Expenditures</u>	7,075	2.9
5.1 Protection of the Basin	4,455	1.8
5.2 Hydrological Network	805	0.3
5.3 Purchase of Lands	1,815	0.8
6. <u>Financial costs</u>	23,170	9.6
6.1 Interest on IDB Loans	8,323	3.4
6.2 IDB Credit Fee	1,422	0.6
6.3 IDB Inspection and Supervision	440	0.2
6.4 Other Interests	5,410	2.3
6.5 OECF Loan	7,575	3.1
7. <u>No Specific Allocation</u>	65,618	27.0
7.1 Contingencies	21,902	9.0
7.2 Escalation	43,716	18.0
TOTAL INVESTMENT	242,500	100.0
	=====	=====
Percentage	100.0	

- 3.13 The costs of the equipment and of the transmission lines are based on the most recent quotations and on the aforementioned projects, with an escalation factor calculated as of January of 1979.
- 3.14 Associated costs envisioned include: (a) purchase of lands and relocation of those affected by the construction of the dam and reservoir; (b) the cost of the hydrological data system for predicting flood peaks; and (c) the additional cost of protecting the upper basin of the Cauca River.
- 3.15 The financial expenditures during construction are US\$23,170,000. These were figured on the basis of the terms expected for the loans that would finance the project. In principle, these terms have been accepted by the CVC and have been used as a basis in calculating the interests, credit fees and for analyzing the flow of funds, with respect to the project and the other operations of the CVC:
- (a) Estimates are that the Bank's loan would be granted using funds from Inter-regional Capital, under the following terms and conditions:
- Amount: US\$44,000,000, or its equivalent in foreign currency.
 - Interest: 7.9% per annum on the balances owed, payable every six months in the currency of disbursement.
 - Credit fee: 1.25% per annum of the nondisbursed balance, payable every six months and accruing within sixty days of the contract.
 - Grace period: 5-1/2 years from the date of the contract.
 - Disbursement period: 5 years from the date of the contract.
 - Amortization period: 20 years, amortization payable in consecutive, biannual and, insofar as possible, equal quotas, the first of which must be paid six months after the last disbursement.
 - Funds for inspection and supervision: charged to financing, the sum of US\$440,000 will be allocated to cover the Bank's commission for general inspection and supervision.
- (b) Financing through a loan offered by the Government of Japan through the Overseas Economic Corporation Fund (OECF), for 12.3 billion fixed Yen equivalent to approximately US\$55.9 million at the January 1979 exchange rate; interest of 4.5% for 20 years, including a 7-year grace period. The disbursement period will be 7 years beginning as of the signing of the loan agreement and the amortization period will be 13 years after the 7-year grace period. The OECF loan will be available to cover the payments to be made by the CVC to contractors for construction of the dam and the spillway

and/or consultants by virtue of the contracts concluded between them for the purchase of goods and/or services necessary for execution of the project, provided that the purchase is made in those countries eligible to be providers, with products manufactured in these countries and/or services provided from them (see paragraph 1.03).

- (c) Financing by suppliers of 85% of the CIF value of the turbines, generators and accessories and of the auxiliary electromechanical equipment under terms and conditions such as the following, which are in keeping with recent operations of a similar nature in Colombia: Amount: US\$27,286,000; Interest: 7.75% per annum on balances owed; Disbursement period: 3 years; Amortization period: 10 years, with a four-year grace period starting from the date of the contract. It should be pointed out that the CVC received a financing proposal from Japan's Export Bank should a Japanese firm win in the bids on equipment.

3.16 The category "No Specific Allocation", is estimated at US\$65,618,000, in other words, 27% of the project's total cost. It involves the following:

- (a) Contingencies estimated at US\$21,902,000, which would cover the possible differences in volume of work that may develop in order to complete the project, on average have been calculated on the basis of 15% for civil engineering works and 10% for equipment and for materials and manpower on the transmission lines.
- (b) Escalation costs from January of 1979 to completion of the project have been estimated at US\$43,716,000. For this project, the escalation factor for investments was estimated in accordance with the CVC at 7.5% for 1979 and 7% for 1980 and subsequent years. The cost escalation of the OECF loan was estimated at 6.5% per annum. For expenditures in local currency, it was assumed that devaluation of the Colombian peso in relation to the American dollar would make up for any inflation above that already calculated.

D. Financing of the Project

3.17 The table on the following page summarizes how the investments in the project would be financed:

Cost and Financing of the Project
(in thousands of US\$)

	<u>CVC</u>	<u>IDB</u>	<u>OECF</u>	<u>Suppliers</u>	<u>Total</u>	<u>%</u>
<u>Engineering and Administration</u>	9,600	600	2,300	-	12,500	5.2
<u>Civil Engineering Works</u>	47,322	19,740	38,667	-	105,729	43.7
2.1 Reroute Tunnels	4,194	10,946	-	-	15,140	6.2
2.2 Dam and Reservoir	27,024	-	36,454	-	63,478	26.2
2.3 Hydroelectric Plant	6,264	8,794	2,213	-	17,271	7.2
2.4 Infrastructure	9,840	-	-	-	9,840	4.1
<u>Equipment</u>	5,674	-	-	19,400	25,074	10.3
3.1 Reroute Tunnels	400	-	-	1,700	2,100	0.8
3.2 Dam and Reservoir	300	-	-	900	1,200	0.5
3.3 Hydroelectric Plant	4,974	-	-	16,800	21,774	9.0
<u>Transmission Lines and S/E</u>	300	3,034	-	-	3,334	1.4
<u>Concomitant Expenditures</u>	4,671	2,404	-	-	7,075	2.9
5.1 Protection of the Basin	2,199	2,256	-	-	4,455	1.8
5.2 Hydrological Network	657	148	-	-	805	0.3
5.3 Purchase of Lands	1,815	-	-	-	1,815	0.8
<u>Financial Expenditures</u>	16,790	6,380	-	-	23,170	9.6
6.1 Interest on IDB Loan	2,383	5,940	-	-	8,323	3.4
6.2 IDB Credit Fee	1,422	-	-	-	1,422	0.6
6.3 IDB Inspection and Supervision	-	440	-	-	440	0.2
6.4 Other Interests	5,410	-	-	-	5,410	2.3
6.5 OECF Loan	7,575	-	-	-	7,575	3.1
<u>No Specific Allocation</u>	30,957	11,842	14,933	7,886	65,618	27.0
7.1 Contingencies	9,883	3,832	6,247	1,940	21,902	9.0
7.2 Escalation	21,074	8,010	8,686	5,946	43,716	18.0
TOTAL INVESTMENT	115,314	44,000	55,900	27,286	242,500	100.0
	=====	=====	=====	=====	=====	=====
Percentage	47.6	18.1	23.0	11.3	100.0	

- 3.18 The sources of the currencies for financing the project would be as follows:

(in thousands of US\$)

	Source of Funds			
	<u>Foreign Exchange</u>	<u>Local</u>	<u>Total</u>	<u>%</u>
IDB	44,000	-	44,000	18.1
OECE	55,900	-	55,900	23.0
Suppliers	27,286	-	27,286	11.3
CVC	20,288	95,026	115,314	47.6
Total	147,474	95,026	242,500	100.0
	=====	=====	=====	=====
Percentages	60.8	39.2	100.0	

- 3.19 The loan from the Bank would finance the direct expenditures in foreign currency for: (a) the consulting group; (b) reroute tunnels; (c) filling tunnel; (d) construction of the machine plant; (e) sluiceways; (f) set up of generating equipment provided by the CVC; (g) transmission line and substations; (h) equipment for the works to protect the basin and for handling of the hydrological data system; (i) the fee for the inspection and supervision services; (j) contingencies and escalation involved in the works financed; and (k) interest during the first four years of execution.
- 3.20 The OECE loan would finance the direct expenditures in foreign currency for: (a) engineering; (b) the dam and concrete slab; (c) spillway; (d) earth movement for the machine plant and substation; (e) contingencies and escalation involved in the works financed.
- 3.21 The suppliers and/or entities financing exports would finance expenditures in foreign currency on 85% of the CIF cost, including the corresponding contingency and escalation costs for: turbines and flow regulators, generators and accessory parts, transformers, dam plug, distributors, cranes, valves, and part of the miscellaneous equipment.
- 3.22 The CVC would finance the remaining 15% of the CIF cost in foreign exchange for the equipment indicated in the preceding paragraph, including the respective contingencies and escalation cost; the credit fee on the loan from the Bank and the interests during the last year of construction and all financing charges on the other loans, as well as the investments to be made in local currency on infrastructure works, the major civil engineering works contracted and the works for protection and control of the Basin.

- 3.23 As indicated in paragraph 1.08, the works on the level ground, which would provide protection against floods that recur every 30 years (probability of one in thirty years) are not included in the financing and would be executed once the dam works are completed. The interest shown by the Valley's farmers in protecting the crop land and the economic success achieved as a result of the protection established allow one to assume that those works would be completed in a relatively short period of time (once the Salvajina Dam is completed). For the economic evaluation of the project, that period is estimated at 10 years. The borrower pledges to present to the Bank, within a period of four years from the date of the contract, a plan for execution of those works, showing the cost and sources of financing (see Recommendation 7).

IV. PROJECT PLAN OF EXECUTION

A. Introduction

4.01 Execution of the Salvajina project will utilize the project monitoring system (PMS) based on the detailed project execution plan (PEP) (see Appendix K). The start of the project execution plan (PEP day zero) is the date of the resolution of the IDB Board of Executive Directors, although some of the activities relating to contracting and implementation of preliminary works and to designs of major works and equipment were carried out before that date. The project is scheduled to be completed in full by September 1984, when all generating units of the plant will enter into operation. The estimated date for final disbursement of loan resources would be December 31, 1984, which is considered sufficient to liquidate all payments.

1. Project engineering and supervision

4.02 Activities pertaining to the procurement of engineering services will be concluded once the CVC decides to contract the consulting firm to make the analysis and recommendations and award of contracts and technical supervision of works construction with periodic reports, etc. The preliminary jobs, including documents for bid calls, were done by the Colombian consulting firm INGETEC. Most studies on protection of the plain, control of watersheds, hydrology, geology and seismology were conducted by CVC technicians in cooperation with well-known foreign experts.

4.03 While the engineering of INGETEC has been satisfactory and its relations with the CVC adequate, the CVC is legally obliged to conduct the procedure for selection of the consulting firm to supervise construction. The Bank may agree to continue to utilize INGETEC services if that company should be selected by the CVC. However, the Bank reserves the right to review and approve the terms of reference and proposed contract for those services. It is recommended that the advisory firm be contracted before the first disbursement from the loan. (See Resolution 8(c) II (1))

4.04 Considering the special characteristics of the project and in view of earlier Bank experiences, it is considered necessary to set up an advisory group at a high level consisting of three individual consultants in various fields of engineering to advise the CVC on specific technical aspects. One of those should be an engineer experienced in the construction of gravel dams surfaced with concrete slabs, another specializing in soil mechanics and tunnel construction and a third a hydrologist experienced in handling watersheds and regulating flow by multiple-use dams. It is recommended that the group of individual consultants be contracted prior to the first disbursement from the loan. (See Resolution 8(c) II (2)).

4.05 In order to fulfill the triple purposes of Salvajina, the CVC has set up a hydrology office that is studying the entire process of rainfall and flow in the Salvajina Basin and the major tributaries down river from the dam. That office will monitor flood tides in each partial basin and for the entire length of the Cauca River. It has been determined that the maximum level at the Juanchito station near the city of Cali should not exceed 1085 m³/s. Consequently, discharge from the Salvajina Dam should not exceed 500 m³/s in order to comply with the first condition for protecting the 100,000 hectares of plain based on a frequency of more than once every 30 years. In turn effective reduction of pollution in the Cauca River requires a minimum flow at Salvajina equal to 75 m³/s.

4.06 Basic operating conditions for the reservoir will be as follows:

- a. The reservoir will be gradually filled by flows produced between February 1 and May 30.
- b. The reservoir will be kept full during the months of June and July.
- c. From August 1 to October 31 the reservoir will be slowly emptied.
- d. In November, December and January a minimum operating level will be maintained at the reservoir, generating energy from all water entering it.
- e. The outflow by Salvajina will also be regulated in terms of rainfall recorded in the basins of the Palo, Jamundi and Timba Rivers down river from Salvajina.
- f. The outflow by Salvajina will be regulated during low-water periods in order to maintain a minimum at the Juanchito station of 130 m³/s so as to decrease the pollution index.

2. Plans and specifications for bidding

4.07 The project has been studied at the feasibility level, and bidding documents have been prepared for the major works by the INGETEC consulting firm. The preclassification process was began in August 1979, according to standards recommended by the Bank. Infrastructure facilities consisting of access roads, camps and energy supply are in progress and expected to be completed by the second quarter of 1980. Final plans and specifications for the major civil works (dam, spillway, tunnels, powerhouse and connection yard) have been completed. The award by the CVC of construction contracts for all works is scheduled in May 1980. Appendix O contains the bidding regulations to be used in the project for procurement of goods and services financed with the resources of the prospective loan.

3. Project execution

- 4.08 The Salvajina project will be administered by the borrower through a special executing unit already set up and operating under the CVC Subdirección Técnica, which is working in close contact with the consulting firm and will assume responsibility for project engineering and supervision, contracting and execution of contracts, payment of certificates and invoices for works and supplies and all matters pertaining to relations with the Bank, the OECF and suppliers. (See paragraphs 5.04 and 4.12).
- 4.09 For purposes of procurement and contracting, project works will be divided into seven packages as follows:
- a. Package zero - Includes the basic infrastructure covering access roads, camp, communications, energy lines for construction, purchase of land for work sites and excavation of portals for deviation and bottom discharge yard tunnels.
 - b. Package one - Includes excavation and surfacing of two deviation tunnels and head tunnel; powerhouse and connection yard structures and assembly of their equipment.
 - c. Package two - Includes the dam and spillway; excavation of powerhouse and transformation yard and load intake.
 - d. Package three - Corresponds to supply, transportation and assembly supervision of equipment for the dam, spillway, powerhouse, connection yard and transformer substation at Pance.
 - e. Package four - Includes materials and construction of the 115 Kv transmission line between the Salvajina plant and Pance substation.
 - f. Package five - Includes acquisition of land for the reservoir, payment of damages to parties concerned and relocation of inhabitants as necessary pursuant to CVC policies contained in Appendix L.
 - g. Package six - Covers installations for protection of the Cauca Upper Basin to be carried out by the CVC on force account. The machinery, vehicles and equipment necessary to execute the works and the system of hydrolic information will be financed with the IDB loan. Salaries of personnel, materials and labor will be financed by the CVC.
- 4.10 Goods and services to be acquired with the resources of the IC loan exceeding the equivalent of US\$100,000 will be put up for bid in accordance with the procedure described in Appendix 0 to the document. Goods to be acquired with the resources of the OECF financing and of suppliers

will be bid on through the procedures agreed upon with the borrower. The packages mentioned will be bid on at the international level on the dates given below:

<u>Package</u>	<u>BID Dates</u>	<u>Financed by</u>
0	Already contracted	CVC
1	November 1979	IDB
2	November 1979	OECE
3	November 1979	IDB
4	July 1980	IDB
5	Not available	CVC
6	July 1980	IDB

- 4.11 Packages one, two and four will be bid on internationally, through separate bids, in which qualified building firms from countries eligible for financing with IDB or EECF resources, as the case may be, will participate. Package 3 will also be bid at the international level, divided into convenient subpackages, with the participation of companies from all countries supplying equipment. The goods required for package 6 will also be divided into convenient units and bid at the international level by suppliers from IDB member countries.
- 4.12 The organization of the project executing unit approved by the CVC (see Appendix Q) is considered acceptable. It will be able, with advice from a consulting firm, to supervise technical execution of the project. This proposed procedure of contracting supervision by consultants was successfully employed by the CVC in executing the Alto Anchicaya Dam.

4. Bidding and construction

- 4.13 In 1978 the infrastructure facilities included in Package 0 of the project works were begun. Their progress is estimated at 55%, which will make it possible to launch the major works as soon as contracts are let. The bid documents for the major civil works are ready, and construction is expected to begin in August 1980. (See Appendix M-1)
- 4.14 Construction programs for packages 2 and 3 call for award of contracts in mid-1980 to complete construction at the end of 1983, which will make it possible to fill the dam and start its operation in mid-1984. (See Appendix M-2 and 3)
- 4.15 Bid documents for package 3, covering supply of equipment, are ready, and contracts with suppliers are expected to be signed in mid-1980. This will permit delivery of the equipment beginning in mid-1982, when the two generating units are required in order to be incorporated into the powerhouse. (See Appendix M-4)
- 4.16 The bid documents for package 4 would be ready at the beginning of 1981, which will allow for start of construction at the end of 1981 so that

- ## 5. Investments

- ### Scheduled Investments by Source of Funds

(In US\$ thousands equivalent)

	Before Year	Year					
<u>Investments</u>	<u>1980</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>Total</u>
Borrower	4,823	18,567	16,467	34,705	25,249	15,503	115,314
IDB Loan	-	7,095	6,119	13,695	10,618	6,473	44,000
OECF Loan	-	16,567	13,554	11,791	10,345	3,643	55,910
Suppliers	-	1,359	3,274	16,815	3,448	2,390	27,236
Total	4,823	43,588	39,414	77,006	49,660	28,009	242,500

- 4.21 This schedule of investments and disbursements is considered adequate, since, on the basis of prior planning and determination of steps to be taken in order to begin execution of the major works, it is concluded that the prospective Bank loan could be disbursed over a period of five years following the date of signature of the prospective loan contract.

B. Recognition of Previous Investments

- 4.22 In view of that background and considering the projected schedule for project execution, it is recommended that costs incurred by the CVC under the project before signature of the prospective loan contract be recognized as part of the local counterpart, provided they were incurred within the 18 months immediately preceding such signature. (See Recommendation 10) Those investments are estimated at the equivalent of US\$5 million (2% of total project cost) and correspond to the costs of studies, engineering designs and infrastructure work. No cost whatever is expected to be incurred prior to contract signature that would be eligible for financing with resources from the proposed Bank loan.

C. IDB Inspection and Supervision

- 4.23 Inspection of project execution by the Bank will be carried out by specialists of the energy sector in the Colombian field office. Supervision of basin conservation and multiple-use dam management will be the responsibility of sectoral specialists appointed by the Bank field office in Colombia.

V. THE BORROWER AND THE EXECUTING AGENCY

A. Institutional Analysis of the Borrower and Executing Agency of the Project

5.01 The Borrower and Executing Agency of the loan proposed in this document would be the Corporación Autónoma Regional del Cauca (CVC) and the Guarantor the Republic of Colombia. CVC is an autonomous regional entity with juridical personality, administrative autonomy and its own patrimony, created under Decree No. 3110 of October 22, 1954, and reorganized under Decree No. 1707 of 1960. ^{1/} The Corporation is domiciled in Cali but upon the decision of its Directing Council, it can establish special offices in other places.

5.02 CVC capital is composed of contributions made by the Government, the Departments and Municipalities, donations and legacies, retained earnings and special taxes up under current law to benefit the corporation. Contributors to CVC acquire no rights to its equity nor authority to intervene in its management.

1. Purpose

5.03 The primary goal of CVC is to promote the preservation and development of the watershed of the Upper Cauca, the Pacific slopes adjacent to the watershed and bordering lands related to or affected by CVC activities. These activities are geared to the execution of an integral plan for the use of the natural resources in the region.

2. Functions, attributes and organization

5.04 The functions, attributes and organization of the Corporation are summarized in Appendix P. CVC is considered to have the necessary attributes to perform its functions properly and an institutional organization to carry out the task commended to it on a timely and suitable basis. For the purpose of project execution, the organization would be strengthened with an executing unit and a high level group of consultants to coordinate technical engineering work. Administration and accounting for the proposed loan would be done by the Office of the Deputy Director for Administration which has a special section for this purpose in the Finance Division. This section currently administers the former loans from the Bank and from other international and private institutions.

5.05 As indicated in Chapter II, depending on the scope of the institutional reorganization of the electricity sector in the Cauca Valley, the

^{1/} Under the provisions of Decree No. 627 of 1974, and for the purposes of the Government trusteeship, CVC was to be placed under the National Planning Department (Art. 55).

functions, attributes and organization of the Corporation might possibly change. For the purposes of execution and operation of the Salvajina project and in order to analyze the new institution's payment capacity, the solution proposed should be acceptable to the Bank. (See Resolution 8(a)).

3. Staff

- 5.06 In December 1978, CVC had a full-time staff of 2,060 employees. In the table on the next page they are classified by office and category. The staffing structure of the Corporation is generally satisfactory. It has the necessary professional and technical staff (15% and 19%, respectively) for management, coordination and operations. Staff qualification and experience are satisfactory as a result of: (i) the low rate of turnover; (ii) staff experience in project execution and plant operation; (iii) the implementation of training programs. Using its own resources and assisted by specialized Colombian entities, CVC maintains a fulltime program to train and develop its personnel; 234 employees attended training courses in 1978. As explained in paragraphs 4.08 and 4.09 of this report, the specific characteristics and scope of the project make it advisable for the technical and operational capacity of CVC to be supplemented for project construction by a consulting firm for supervision and a high level advisory group.

4. Financial management

- 5.07 The accounting and financial management of the Corporation, which is satisfactory, is under the jurisdiction of the Deputy Director for Management, specifically the Finance Division. This Division is organized into five sections, whose functions are duly established and summarized below: 1/
- a) Section for Management External Loans: This section handles the processing of disbursements and control of debt service payments on medium and long term loans entered into by the Corporation, and coordinates the financial aspects of said loans with other departments.
 - b) Budget Section: Assists other divisions of the Corporation in the preparation and control of their budget and is responsible for drawing up the final budget. Handles the incoming accounts payable for review and approval based on contract provisions and current administrative and fiscal regulations.
 - c) Tax Section: Monitors the timely collection of special taxes allocated to the Corporation and those paid by CVC chargeable to third parties under its legal and statutory authority.

1/ Appendix Q includes the Organization Chart of the Deputy Directorate for Administration.

CVC

STAFF CLASSIFICATION BY AREAS AND LEVELS AT 31 DECEMBER 1978

	Management 1/	Development		Deputy Director			Total	%
		Program B/Ventura	Administration	Development	Operations	Technical		
Executive	5	5	4	4	3	3	24	1
Professional	31	34	23	114	41	38	281	14
Technical	6	19	3	206	83	70	387	19
Administrative	30	19	112	90	133	33	417	20
Service	5	3	25	326	350	61	770	37
Blue Collar	1	1	9	90	45	35	181	9
	78	81	176	830	655	240	2,060	100
TOTAL	4	4	9	40	32	11	100	
%								

1/ Includes the General Secretariat, Internal Audit, Planning and Assessment

Source

CVC Personnel Division

August 1979

- d) Treasury: Directs and coordinates the collection and custody of revenues and funds allocated to CVC and handles the payment of obligations, commitments and expenditures.
- e) Accounting Section: Directs and coordinates the accounting for all current activities of the Corporation, power distributors and specific projects. Prepares the balance sheets and required financial reports on a timely basis.

5.08 As of December 1978, the Finance Division had 85 employees, broken down into the following categories: 1 chief of division, 8 professionals and 76 administrative technicians. The structure of this Division and the size of its staff (11% professional and 88% administrative) is due to the fact that Corporation accounting is done manually. The staff is qualified and has several years experience in the Division, particularly the professional staff which coordinates and directs its work.

a) Accounting system

5.09 The accounting system of the Corporation is spelled out in the plan of accounts which also contains the classifications, standards and procedures for recordkeeping. The accounting is done manually and transactions are recorded by cost centers according to different sectors: electric power, regional development and administrative. Monthly financial statements are prepared as well as yearly financial statements for the fiscal period with the relevant closing adjustments. The accounting is up to date and transactions can be analyzed from its records.

5.10 In April 1979, CVC with the help of the Consulting firm of Carvajal, S.A., began to computerize its accounting. The employee payroll and detailed customer billings from the power sector were fed into the computer in the first phase on a trial basis. The Corporation presently rents computer time and is moving forward on studies to fully computerize its accounting.

5.11 In April 1977, the ledger for the project to regulate the Cauca river (Salvajina) was opened and a special plan of accounts began for the correct allocation of project expenditures from its very beginning. The ledger provides the means to classify project costs under their major categories (which for Bank purposes only require regrouping and small adjustments) and has equivalency codes so they can be recorded in the integrated accounting system of the Corporation.

b) Budget system

5.12 As a national public entity, CVC must abide by the organic standards of the general national budget, Decree Law No. 294 of 1973. The budget is drawn up by the Budget Section which coordinates and groups the information supplied by the other divisions in the Corporation according to

standards and classification designed by the General Directorate for Budget and the National Planning Department so it can form part of the draft budget submitted by the Chief Executive to the Congress for approval. For this purpose, CVC must submit its budget to the sector eight months before it takes effect.

- 5.13 Budgetary control is carried out by means of a records system that parallels the equity accounting system. Whereas Accounting provides the data, Budget has prior control over expenditures. Under this system, costs can be quantified by programs with a degree of analysis that facilitates satisfactory identification of transactions. Monthly statements on budgetary performance are prepared and distributed to Corporation executives for their analysis. Semiannual reports are made to the National Government and the Office of the Comptroller General on the physical and financial progress in investments and programs.

c) Billing and collection system

- 5.14 CVC sells 83% of its power by lump sale to three large groups: CHIDRAL, ISA and municipalities. Billing and collection from these groups is very different from billing procedures for the approximately 120 thousand customers who are served directly (retail sale). Billing for lump sales to ISA and the municipalities is done on a monthly basis and the administration of this billing is a simple matter because of the small number of clients. Billings for retail electricity accounts are collected monthly through affiliated bank offices. The customer has 15 days to pay and is subject to a surcharge of 2-1/2% per month for late payment. At the present time, 40% of the retail billing is computerized and 60% is done by hand. By the first quarter of 1980 it is expected that 100% of the billing will be computerized.

- 5.15 CVC provides several services to the community. Generally it is Corporation policy that each division is responsible for collecting its own revenues. Collections for technical assistance, advice on estate management, supervision, water concession and surveillance rates, and others are made through affiliated offices and banks under the control of each division that provides the service.

d) Internal audit

- 5.16 In compliance with an earlier loan recommendation of the Bank, the Corporation formed an internal audit office to coordinate and monitor compliance with administrative, accounting, financial and operational practices, policies and procedures of the institution. At the current time, this office is directly under the Executive Director which enables it to maintain the necessary arm's length relationship for the performance of its functions.

The internal audit activities reach into all areas, operations, projects and activities of the Corporation. Its work is geared towards specific

projects that make up the plan of activities of CVC. The office has a staff of 9, including 4 auditors and 4 assistant auditors. The work done by the office is complemented by and coordinated with the Office of the Fiscal Auditor, the permanent delegations of the Office of the Comptroller of the Republic, thus avoiding overlapping controls.

e) External audit

- 5.17 Under Law No. 151 of 1959, the Office of the Comptroller General of the Republic exercises external control over CVC operations. It therefore maintains a permanent field office at CVC, the Office of the Fiscal Auditor, who reports directly to the Comptroller General. This office performs a preliminary examination of all transactions to determine that expenses are correctly classified and the actions and contracts of the Corporation are in keeping with the law. The Office of the Comptroller General sends skilled staff to perform the annual audit of the Corporation. It is recommended that this audit and the project audit be submitted annually to the Bank.

B. Financial Analysis of the Borrower 1/

- 5.18 Past CVC financial statements (for the fiscal years ended December 31, 1974, 1975, 1976, 1977 and 1978) upon which this analysis is based, have been audited by the Office of the Comptroller General of the Republic, and have been reclassified and summarized with the assistance of the Finance Division of the Corporation for a clearer presentation and to highlight the operations in the energy sector.

1. Financial statements

- 5.19 The financial statements are submitted in Appendix R and are summarized as follows:

a) Fixed assets

- 5.20 Fixed assets are composed mainly of plants and equipment in the electricity sector, representing on the average for the period 1974-76, 85.6% of total assets and 75% for 1977-78. The drop in the percentage in recent years is due principally to a higher share of investment in total assets; as will be explained later, this is due to new investments and their reevaluation in ISA and reinvestment in CHIDRAL.
- 5.21 Plant and equipment in gross service by CVC in 1974 were worth Col.\$1,233.9 million, representing 25% of the total asset worth. Twenty percent of these assets were administered directly by CVC and 80% were under CHIDRAL operation. Investment in construction of the Alto

1/ Unless otherwise stated, all past financial statements are presented in millions of Colombian pesos (Col.\$).

(Millions of Col.\$)

	1 9 7 4		1 9 7 5		1 9 7 6		1 9 7 7		1 9 7 8	
	Col.\$	%	Col.\$	%	Col.\$	%	Col.\$	%	Col.\$	%
Assets										
Fixed										
Plant and equipment in service Net	1,019.4	21	4,396.2	82	4,779.2	83	5,036.7	74	5,486.5	72
Real estate	15.9	-	15.9	-	17.2	-	15.1	-	15.0	-
Construction in process	3,154.2	66	149.7	3	123.5	2	100.6	2	172.9	2
Total fixed assets	<u>4,189.5</u>	<u>87</u>	<u>4,561.8</u>	<u>85</u>	<u>4,919.9</u>	<u>85</u>	<u>5,152.4</u>	<u>76</u>	<u>5,674.4</u>	<u>74</u>
Medium-term and long-term realizables										
Investments	369.2	8	505.3	9	576.5	10	1,140.9	17	1,106.5	15
Inventories	68.6	1	81.1	2	75.2	1	92.2	1	197.4	3
Other	44.4	1	14.7	-	12.2	-	57.6	1	192.5	2
Total medium-term and long-term realizables	<u>482.2</u>	<u>10</u>	<u>601.1</u>	<u>11</u>	<u>663.9</u>	<u>11</u>	<u>1,290.7</u>	<u>19</u>	<u>1,496.4</u>	<u>20</u>
	61.4	1	103.3	2	144.6	2	245.0	4	392.6	5
Current										
Deferred and other assets	100.4	2	87.9	2	91.4	2	127.3	1	129.1	1
Total Assets	<u>4,833.5</u>	<u>100</u>	<u>5,354.1</u>	<u>100</u>	<u>5,819.8</u>	<u>100</u>	<u>6,815.4</u>	<u>100</u>	<u>7,692.5</u>	<u>100</u>
Net worth and Liabilities										
Net worth										
	810.7	17	944.6	18	1,078.0	19	1,703.3	25	2,404.2	31
Long-term Liabilities										
Obligations in local currency	373.1	8	533.0	10	494.5	8	726.2	11	634.1	8
Obligations in foreign currency	2,507.0	52	2,858.0	54	3,414.8	59	3,396.6	50	3,464.6	45
Other obligations	301.3	6	288.8	5	315.4	5	306.0	4	153.9	2
Total long-term liabilities	<u>3,181.4</u>	<u>66</u>	<u>3,679.8</u>	<u>69</u>	<u>4,224.7</u>	<u>72</u>	<u>4,428.8</u>	<u>65</u>	<u>4,252.6</u>	<u>55</u>
Current										
Current portion long-term debt	123.3	3	176.8	3	326.3	6	544.0	8	741.2	10
Other obligations	667.9	13	494.1	9	128.2	2	37.4	-	231.4	3
Total current	<u>791.2</u>	<u>16</u>	<u>670.9</u>	<u>12</u>	<u>454.5</u>	<u>8</u>	<u>581.4</u>	<u>8</u>	<u>972.6</u>	<u>13</u>
	50.2	1	58.8	1	62.6	1	101.9	2	63.1	1
Deferred	<u>50.2</u>	<u>1</u>	<u>58.8</u>	<u>1</u>	<u>62.6</u>	<u>1</u>	<u>101.9</u>	<u>2</u>	<u>63.1</u>	<u>1</u>
Total net worth and liabilities	<u>4,833.5</u>	<u>100</u>	<u>5,354.1</u>	<u>100</u>	<u>5,819.8</u>	<u>100</u>	<u>6,815.4</u>	<u>100</u>	<u>7,692.5</u>	<u>100</u>

Anchicayá hydroelectric plant, which was co-financed by the Bank, was Col.\$3,154.2 million (66% of total assets). In 1975, Alto Anchicayá began service with a worth equal to Col.\$3,437.7 million, and CVC, as explained earlier, decided to take over its operation.

- 5.22 This decision was reflected in the fact that from that time CVC operated approximately 75% of the worth of its assets and CHIDRAL 22%, in inverse ratio from the position in 1974; in 1978 this ratio was 80% CVC and 20% CHIDRAL.
- 5.23 Under Colombian business law, CVC cannot change the book value of its assets; nevertheless, CVC moves the value of its assets upward each year at a rate equal to the increase in long-term foreign currency liabilities caused by exchange rate adjustments. Thus the book value of fixed assets can be regarded as partially revalued. ^{1/} During the period analyzed, plant and equipment in service increased by Col.\$5,051.7 million as a result of: (i) incorporation of Alto Anchicayá, Col.\$3,437.7 million; (ii) revaluation, Col.\$1,221.0 million; and (iii) expansion and improvements (net of withdrawals), worth Col.\$292.0 million.

b) Investment

- 5.24 As of December 1978, CVC reported Col.\$1,106.5 million in investments (20% of its total assets), represented by capital stock and/or securities of: (i) ISA, Col.\$842.4 million (76%); (ii) CHIDRAL, Col.\$230.3 million -- net of provision -- (21%); (iii) Power distributors, Col.\$20.6 million (1.8%); and (iv) other investments worth Col.\$482.5 million in capital stock, Col.\$77.2 million in bonds and Col.\$282.7 million for revaluation stock. CVC as a stockholder in ISA, invests funds yearly in projects which are advanced by ISA according to an arrangement agreed upon with ISA stockholders so that CVC always accounts for 20% of its net worth. Performance of this heading of the balance sheet is considered acceptable.

c) Receivables: electricity

- 5.25 At the present time, CVC bills approximately 60% of its sales to CHIDRAL, with whom it has agreed upon two forms of payment: (i) it credits CHIDRAL for purchases of power; and (ii) the balances are paid in four equal installments every 10 days counting from the twentieth day after the billing date. In addition, CVC charges CHIDRAL for the right to use CVC assets an amount equivalent to the book depreciation of the assets plus the interest on their debt service. Both institutions keep current accounts where they record these operations. A summary of the CVC current account with CHIDRAL is given below:

^{1/} For purposes of computing the return required by the Bank, CVC keeps extra accounting records in which assets are revalued following the methodology agreed upon with the Bank.

(Thousands of Col.\$)

	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>
<u>Account with CHIDRAL</u>					
balance	(5,014)	7,284	96,029	141,943	262,932
<u>during the year:</u>					
for the use of assets	45,949	61,680	66,553	63,348	58,908
city supplied to					
AL	79,935	324,135	451,820	695,207	1,055,952
aneous charges and					
ts	<u>29,240</u>	<u>(2,320)</u>	<u>22,865</u>	<u>21,801</u>	<u>5,201</u>
illed	155,124	383,495	541,238	780,356	1,120,061
<u>Payments made by</u>					
<u>AL:</u>					
tricity supplied to					
	86,897	116,355	174,864	257,966	402,702
	<u>65,149</u>	<u>182,129</u>	<u>322,960</u>	<u>404,281</u>	<u>522,512</u>
	152,046	298,484	497,824	662,247	925,214
<u>Payments by CVC to</u>					
<u>CHIDRAL</u>	<u>9,220</u>	<u>3,734</u>	<u>2,500</u>	<u>2,880</u>	<u>3,590</u>
alance on current					
nt	7,284	96,029	141,943	262,932	461,369

	<u>1 9 7 4</u>	<u>1 9 7 5</u>		<u>1 9 7 6</u>		<u>1 9 7 7</u>		<u>1 9 7 8</u>	
		<u>Col.\$</u>	<u>%</u>	<u>Col.\$</u>	<u>%</u>	<u>Col.\$</u>	<u>%</u>	<u>Col.\$</u>	<u>%</u>
e/sale of electri-									
net	(6,962)	207,780	100.0	276,956	100.0	437,241	100.0	653,250	100.0
alance paid by CHIDRAL									
other obligations	(14,246)	111,751	53.8	135,013	48.7	174,309	39.9	191,881	29.4
ing balance for									
of electricity	7,284	96,029	46.2	141,943	51.3	262,932	60.1	461,369	70.4

- 5.26 The preceding table shows the year by year increases in the CHIDRAL debt. This has come about cumulatively to the extent that CHIDRAL has been unable to raise its annual payments at the same rate as its balances (favorable to CVC) for electricity transactions. Part B of the table shows the share that would theoretically cover CHIDRAL payments of the electricity billing if the debt from the preceeding year and the other charges and payments during the year were deducted first. In 1975 there was a net balance from electricity transactions equivalent to Col.\$207.7 million. Net balances on hand were Col.\$111.7 million of the Col.\$182.1 million CHIDRAL paid during that year. This balance on hand only covered 53.8% of the net billings for the year. With CHIDRAL payments failing to increase by an equal or higher percentage, the balance of its debt to CVC has increased each year. In 1978 the balance on hand (Col.\$191.8 million) only covered 29.4% of the billings for the year. A large part of the year's payment (Col.\$522.5 million) was used first to cover the preceding year's indebtedness.
- 5.27 The notes to the balance sheets from 1975 to 1978 indicate that the percent due of the current account balance was equal to 74.6%, 64.3%, 73.0%, and 77.7% of the total indebtedness for each year. This means that on an average over the past four years somewhat over 70% of the current account balance of CHIDRAL was due and payable.
- 5.28 The currenct account indebtedness of CHIDRAL increased by Col.\$454.1 million over the past four years because of EMCALI delinquencies in paying its obligations to CHIDRAL. Neither CVC nor CHIDRAL have enforceable instruments to solve the situation that would not involve total institutional change. The alternatives to this are under study. See paragraph 2.34. EMCALI reported that it has acceptable net earnings on its power operations and that there are no special problems with collections. The problem lies in the fact that it is using part of its cash resources for its expansion programs in other sectors. See paragraph 5.32. A summary of movement in CHIDRAL accounts receivable from EMCALI for electricity is given below:

CHIDRAL ACCOUNTS RECEIVABLE FROM EMCALI FOR ELECTRICITY

(Thousands of Col.\$)

	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>
Initial balance	29,727	87,525	104,921	103,849	180,110
Plus: Current year billings	285,782	364,910	521,457	660,112	1,040,065
Interest on overdue bills	<u>92</u>	<u>906</u>	<u>179</u>	<u>4,437</u>	<u>23,083</u>
Less: Collections					
Current year billings	198,349	260,895	417,787	484,439	710,487
From prior years	<u>29,727</u>	<u>87,525</u>	<u>104,921</u>	<u>103,849</u>	<u>180,110</u>
Total collected	<u>228,076</u>	<u>348,420</u>	<u>522,708</u>	<u>588,288</u>	<u>890,597</u>
Final balance	<u>87,525</u>	<u>104,921</u>	<u>103,849</u>	<u>180,110</u>	<u>352,661</u>

The age of the balances mentioned above was:

1 to 60 days not due	87,525	54,519	69,479	106,249	178,153
61 to 90 days due	-	45,429	34,370	72,623	123,746
91 to 120 days due	-	4,973	-	1,238	50,762
Total	<u>87,525</u>	<u>104,921</u>	<u>103,849</u>	<u>180,110</u>	<u>352,661</u>

Percentagewise the age was:

1 to 60 days not due	100	52	67	59	51
61 to 90 days due	-	43	33	40	35
91 to 120 days due	-	5	-	1	14
Total	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>

- 5.29 A comparison of CVC receivable balances from CHIDRAL with those of the latter from EMCALI indicates that the balances of the former would be significantly lower if EMCALI paid its bills on time. In an interview with an EMCALI representative, he said that because of general treasury balances in the past EMCALI was behind in its payments but corrective action had been taken in other production sectors of the company to make them self-sufficient within the next 18 months. The situation has improved somewhat in 1979. The delinquent balance of EMCALI was sliced from Col.\$203.5 million in January to Col.\$113.1 million in May.
- 5.30 The lag in the collection of 60% of corporation billings must be resolved. It makes the tight liquidity situation even more serious and is partly responsible for CVC's having to refinance its obligations. It is therefore recommended that during the period of project execution, as of June 30, 1980, CVC submit a yearly statement showing that it has collected at least 70% of the callable balances for the prior year 1/, including the balance outstanding for collection at the beginning of each period, of billings for the sale of electricity to CHIDRAL and CHIDRAL sales of electricity to EMCALI. (See Recommendations 5).
- 5.31 In order to ensure the timely payment of invoices by EMCALI, in addition to the EMCALI agreement with CHIDRAL pledging its bank accounts which is still in force but inoperative, a provision is recommended for inclusion in the guaranty agreement with the Government under which the Guarantor undertakes not to authorize a new application for internal or external indebtedness by EMCALI until it has paid CHIDRAL the amounts billed for lump sales of electricity within the normal collection period. (See Recommendation 9).
- 5.32 CVC makes lump sales of electricity not sold to CHIDRAL (approximately 40% of the total power produced) to 23 distributing entities and 22 municipalities plus direct sales to some 120 thousand final consumers. As indicated in the following table, collection poses no problems. The non-overdue portfolio was over 90% in 1978. The performance of accounts receivable for the years 1974-78 is indicated in Appendix S.

1/ This percentage would gradually increase by 4% yearly up to 85% in 1984.

Composition of Accounts Receivable Balance Electricity 1978

(Thousands of Pesos)						
	1-60 Not due	61-90	91-120	121-360	Over 360	TOTAL
Electricity distributors <u>1/</u>	2,744	247				2,991
Valle Department and Municipalities <u>2/</u>	1,014	179	173	27		1,393
National Government Administrators and Collectors <u>3/</u>	2,391	122	43	63	35	2,654
Other Public Utilities <u>4/</u>	14,887	808	135			15,830
Private Companies <u>5/</u>	13,006	539	598	521		14,664
	<u>38,855</u>	<u>3,392</u>	<u>210</u>			<u>42,457</u>
Total	72,897	5,287	1,159	611	35	79,989
Percentage	91%	7%	1%	1%	-	100%

5.33 Although the accounting process does not describe the billing in as much detail as would be desired, in general the collection situation is satisfactory. The average collection period for large groups is given below:

(days on accounts receivable)

	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>
<u>LUMP SALES</u>					
23 Distributors	3	8	7	5	14
Others	150	252	144	70	75
<u>OFFICIAL</u>					
National Government and 22 Municipalities	51	59	56	75	68
<u>PRIVATE</u>	40	39	51	39	51

- 1/ Billing of 23 distributing entities.
 2/ Billing of 22 municipal entities that distribute electricity.
 3/ Billing for retail sales (residential, industrial, commercial, etc.) in rural areas and towns for which administrators and collectors are responsible.
 4/ Collectable billing from EMCARTAGO, Electric Company.
 5/ Mainly billing of large industrial consumers.

Under lump sales, the "other" group basically stands for two entities, the Cía Eléctrica de Tuluá and EMCARTAGO, where the average collection period on accounts receivable has been excessively long. This has no perceptible effect on the liquidity of the Corporation because their volume is small and, as indicated, beginning in 1977 there was a noticeable change for the better.

d) Net worth

- 5.34 CVC is a public law entity and therefore its capital structure, unlike that of a private business, is made up mainly of contributions from the central government, departments, municipalities and capitalization of taxes (in this case real estate) and retained earnings. Likewise, donations, mainly from private companies, which offset company investments for their benefit, generally electric connections, are capitalized. The performance of the net worth accounts was as follows:

(In thousands of Col.\$)

<u>PAID-IN CAPITAL</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>
<u>Contributions</u>					
<u>Initial balances</u>					
Donations	15,930	25,009	40,868	61,914	78,291
Government and department	478,432	529,798	626,496	670,405	671,874
Taxes	179,048	192,873	197,862	208,797	253,385
<u>Additions:</u>					
Donations	9,079	15,859	21,046	16,377	34,776
Government and departments	51,366	96,698	43,909	1,469	11,019
Taxes	13,825	4,989	10,935	44,588	209,064
<u>Final Balance</u>	<u>747,680</u>	<u>865,226</u>	<u>941,116</u>	<u>1003550</u>	<u>1258409</u>
<u>Retained Earnings</u>					
<u>Initial Balance</u>	45,935	63,007	79,342	136,920	329,919
Plus: Net earnings for the year	17,072	74,650	57,578	192,999	533,209
Plus or minus: Adjustments	-	(58,315)	-	-	-
<u>Final Balance</u>	<u>63,007</u>	<u>79,342</u>	<u>136,920</u>	<u>329,919</u>	<u>863,128</u>
<u>Reevaluation of Investments</u>					
<u>Initial Balance</u>	-	-	-	-	369,800
Plus: Additions (withdrawals) during the year	-	-	-	369,800	(87,100)
<u>Final Balance</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>369,800</u>	<u>282,700</u>
<u>Final Balance Total</u>	<u>810,687</u>	<u>944,568</u>	<u>1078036</u>	<u>1703269</u>	<u>2404237</u>

- 5.35 Contributions and donations increased during the period by Col.\$241.2 million of which Col.\$88.1 million (37%) represented donations mainly for private company connections, and Col.\$153.1 million (63%) represented contributions from the Government and other national institutions for specific regional development programs in the Cauca Valley.
- 5.36 Law No. 25 of 1959 amended legislation on real estate tax collections. The new law provides for a tax rate of 3 mills on property values in accordance with appraisal rules. The tax is collected by the municipalities and transferred to CVC. Of the amount collected, the law stipulates that approximately 41% must be reimbursed to the tax payers through placement of bonds. Because of the administrative procedures involved, there has been virtually no demand for the bonds. The non-reimbursable balance of approximately 59% is capitalized and applied to regional development programs. The special increment in this account in 1978 was due to a resolution by the Board of Directors that authorized Col.\$200 million to be transferred from the long-term account --bonds-- to capital after concluding that there would be insufficient demand for bonds in the medium-term.
- 5.37 The Corporation has been capitalizing its earnings and increased its net worth by Col.\$800.1 million in this manner. Net earnings generated during the period analyzed were Col.\$858.4 million. In 1975, deferred charges for studies, exchange rate adjustments and others, amounting to Col.\$58.3 million, were amortized.

e) Long-term debt

- 5.38 The long-term debt in national and foreign currency (including its current portion) accounted for 60.9% of total net worth and liabilities in 1974; in 1978, 61.3%. In current terms, the debt jumped from Col.\$2,944.7 million in 1974 to Col.\$4,715.6 in 1978, a net increase of Col.\$1,770.9 million, brought about by: (i) additional indebtedness in national currency of Col.\$1,013.7 million; (ii) additional foreign currency indebtedness worth Col.\$637.1 million; (iii) rate adjustments on the debt in foreign exchange worth Col.\$1,432.8 million. During the period, debt amortization was Col.\$1,312.7 million.
- 5.39 The debt/net worth ratio performed favorably during the five-year period. The ratio of 83 to 17 in 1974 was 60 to 31 in December 1978. As explained earlier, the indebtedness position improved because of the performance of net worth. However, it should be mentioned that current obligations, including amortization of advances, grew sharply. In 1978 it represented 14% of total liabilities which, compared to the 1974 figure of approximately 3%, is accounted for by the maturity of prior year refinancings when the CHIDRAL rate was frozen. A sample of the gradual economic recovery of the institution is reflected in an analysis of the liquidity indices, as follows:

	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>
Current ratio	0.16	0.27	0.48	0.58	0.60
Acid Test <u>1/</u>	0.08	0.15	0.32	0.42	0.40

The current ratio and acid test both showed considerable improvement during the period, moving from a critical position in 1974 to a reasonable although low composition in 1978. This liquidity situation, the result of frozen rates in the past and lags in collections, forced CVC to refinance part of its debt annually. Although some debt refinancing is expected in the future, this will be geared to strengthening the financial structure of the Corporation and used as alternative sources of credit to finance part of the local contribution of the project. (See paragraph 5.63). The major financial indices in the past are given in Appendix T.

2. Statement of earnings

- 5.40 Detailed statements of earnings of CVC during the period 1974-78 are found in Appendix U and summarized below.

1/ Liquid current assets loan alone considered.

C. V. C.
Earnings from Operations
(In millions of pesos)

	1974		1975		1976		1977		1978
	Col.\$	%	Col.\$	%	Col.\$	%	Col.\$	%	Col.\$
of electricity (GWh)	442.1		1,782.1		1,848.9		2,085.2		2,400.1
age rate (millions Col.\$)	317.3		309.4		408.6		542.0		699.1
ting Income: Energy									
of electricity	140.3	93	551.4	87	755.5	89	1,130.2	92	1,678.1
operating income electricity	11.2	7	79.5	13	95.2	11	98.6	8	104.1
operating income Energy Sector	<u>151.5</u>	<u>100</u>	<u>630.9</u>	<u>100</u>	<u>850.7</u>	<u>100</u>	<u>1,228.8</u>	<u>100</u>	<u>1,783.1</u>
ting costs: Energy									
tions: Operation and Maintenance	0.8	-	26.1	4	38.8	4	56.8	5	58.1
operation and maintenance ISA	-	-	27.2	4	32.7	4	26.7	2	71.1
ase of electricity	87.6	57	119.5	19	238.1	28	347.6	28	548.1
tribution: Operation and maintenance	22.6	15	19.9	3	26.1	3	33.3	3	43.1
billing and collections	2.5	2	3.4	1	4.5	1	6.4	1	8.1
istration and overhead	4.1	3	5.6	1	13.6	1	14.9	1	24.1
ciation	8.9	6	120.2	19	142.5	17	150.4	12	163.1
operating costs: Energy	<u>126.5</u>	<u>83</u>	<u>321.9</u>	<u>51</u>	<u>496.3</u>	<u>58</u>	<u>636.1</u>	<u>52</u>	<u>919.1</u>
operating Income: Energy	25.0	17	309.0	49	354.4	42	592.7	48	864.1
expenditures energy sector	2.5	2	268.8	43	274.3	33	376.2	30	436.1
t on energy operation	<u>22.5</u>	<u>15</u>	<u>40.2</u>	<u>6</u>	<u>80.1</u>	<u>9</u>	<u>216.5</u>	<u>18</u>	<u>427.1</u>
ost programs other sectors	2.8	2	2.5	-	3.4	-	4.1	-	6.1
net income (expenditures)	<u>(2.6)</u>	<u>(2)</u>	<u>36.9</u>	<u>6</u>	<u>(19.1)</u>	<u>(2)</u>	<u>(19.4)</u>	<u>(2)</u>	<u>112.1</u>
profit for the fiscal year	<u>17.1</u>	<u>11</u>	<u>74.6</u>	<u>12</u>	<u>57.6</u>	<u>7</u>	<u>193.0</u>	<u>16</u>	<u>533.1</u>

- 5.41 At the beginning of the period analyzed, two important events took place: (i) the rate problem with EMCALI was settled in mid-1944 and (ii) the Alto Anchicayá hydroelectric plant went into service at the end of the same year. These combined events sent yearly gross operating costs from Col.\$140.3 million in 1974 to Col.\$1,678.3 million in 1978. Billings increased from 442.1 GWh in 1974 to 2,400.0 GWh in 1978, approximately 5 times the volume at the beginning of the period. The average rate was as follows:

	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>
Current average rate (Millions Col.\$)	317.3	309.4	408.6	542.0	699.3
Yearly Increase (%)	-	(2.5)	32.1	32.6	29.0
IPC Cali Increase (%)	-	21.0	22.7	31.8	18.2
Real Annual Increase <u>1/</u>	-	(19.4)	7.3	0.6	9.3

- 5.42 As noted in the preceding table, in 1975 the average rate slipped by 2.5% in real terms. If we add the 21% domestic inflation rate in Cali, this is a real drop of approximately 19.4% (at 1978 prices). Beginning in 1976 however, there is a sustained increase in the rates of about 30% in current terms which in real terms meant growth rates of about 8% yearly, with the exception of 1977 when IPC Cali far surpassed the average for the other years (average 20.6%; 1977, 31.8%).

- 5.43 The authorization by the Junta Nacional de Tarifas to authorize automatic rate hikes of 2.2% monthly was responsible for the performance achieved. This policy will continue in force until at least December 1982.

Operating and maintenance costs in the power sector for the period 1975-78 averaged approximately 53% of revenue. The 47% net operating earnings enabled the company to cover the financial costs in the sector by increasingly higher percentages. On an average they were 31%. However, in two of the years internal generation of funds scarcely managed to cover the debt service of the Corporation, as shown in the following table.

	(Millions of Col.\$)			
	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>
Internal generation <u>2/</u>	435.0	499.2	746.8	1,037.2
Debt service 550.3	452.1	931.9	993.4	
Coverage <u>2/</u>	0.79	1.10	0.80	1.04

1/ To determine the real annual increase, the rate was computed at 1978 prices.

2/ Net operating income from electricity plus depreciation and other net reserves.

- 5.44 Regional development programs, representing a group of activities aimed at the integral development of the Cauca Valley and the rational exploitation of its wealth, were drawn up in terms of the earnings projection of the Corporation. Through collections from irrigation, property reassessment, the real estate tax and others, its yearly budget was successfully balanced. In addition to direct collections from the users, funds were contributed by the National Government and CVC, providing the means to conduct programs worth Col.\$153.6 million in 1978, a figure three times higher than 1974. Although it is a general Corporation rule that the development program should be self-financed, the Corporation since 1976 has contributed its own resources, which on an average has meant an investment of Col.\$27.6 annually in the different programs.
- 5.45 As established in the projection, CVC will require all its internal resources to meet the national counterpart for the project under consideration and its other obligations.
- 5.46 Following the revaluation methodology agreed upon with the Bank, the return from the CVC Energy Sector during the last three years has grown significantly, from 4.6% for 1976 to 7.2% for 1977 and 9.9% for 1978. In prior loan agreements the Bank fixed a rate of return of at least 9% per year. This goal was met thanks to the recent rate increases. In August 1979, the Junta Nacional de Tarifas approved automatic rate hikes for CVC and CHIDRAL of 2.2% a month (approximately 29.8% annually), similar to those that have occurred in the past 3 years. This is expected to enable CVC to maintain a satisfactory rate of return in the future.

3. Statements of Source and Application of Funds

- 5.47 The statements of source and application of funds for the period 1975-78 are given in Appendix V and summarized on the following page.
- 5.48 During the period CVC generated 48% of its funds internally, 49% from loans and their revaluation and 3% from contributions and donations. Total funds mobilized were Col.\$7,059 million during the period, 42% of which were applied to investment programs in the electricity and regional development sectors, 41% earmarked for debt service, 10% for additions to working capital and the remaining 7% for other assets. The energy sector provided 81% (Col.\$2,718 million) of the internally generated funds totalling Col.\$3,363 million; resources from regional development programs, 16% (Col.\$529 million) and other revenue, mainly from the energy sector, 3% (Col.\$115.8 million). The contribution of the energy sector to total CVC sources has increased annually from Col.\$435 million in 1974 (29%) to Col.\$1,037.2 million in 1978 (49%). As indicated earlier, these increases were the result of having tripled the volume of GWh billings and of rate increases of 8% in recent years expressed in real terms.

(Millions of Col.\$)

	1975		1976		1977		1978		TOTAL	
	Col.\$	%	Col.\$	%	Col.\$	%	Col.\$	%		
<u>SOURCES</u>										
1. <u>Internal</u>										
Internal generation - energy sector	435.0	29	499.2	33	746.8	39	1,037.2	49	2,718.2	39
Specific funds development program	84.7	6	108.5	7	157.0	8	178.8	8	529.0	7
Other income (expenditures) net	38.3	2	(17.2)	(1)	(18.6)	(1)	113.3	5	115.8	2
Total internal sources	558.0	37	590.5	39	885.2	46	1,329.3	62	3,363.0	48
2. <u>External</u>										
Contributions and donations	112.5	7	64.9	4	17.8	1	45.8	2	241.0	3
Loans:										
local currency	369.2	24	85.6	6	706.7	37	224.1	11	1,385.6	20
foreign currency	476.2	32	765.7	51	298.2	16	529.8	25	2,069.9	29
Total loans	845.4	56	851.3	57	1,004.9	53	753.9	36	3,455.5	49
Total external sources	957.9	63	916.2	61	1,022.7	54	799.7	38	3,696.5	52
3. Total Sources	1,515.9	100	1,506.7	100	1,907.9	100	2,129.0	100	7,059.5	100
	=====	===	=====	===	=====	===	=====	===	=====	===
<u>Application</u>										
Investment program	692.2	45	661.3	44	686.7	36	903.7	42	2,943.9	42
Net variations in asset accounts	71.1	5	11.4	-	155.5	8	241.9	11	479.9	7
Net variations in liability accounts	(8.6)	-	(3.7)	-	(39.1)	(2)	56.5	3	5.1	-
Debt service	550.3	36	452.1	30	931.9	49	993.4	47	2,927.7	41
Increase (decrease) working capital	210.9	14	385.6	26	172.9	9	(66.5)	(3)	702.9	10
Total application of funds	1,515.9	100	1,506.7	100	1,907.9	100	2,129.0	100	7,059.5	100
	=====	===	=====	===	=====	===	=====	===	=====	===

- 5.49 During the period, external sources provided funds worth Col.\$3.696 million, composed of loans worth Col.\$3,455 million (93%) and contributions and donations worth Col.\$241 million (7%). Loans in national currency, including borrowings worth Col.\$371.9 accounted for Col.\$1,385 million in resources. Col.\$637 million were received in direct foreign currency. Foreign exchange rate adjustments accounted for Col.\$1,433 million.
- 5.50 The investment program during the period equaled Col.\$2,944 million invested as follows: Col.\$2.069 million in the power sector, of which the real investment was Col.\$605.6 million and the remainder extra costs because of differences in exchange rates; Col.\$420 million in regional development programs; Col.\$357 million in ISA; and Col.\$98 million in other investments. The direct investment in the power sector was not significant during these years. In 1974, the Alto Anchicayá hydroelectric plant was completed at an investment of Col.\$3,437.7 million. The next investment would be the Salvajina works whose financing is considered in this document.

C. Financial Projections

- 5.51 The CVC financial projections for the next ten years (1979-88) have been computed based on the assumptions and conditions submitted in Appendix W to this report. Each of the projected statements is considered below.

STATEMENTS OF PROJECTED OPERATING EARNINGS
(In thousands of US\$)

	1978 Real	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	TOT 197
Sales of electricity GWh	2400	2431.1	2725.7	2875.6	3196.7	3518.4	3872.6	4358.4	4812.7	5308.9	5850.8	
Average rate US\$ per KWh	0.018	0.022	0.024	0.026	0.027	0.027	0.027	0.027	0.027	0.027	0.027	
<u>Operating income</u>												
Sale of electricity	42510	54420	65035	73748	87478	96152	105693	118430	130555	143793	158244	103
Other Operating income	2654	2465	2399	2353	2336	2321	2335	2361	2449	2563	2686	2
Total operating income	<u>45164</u>	<u>56885</u>	<u>67434</u>	<u>76101</u>	<u>89814</u>	<u>98473</u>	<u>108028</u>	<u>120791</u>	<u>133004</u>	<u>146356</u>	<u>160930</u>	<u>105</u>
<u>Operating expenditures</u>												
Generation: Operation and maint.	1482	1491	1491	1491	1491	1491	1912	2208	2208	2208	2208	1
Cost of oper. and maint. ISA	1816	1904	1716	1579	1531	1484	1442	1396	1353	1312	1273	1
Purchase of electricity	13888	17468	21376	23314	27454	31654	31002	33374	39198	45554	52506	32
Distr: Operation and maint.	1107	1102	1254	1339	1461	1592	1735	1892	2061	2247	2449	1
Costs of billing and collection	210	204	214	225	236	248	260	273	287	301	316	
Administration and overhead	631	699	654	745	850	969	1104	1259	1435	1636	1865	1
Depreciation	4146	4050	4273	4395	4517	4639	4761	11871	11993	12115	12237	7
Total operating expenditures	<u>23280</u>	<u>26918</u>	<u>30978</u>	<u>33088</u>	<u>37540</u>	<u>42077</u>	<u>42216</u>	<u>52273</u>	<u>58535</u>	<u>65373</u>	<u>72854</u>	<u>46</u>
<u>Net Operating Income</u>	<u>21884</u>	<u>29967</u>	<u>36456</u>	<u>43013</u>	<u>52274</u>	<u>56396</u>	<u>65812</u>	<u>68518</u>	<u>74469</u>	<u>80983</u>	<u>88076</u>	<u>59</u>
<u>Other Expenditures Electricity</u>												
Interest paid	10245	10293	9308	8416	7091	5933	4898	13104	11758	10407	8915	9
Transfer funds for nat resources	816	983	-	-	-	-	3160	3433	3886	4092	4460	2
Total other exp. electricity	<u>11061</u>	<u>11276</u>	<u>9308</u>	<u>8416</u>	<u>7091</u>	<u>5933</u>	<u>8058</u>	<u>16547</u>	<u>15644</u>	<u>14499</u>	<u>13375</u>	<u>11</u>
<u>Profit on electricity operation</u>	<u>10823</u>	<u>18691</u>	<u>27148</u>	<u>34597</u>	<u>45183</u>	<u>50463</u>	<u>57754</u>	<u>51971</u>	<u>58825</u>	<u>66484</u>	<u>74701</u>	<u>45</u>
<u>Programs</u>												
Income: Land mgmt. & works planned	17	31	31	31	48	101	277	569	813	970	922	3
Regional development	3890	3703	2844	2910	2977	3047	6278	6636	7154	7438	7886	50
Program cost	4074	3838	2979	3045	3550	4185	7401	7402	7720	8108	8675	56
Net program cost	(167)	(104)	(104)	(104)	(525)	(1037)	(846)	(197)	247	300	133	(2)
Return ISA	<u>2849 a/</u>	<u>1004</u>	<u>2802</u>	<u>3515</u>	<u>3685</u>	<u>4525</u>	<u>6730</u>	<u>7374</u>	<u>7374</u>	<u>7374</u>	<u>7374</u>	<u>51</u>
<u>Profit for Fiscal Period</u>	<u>13505</u>	<u>19591</u>	<u>29846</u>	<u>38008</u>	<u>48343</u>	<u>53951</u>	<u>63638</u>	<u>59148</u>	<u>66446</u>	<u>74158</u>	<u>82208</u>	<u>535</u>

In 1978 includes other net income (expenditures) not from operations. These are considered offset in the years covered by the project.

1. Earnings from operations

- 5.52 This projection, presented on the following page, shows operating income equivalent to US\$1,057.8 million generated during the period, which covers operating costs of US\$461.8 million (44%) and financial costs of US\$90.1 million (8.5%). The electricity sector produced a surplus of US\$485.8 million (46%) after US\$20 million (1.5%) in contributions from the sector to the regional development programs. In addition to net operating income from plants in operation, through its investments in ISA the electricity sector will contribute US\$51.7 million in earnings during the period. After the deduction of small yearly contributions to other special programs, the profit for the period as a whole is equivalent to US\$535 million.
- 5.53 For the projection of operating income, real increases in the rates charged equal to 7% for the years 1980-82 have been assumed in order to reflect the authorized rate increase equal to 2.2% monthly up to December 1982. To determine the real percentage increase in dollars for the coming years, the rate increase in the past three years was analyzed, the period when CVC was authorized to implement similar rate hikes.
- 5.54 Projecting the performance of the economy during the past three years and assuming no significant changes, it was estimated that domestic inflation in Cali for the next three years might be about 20 to 24%. In constant terms the projected rate growth would be 6.4% annually, assuming yearly increases of 29.8% and domestic inflation of about 22%.
- 5.55 From the projection of operating costs, the performance of expenses for the purchase of electricity should be mentioned. Basically, this expenditure represents purchases of electricity from ISA during the period, which leap from US\$17.5 million in 1979 to US\$52.5 million in 1988, as the yearly growth in KWh purchased climbed from GWh 369 in 1979 to GWh 2,189 in 1988, virtually 6 times more than at the beginning. The production of Salvajina, GWh 896 yearly starting in 1985, helps to service local demand but does not succeed in covering it and starting in 1985 purchases from ISA grow more rapidly.
- 5.56 Internal generation of resources would satisfactorily cover debt service during the period. The projection shows that from a minimum coverage in 1978, internal generation would more than triple debt service by 1988, averaging 2.5 times for the entire period, mainly because of higher net operating income.

2. Source and application of funds

- 5.57 According to this projection, found on the following pages, CVC will mobilize total resources during the period of the projection equal to US\$972.8 million, of which US\$524.8 million (54%) will be earmarked for the electricity system expansion program, US\$56.9 million (6%) for regional development and other similar programs, US\$245.1 million (25%) for debt service, and US\$10.6 million (1%) for working capital, leaving a surplus earned by CVC equal to US\$135.4 million (14%) by the end of the period.
- 5.58 During the period of the projection, an estimated US\$202.2 million in external resources, mainly to finance the works of the project under consideration, would be used, representing 21% of total sources. Excluding specific resources for development programs (US\$48.1 million) the power sector would contribute US\$722.5 million, somewhat over 74% of the total sources. The projections contain income from reappraisal of real estate totaling the equivalent of US\$30.5 million which would come from collections for improvements and reclamation of land from the agricultural sector aided by the project and US\$21 million representing transfers from CHIDRAL to CVC.
- 5.59 Cash flow has two clearly defined periods. From 1979 to 1984, the years of project execution, cash shows a yearly deficit that accrues to a maximum of US\$25.3 million in 1982 and ends in 1984 with a small surplus of US\$547 thousand.
- 5.60 The foregoing indicates that, in spite of a deficit in the first three years of project execution (1980-82), beginning in 1983 annual surpluses begin which make it possible to eliminate the accumulated deficit in 1984. Therefore CVC would be in a position to obtain loans to refinance part of debt service in order to have the resources required by its investment program. It is therefore recommended that during the period of project execution, beginning with fiscal year 1980, the CVC submit a cash flow within 60 days after commencement of the fiscal year showing its plans for obtaining the financial resources required for its investment program during the year and to meet its other financial obligations (see Recommendation 4).
- 5.61 During the second period from 1985 to 1988, a cash surplus of US\$156.5 million is accrued, mainly because there is a minimum investment program during this period. Inasmuch as CVC to date still has no investment program established for that time. ^{1/} Use of the resources indicated above will depend on the investment program decided upon for the years 1985-88.

^{1/} The CV Investment Program is decided at the national level. During the second half of the year agreement is expected to be reached with the other electric companies in the country.

CVC

Projected Statement of Source and Application of Funds
(In thousands of US\$)

	1978 Real	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
<u>Source</u>											
<u>1. Internal</u>											
Net operating income: energy	21,884	29,967	36,456	43,013	52,274	56,396	65,812	68,518	74,469	80,983	88,076
Depreciation: energy	4,387	4,050	4,273	4,395	4,517	4,639	4,761	11,871	11,993	12,115	12,237
Resources earmarked for Programs	4,529	4,188	4,398	4,509	4,623	4,741	4,862	4,988	5,116	5,248	5,384
Yields ISA	2,870	1,004	2,802	3,515	3,685	4,525	6,730	7,374	7,374	7,374	7,374
Total internal sources	33,670	39,209	47,929	55,432	65,099	70,301	82,165	92,751	98,952	105,720	113,071
<u>2. External</u>											
Government contributions	1,160	840	1,183	1,183	1,183	1,183	352	352	352	352	352
Taxes, reassessment Salvajina	-	-	-	842	2,117	3,027	3,518	3,654	3,654	3,654	10,088
Recovery works flatlands	-	-	-	-	17	70	246	538	782	939	891
<u>a) Regional currency</u>											
Other	5,676	1,049	1,478	1,199	197	-	-	-	-	-	-
<u>b) Foreign currency</u>											
IDB (proposed project)	-	-	7,095	6,119	13,695	10,618	9,173	-	-	-	-
IDB (rural electrifica- tion project)	-	-	751	751	751	750	-	-	-	-	-
OECF	-	-	16,567	13,554	11,719	10,345	3,052	-	-	-	-
Suppliers	-	-	1,359	4,413	21,206	5,300	2,709	-	-	-	-
Other	469	-	-	-	-	-	-	-	-	-	-
Refinancing debt	-	10,000	7,000	-	-	-	-	-	-	-	-
Total External Sources	7,305	11,889	35,433	28,061	50,885	31,293	19,050	4,544	4,788	4,945	11,331
Total Sources	40,975	51,098	83,362	83,493	115,984	101,594	101,215	97,295	103,740	110,665	124,402

CVC

Projected Statement of Source and Application of Funds
(In thousands of US\$)

	1978 Real	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
II. Applications:												
1. Investment Program: Energy												
<u>In process</u>												
Investments in GTP and SD	4,721	4,475	3,659	3,659	3,659	3,659	3,659	3,659	3,659	3,659	3,659	3,659
Rural electrification	-	1,400	2,275	2,275	2,275	2,275	-	-	-	-	-	-
Investment in ISA	1,378	13,701	14,935	16,192	19,367	19,898	21,576	27,847	-	-	-	13,701
Studies	-	1,165	793	-	-	-	-	-	-	-	-	-
Total in Process	6,099	20,741	21,662	22,126	25,301	25,832	25,235	31,506	3,659	3,659	3,659	18,360
<u>Proposed Project</u>	-	4,823	43,588	39,414	76,934	49,660	28,003	-	-	-	-	24,000
<u>To be Executed</u>												
Control Center	-	-	-	2,025	5,113	2,108	340	-	-	-	-	-
Rural electrification	-	-	-	-	-	-	704	704	704	704	704	704
Investments in ISA	-	-	-	-	-	-	-	-	27,847	27,847	27,847	8,359
Studies	-	-	849	1,332	219	-	-	-	-	-	-	-
Total Investment Energy Sector	6,099	25,564	66,099	64,897	107,567	77,600	54,282	32,210	32,210	32,210	32,210	52,767
2. <u>Regional Development Programs</u>	4,075	3,838	2,979	3,045	3,112	3,182	6,413	6,771	7,289	7,573	8,021	5,000
3. <u>Works on the Flatlands</u>	-	-	-	-	438	1,003	988	631	431	535	654	-
Variations methods assets/ liabilities	7,323	-	-	-	-	-	-	-	-	-	-	-
4. <u>Debt Service</u>												
Amortization	14,916	15,017	15,322	14,025	14,002	12,510	13,562	15,679	16,573	19,199	19,064	15,000
Financial Costs	10,380	10,293	10,645	11,174	12,224	13,469	13,646	13,104	11,758	10,407	8,915	11,000
Total Service of Gross Debt	25,296	25,310	25,967	25,199	26,226	25,979	27,208	27,783	28,331	29,606	27,979	26,000
Less Capitalized Interests	134	-	1,337	2,758	5,133	7,536	8,748	-	-	-	-	2,000
Total Service of net Debt	25,162	25,310	24,630	22,241	21,093	18,443	18,460	28,783	28,331	29,606	27,979	24,000
5. <u>Increase (decrease) working capital</u>	(1,684)	344	228	258	329	459	493	3,686	3,464	693	676	1,000
6. <u>Total Applications</u>	40,975	55,054	93,936	90,641	132,539	100,687	80,636	72,081	71,725	70,617	69,540	83,000
7. <u>Surplus (deficit) annual accrued</u>	-	(3,956)	(10,574)	(7,148)	(16,555)	907	20,579	25,214	32,015	40,048	54,862	13,000
	-	(3,956)	(14,530)	(21,678)	(38,233)	(37,326)	(16,747)	8,467	40,482	80,530	133,392	-
8. <u>Transfers from CHIDRAL</u>	-	3,348	4,353	3,068	2,144	2,243	2,138	2,543	785	820	671	2,000
9. <u>Surplus (deficit) annual accrued</u>	-	(608)	(6,221)	(4,080)	(14,411)	3,150	22,717	26,757	32,800	40,868	55,533	15,000
	-	(608)	(6,829)	(10,909)	(25,320)	(22,170)	547	27,304	60,104	100,972	156,505	-

- 5.62 Bearing in mind that beginning in 1984 a yearly surplus is accumulated which will reach US\$156.5 million by 1988, an increase in rates during the period of execution of the project under consideration is believed unnecessary. Instead, the projected rate structure should be maintained. It is recommended that CVC and the guarantor take action acceptable to the Bank so that the rate for supply of electric power: (i) will generate enough income to cover all the operating costs of its electricity system, including administration, operation and maintenance, billing and collections, and depreciation; (ii) provide a reasonable return on the revalued fixed assets in the systems. ^{1/} Should implementation of (i) and (ii) above fail to generate enough income to cover timely service of CVC obligations, CVC and the guarantor should take action to obtain any additional resources required to achieve those goals (see Recommendation 8(d)).
- 5.63 In addition to the loans for debt refinancing included in the projections, US\$10 million approved for 1979 and US\$7 million authorized for 1980, CVC is processing an application for US\$16 million for debt refinancing in 1980 with the National Planning Department. If this is approved the deficit projected for the period of project execution would be cut to only US\$14.4 million. Given the size of the operations of the Corporation, this amount should not be very difficult to obtain particularly with the later significant financial recovery beginning in 1985.
- 5.64 The agreements between CVC and CHIDRAL provide for the transfer of resources as a long-term loan at no interest. Therefore, the CVC cash flow includes transfers of resources from CHIDRAL worth US\$21 million.
- These resources represent surplus CHIDRAL funds during the period ^{1/} which originate from (i) the minimum investments that would be implemented by CHIDRAL and (ii) the low rent it pays CVC for use of its assets. It should be mentioned that the present income received by CVC for rental of its equipment to CHIDRAL represents a gradually diminishing return of only somewhat more than 2%, since service on the debt ends in 1985.
- 5.65 If the situation remains unchanged, CVC will go on transferring net resources to CHIDRAL, in which it has only 65% ownership. Aside from any institutional solution that might be adopted in the future, it is desirable for CVC assets to yield a reasonable return whether administered by CVC itself or another company. It is therefore recommended that CVC charge CHIDRAL for the use of its assets an amount at least equal to the 9% return on revalued net assets required of CVC by the Bank under the proposed loan agreement, and that any treasury surplus shown by CHIDRAL after meeting its own obligations and the charge for the right to use

^{1/} Annex A of the agreement will stipulate that the return should be at least 9% computed on the net revalued fixed asset investment of the CVC electricity system.

CVC assets, computed as indicated previously, be transferred to CVC as a long-term loan without interest. CVC should inform the Bank of the acceptance of the preceding charges and transfer by CHIDRAL as a prior condition to the first investment (see Resolution 8(c)(ii)).

- 5.66 As indicated in Chapter II of this Report, the project would directly benefit the agricultural sector. Because of these benefits, CVC is authorized to recover part of the investment through higher real estate assessments. During the period covered by the projection, US\$30.5 million would be collected, representing 33% of total estimated collections of US\$91.1 million, including capital and interest. ^{1/} Bearing in mind however that as of the date of the mission these charges were still being computed and negotiated, it is recommended that CVC inform the Bank within the 12 months following signature of the loan agreement on the outcome of its efforts to collect higher real estate taxes for the part of the project chargeable to the agricultural sector and the beneficiaries in the industrial sector ^{2/} as well as the timetable approved showing the schedule of collections from the beneficiaries. On a semi-yearly basis, CVC should report to the Bank the status of the collection process, indicating (i) the total billed not due, the total due (age in days), (ii) the outstanding balance, and (iii) the totals involved in proceedings begun to compel payment (see Recommendation 6).

3. Financial statement

- 5.67 The projection of the financial statement from the following pages shows that as a result of the Investment Program by the Corporation, total assets in net service would increase by 174.6% from the equivalent of US\$131.9 million in 1979 to the equivalent of US\$362.2 million in 1988, mainly due to the inclusion of assets derived from the Salvajina project. Receivables from sale of electricity climbed from US\$2.4 million in 1979 to US\$5.3 million in 1988. This is because they were computed assuming CHIDRAL will pay its obligations to CVC on time, which implied timely payment by EMCALI to CHIDRAL. Therefore, this account only represents the equivalent of 16.6% of retail billings to distributors.
- 5.68 The net worth of the Corporation would increase from the equivalent of US\$81.2 million in 1979 to the equivalent of US\$648.1 million in 1988 as a result of (i) capitalization of annual earnings worth US\$535.3 million, and (ii) charges for reassessment of real estate worth US\$30.5 million, among other factors. The significant increases in the net worth accounts of the Corporation and the reasonable indebtedness in the coming years enable the institution to change its indebtedness position significantly from a total debt-to-net worth ratio of 2.2 in 1978 to 0.22 in 1988, as indicated in the financial statements found on the following page.

^{1/} The remaining US\$60.6 million would continue to come in to CVC in equal installments until 1993.

^{2/} The industrial sector benefits by being able to postpone investment for water treatment.

CVC

Projected Financial Statement

(In thousands of US\$)

	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
	Real										

AssetsFixed

Plant and equipment in service	123047	125155	133138	139072	145006	150940	156874	413245	417607	421971	426334
Less: Accumulated depreciation	12612	15935	19481	23149	26939	30851	34885	46029	57295	68683	80193
Plant and equipment in service - Net	110435	109220	113657	115923	118067	120089	121989	367216	360312	353288	346141
Assets in use by CHIDRAL	30260	30260	30260	30260	30260	30260	30260	30260	30260	30260	30260
Less: Accumulated depreciation	6879	7606	8333	9060	9787	10514	11241	11968	12695	13422	14149
Assets in use by CHIDRAL - Net	23381	22654	21927	21200	20473	19746	19019	18292	17565	16838	16111
Real estate	365	365	365	365	365	365	365	365	365	365	365
Construction in process	4217	12807	54346	95785	177832	229600	256372	4364	4364	4363	4363
Total fixed assets	138398	145046	190295	233273	316737	369800	397745	390237	382606	374854	366980

Medium and Long-Term Realizables

Investment (net)	26988	40689	55624	71816	91183	111081	132657	160504	188351	216198	244045
Inventories	4814	4800	4800	4800	4800	4800	4800	7600	10400	10400	10400
Accounts receivable CHIDRAL	3962	-	-	-	-	-	-	-	-	-	-
Accounts receivable EMCALI	452	339	226	113	-	-	-	-	-	-	-
Tax reassessment Aquablanca	150	150	135	120	105	90	75	60	45	30	-
Other	132	132	79	26	-	-	-	-	-	-	-
Total medium and long-term realizable	36498	46110	60864	76875	96088	115971	137532	168164	198796	226628	254445

Current

Cash and banks	3393	720	706	666	628	569	587	856	870	881	838
Bills receivable	1409	-	-	-	-	-	-	-	-	-	-
Accounts receivable energy	1951	2440	2660	2889	3160	3443	3754	4090	4459	4860	5298
Other accounts receivable	2004	1402	1402	1402	1402	1402	1402	1402	1402	1402	1402
Deposits and advances	819	819	819	819	819	819	819	819	819	819	819
Total current	9576	5381	5587	5776	6009	6233	6562	7167	7550	7962	8357
Other cash assets	-	-	-	-	-	-	547	27304	60104	100972	156505
Deferred 2259	3424	5066	6398	6617	6617	6617	6617	6617	6617	6617	-
Other assets	890	890	890	890	890	890	890	890	890	890	890

TOTAL ASSETS	187621	200851	262702	323212	426341	499511	549893	600379	656563	717923	793794
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CVC

Projected Financial Statement

(In thousands of US\$)

	1978 Real	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
<u>Net Worth and Liabilities</u>											
<u>Net Worth</u>											
Contributions and variations	19414	20254	21437	22620	23803	24986	25338	25690	26042	26394	26746
Taxes and revaluation of real estate	11279	13379	14887	17282	20999	25674	29717	35120	40576	46086	58071
Retained earnings	21052	40643	70489	108497	156840	210791	274429	333577	400023	474181	556389
Surplus revaluation investments	6895	6895	6895	6895	6895	6895	6895	6895	6895	6895	6895
Total net worth	58640	81171	113708	155294	208537	268346	336379	401282	473536	553556	648101
<u>Long-Term Liabilities</u>											
Bonds	2691	1981	1793	1558	1323	1088	2097	1816	1535	1254	973
Obligations in local currency	15465	12065	8881	5628	2905	483	-	-	-	-	-
Obligations in foreign currency	84503	83630	107039	122326	160107	175980	175718	159145	139946	120882	101818
Advances received	636	-	-	-	-	-	-	-	-	-	-
Other	426	1034	7255	11335	25746	22596	426	426	426	426	426
Total long-term liabilities	103721	98710	124968	140847	190081	200147	178241	161387	141907	122562	103217
<u>Current</u>											
Current portion long-term debt	18079	15322	14025	14002	12510	13562	15679	16573	19199	19064	19064
Obligations and accounts payable ISA	4239	-	-	-	-	-	-	-	-	-	-
Other obligations and accounts payable	760	760	760	760	760	760	760	760	760	760	760
Other	642	-	-	-	-	-	-	-	-	-	-
Total current	23720	16082	14785	14762	13270	14322	16439	17333	19959	19824	19824
Deferred	1540	4888	9241	12309	14453	16696	18834	20377	21161	21981	22652
Total assets	128981	119680	148994	167918	217804	231165	213514	199097	183027	164367	145693
TOTAL NET WORTH AND LIABILITIES	187621	200851	262702	323212	426341	499511	549893	600379	656563	717923	793794

- 5.69 The financial recovery of the Corporation is significant. Its liquidity situation, although better each year, continues to show indices that while on the limit of what is financially recommendable, are reasonable given the activities conducted by CVC. The current ratio goes from 0.60 in 1978 to 0.95 in 1988 and the acid ratio remains basically steady at 0.40 throughout the period. It is therefore recommended that as long as the proposed loan contract is in force, the CVC not assume without prior authorization from the Bank new financial obligation with maturities in excess of one year as a result of which (i) its long-term debt would be more than two times its net worth, (ii) on a yearly basis, internal generation of funds would be less than 1-1/2 times total debt service, and (iii) current assets, excluding inventories, would be less than 0.50 times current liabilities yearly (see Recommendation 7).
- 5.70 Based on projected financial performance, the return on the revalued fixed asset investment following the methodology 1/ indicated in Appendix Y would increase from 9.7% to 24.3% in the course of the period 1978-84. Once the Salvajina Hydroelectric plant goes into service, it drops to a reasonable average of 15.3% for the years 1985-88. Several factors influence this rate of return, including (i) the appreciable effort made by Colombia to allot rates that would mobilize more internal sources to make available the counterpart funds to support external credits, and (ii) a minimum level of investment projected for the period 1985-88.

1/ The methodology for revaluating investments was agreed upon during the mission with CVC officers and is the same as that accepted by the Bank in the latest loans to ISA.

CVC

Projection Financial Ratios

	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>
<u>Liquidity Situation</u>											
Current Ratio	0.60	0.63	0.70	0.72	0.81	0.77	0.69	0.85	0.90	0.92	0.95
Acid Ratio	0.40	0.33	0.38	0.39	0.45	0.44	0.40	0.41	0.38	0.40	0.42
<u>Degree of Indebtedness</u>											
Total debt to Net worth	2.20	1.47	1.31	1.08	1.04	0.86	0.63	0.50	0.39	0.30	0.22
Long-term liabilities/ Current liabilities to total debt % <u>1/</u>	82/18	87/13	90/10	91/9	94/6	94/6	92/8	91/9	89/11	88/12	86/14
Total debt/Net worth (%)	69/31	60/40	57/43	52/48	51/49	46/54	39/61	33/67	28/72	23/77	18/82
<u>Yield</u>											
Net operating income/total earnings (%)	48	53	54	57	58	57	61	57	56	55	55
Internal generation of funds (US\$ millions)	26.03	34.02	40.73	47.40	56.79	61.04	70.57	80.39	86.46	93.10	100.31
Debt service coverage, times	1.0	1.3	1.6	1.9	2.2	2.3	2.6	2.8	3.0	3.1	3.6
Return on fixed asset invest- ment (%) <u>2/</u>	9.7	12.7	15.0	17.2	20.3	21.4	24.3	16.8	13.7	14.8	15.9

1/ Long-term liabilities include loans to be financed and deferred.

2/ Computed on revalued fixed following the methodology set forth in this document, base year 1978.

VI. ECONOMIC ANALYSIS OF THE PROJECT

A. Introduction

- 6.01 The end purpose of the Salvajina Project is to foster the economic and social development of the Cauca Valley through the integral utilization of the Cauca River basin. To begin with, the project was conceived as an agrolivestock project intended primarily to prevent the damage and losses caused every so often in the Cauca Valley flatlands when the river overflowed its banks. As the project study was taken further, new purposes were added until it became a classic multipurpose project. Moreover, from the time the project studies were started various of the areas subject to flooding were improved and the agricultural goal dropped back to second place behind power generation.

B. Bases of the Economic Analysis

- 6.02 Salvajina is a multipurpose project with an economic life of 55 years (5 years for construction and 50 years' operation). It will produce three types of direct benefits: (a) flood control; (b) power generation, and (c) water quality control. In addition, there will also be the indirect benefits connected with employment creation in the project's area of influence, the demand for local materials and equipment and the multiplier effect of the higher incomes resulting from increased agricultural productivity in the region. This economic analysis will look solely at the direct benefits, owing to the problems in measuring the indirect ones; nevertheless, mention will be made of certain of the latter in qualitative terms.
- 6.03 For the purpose of the economic appraisal, the project includes the costs connected with: (a) the dam at the Salvajina site; (b) the additional costs of protection in the upper basin of the river, and (c) the dikes along the Cauca and its tributaries, plus the main and drainage canals (the latter not being included in the project). The impoundment capacity and the height of the dikes will be determined jointly once the 30-year protection requirement has been defined and after comparison of the total cost of the project with its benefits.
- 6.04 Control of the monthly water flow by means of the project will make it possible both to reduce the degree of pollution of the Cauca and to reduce the cost of treating the raw water for supply to the city of Cali.
- 6.05 The pollution is caused chiefly by the discharge of sewage and industrial wastes into the river by Cali and Yumbo. With the higher flow during low-water periods the concentration of pollutants becomes less and the water's oxygen content is raised to acceptable levels. In its turn, regulation of the flow during high and low-volume periods will reduce the expenditures on reagents for purifying the water.

- 6.06 For the economic evaluation three subprojects were distinguished: the agricultural, the hydropower and the water quality control subprojects. The costs and benefits pertaining to each of these were identified, the remaining costs then being the common costs of the multipurpose project. The analyses of the subprojects are given below, while the empirical and methodological bases are set out in Appendix Z. The analysis of the project beneficiaries is presented in Appendix AA.

1. Agricultural subproject

- 6.07 The benefits of the Agricultural Subproject (AS) are obtained by: (a) the increases in net incomes resulting from the change in the quality and use of the land, and (b) the losses prevented by controlling the flooding. The benefits of the agricultural subproject (BAS) would then be represented by the higher income, net of flood-caused losses, in the subproject areas of influence, thus:

$$\text{BAS} = \text{Yw} - \text{Ywt} + \text{DP}$$

Agricultural Subproject Benefits	=	Net income with Salvajina	-	Net income without Salvajina	+	Losses prevented by Salvajina
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(a) Benefits resulting from change in agricultural productivity

- 6.08 The methodology followed for computing the net benefits (NB) under this head considers the situations with and without the AS. The NB are defined as the difference between the net income with (Yw) and without (Ywt) the AS: $\text{NB} = \text{Yw} - \text{Ywt}$.
- 6.09 The net income is estimated by calculating the value of production less the operating costs. In the situation with the AS the probable change in the quality of the land and the type of crops raised is estimated. In the situation without the AS, the growth in production is estimated on the basis of what could be expected if nothing were done.
- 6.10 With the AS, the productivity of the land is improved with elimination of flooding, which reduces the water levels, improves the drainage and brings down the concentrations of salts and sodium. Besides the 82,945 ha that will receive the direct benefits (through prevention of flooding and improved drainage), there is another 13,955 ha that will receive indirect and reflex benefits (improved drainage as a result of the elimination of flooding in the area directly benefited). The following table shows the soil classifications before and after the AS in the area directly benefited.

Soil Classifications before and after the Project

Soil Class		Area	
Before	After	Ha	%
II	I	28,989	35.0
III	I	52	0.1
III	II	28,155	33.9
IV	II	4,421	5.3
IV	III	6,239	7.5
V	III	8,732	10.5
V	IV	257	0.3
VI	IV	1,853	2.2
VI	V	2,215	2.7
VII	V	142	0.2
VII	VI	1,890	2.3
Total		82,945	100.0
		=====	=====

Source: CVC, Proyecto de Regulación del Río Cauca: Evaluación Económica (Cali: Report CVC-79-10, July 1979).

6.11 In the situation without the AS, land improvements by private enterprise were considered. The agricultural development of the valley was started, as was to be expected, in the well-drained parts not subject to flooding. The agricultural expansion of the past decades took place through the bringing into use of land that was prone to flooding, a process that is still continuing. Three stages can therefore be distinguished in the agricultural development of the valley: (a) partial improvement by private enterprise; (b) partial improvement supervised and complemented with CVC flood control districts, and (c) comprehensive improvement through the Salvajina Project.

6.12 CVC has ascertained the characteristics of the farming carried on in the improved and unimproved areas by means of field studies. The data from these studies were revised and adjusted to represent areas and yields more in accordance with the agriculture practised in the Cauca Valley. The assumptions and data used for estimating the benefits are given in Appendix Z. The following table sets out the revised historical data and forecasts for areas and yields in the project area without the project:

1/ Based on the USDA Soil Conservation Service Classification.

Areas and Yields by Crop: Without the Project

Crop	Actual		Figures		Forecasts		
	1970		1978		2000		
	Area (ha)	Yield (t/ha)	Area (ha)	Yield (t/ha)	Area (ha)	Yield (t/ha)	
I. <u>Temporary Crops</u>							
A. Cotton:	I	1,305	2.8	3,173	3.0	6,373	3.4
	NI	3,195	1.8	3,893	2.0	1,627	2.4
B. Rice:	I	746	4.1	2,364	5.3	2,400	6.1
	NI	1,826	3.6	1,576	4.2	1,060	5.0
C. Beans:	I	371	1.2	1,368	1.7	1,400	2.0
	NI	906	0.9	912	1.1	650	1.5
D. Corn:	I	2,320	3.5	2,964	4.0	3,000	4.6
	NI	5,680	2.4	1,976	2.6	1,900	3.4
E. Sorghum:	I	4,599	3.3	13,944	4.5	14,000	4.5
	NI	11,258	3.0	9,296	3.0	9,000	3.4
F. Soybeans:	I	6,526	2.1	22,920	2.4	23,000	2.8
	NI	15,926	1.9	15,280	2.0	15,000	2.1
II. <u>Permanent Crops</u>							
A. Sugarcane:	I	10,729	106.0	20,520	120.0	44,275	146.0
	NI	21,171	82.5	13,680	88.0	275	90.0

I: Improved area.

NI: Non-improved area.

N.B.: Adjusted figures based on CVC data, Proyecto de regulación del Río Cauca: Evaluación Económica, p. 69; CVC, "Cálculos revisados de los beneficios agropecuarios", Cali, CVC, August 1979, and J. Millán and J. Mejía, Evaluación de Proyectos Hidráulicos en Colombia: Proyecto de Regulación del Río Cauca, Bogotá, CEDE and CETIH, March 1976, p. 94.

6.13 In the situation without the AS it has been presumed that improvement will continue progressively (Stage 2, see paragraph 6.10) as has been the case in the past, in response to changes in prices, support policies and marketing conditions. In their turn, the yields have been forecast on the basis of the potential productivity of the improved area in the Cauca Valley. The forecasts of areas and yields by crop in the non-improved area follow the trend observed and the technology changes expected. The yields in the improved area are, in all events, higher than those expected in the non-improved area.

6.14 In analyzing the situation with the project, factors connected with the soil's potential were considered, together with the trends in land use, marketing conditions and prices and factors bearing on the profitability

of the crops. The cropping pattern established will be implemented as the works are completed. CVC considers that once the project is completed in 1984, implementation of the works in the plain will cover some 60% of the improved area in 1985, 70% in 1986 and so on until 100% improvement is reached in 1989. For the purposes of the analysis, this schedule was considered optimistic and the more conservative one shown in the following table was therefore used:

Project Construction and Implementation Schedule

(percentages)

Year	Dam	Power Station	Crop Changes	
			CVC	IDB
1979	2.8	1.1	-	-
1980	29.0	10.2	-	-
1981	17.8	17.8	-	-
1982	25.6	46.7	-	-
1983	18.0	14.6	-	-
1984	6.8	9.6	-	-
1985	-	-	60	60
1986	-	-	70	65
1987	-	-	80	70
1988	-	-	90	75
1989	-	-	100	80
1990	-	-	-	85
1991	-	-	-	90
1992	-	-	-	95
1993	-	-	-	100

- 6.15 The net benefits of the AS star in 1985, reaching a figure of US\$2.4 million. As the improvements and crop changes proceed, the net benefits rise to US\$17.9 million in 1993. From that year, the annual net benefits begin to decline while production in the situation without the project rises, a result of the improvement process that would continue if the project were not implemented, the net benefit figure for 2000 being US\$8.8 million. From that date it is presumed that the improvement process without the project has reached its limit and that the net benefits from the project will begin to mount once more, owing to the greater productivity with the project, reaching US\$9.7 million in 2028 and remaining constant till 2034, when the economic life of the project is presumed over.

(b) Benefits from flood control

- 6.16 CVC estimates benefits from flood control at US\$21 million/year, on the basis of five surveys made in the project area after major floods and application of the methodology developed by Prof. E. Kuiper. ^{1/} The

^{1/} Water Resources Project Economics, London, Butterworth's, 1971.

benefits thus calculated include the gross losses of crops and fixed assets as estimated by the farmers in the project area. The value of these losses has been overestimated because: (a) operating costs have not been deducted; (b) the agricultural losses have not been valued using the same prices as for calculating the benefits from productivity, and (c) a part of the losses has been considered prevented in the calculation of production with the project. For the economic analysis the flood-control benefits were adjusted to represent the situation with the project more precisely, producing an annual figure of US\$6.2 million, from which US\$1 million already included in the calculation of the benefits from changes in the agricultural productivity was deducted.

- 6.17 Another adjustment made was to bear in mind that as the plain would be being improved in the situation without the project, the benefits from flood control would decline as this improvement proceeded. For 1993 total benefits are estimated at US\$5.2 million, going down to US\$3.7 million in 2000 and remaining constant thereafter (see Appendix Z).

2. Alternative to agricultural subproject

- 6.18 The alternative to the AS consists in raising the dikes in the plain to the height needed to obtain same level of benefits as with the AS. The present value of the construction cost for this is US\$86.8 million at January 1979 prices and that of the operating cost is US\$28.8 million. Considering the BAS calculated in the preceding paragraphs, this alternative would give an internal rate of return of 4.4% or a negative net present value of US\$53.4 million.

3. Hydropower subproject

- 6.19 The benefits from power generation by the hydropower subproject (HS) were estimated on the basis of the savings to the system in terms of investment and operating costs as compared with the alternative without the project. Two sequences of the equipment (or expansion) of the interconnected system were considered, one with the HS and the other with an equivalent thermal plant of 120 MW. Energy and power balances were computed, taking care that the energy contributions and capacities of each alternative were equivalent. The operation of the two alternatives was then corrected by simulation of the operation of the existing thermoelectric stations. With Salvajina, operation of the existing thermal capacity drops in the periods of highest flow and rises in the low-water periods. In this way, both alternatives take into consideration the fuel costs (revalued to international prices) of the thermal plants in existence and under construction.
- 6.20 Salvajina is included in the Basic Plan for the sector, which shows the programmed entry into operation of the plants and projects under construction and study that form the ISA expansion plan. It should be noted that the order in which the Betania and Playas plants will enter service is still uncertain. In ISA's initial evaluations, the most

attractive alternative put the Playas plant at October 1985 and the Betania plant in March 1986. However, Betania appears to have made good progress while Playas has fallen behind, for practical and institutional reasons. Also, the last two projects (Patía and San Juan) are still not recommended in the construction program; however, they have been included here in order to determine their probable entry-into-service dates upon completion of the planning period.

Alternative I: Basic Expansion Plan

<u>Plant</u>	<u>Type</u>	<u>Capacity (MW)</u>	<u>Date of Entry into Service</u>
Tasajero	T	132	January 1983
Salvajina	H	180	January 1984
Guadalupe IV	H	260	July 1984
Cerrejón II	T	120	October 1984
Betania	H	500	October 1985
Playas	H	240	January 1986
Guavio	H	975	November 1986
Urrá I & II	H	1,050	May 1988
Patía	H	1,200	July 1989
San Juan	H	1,500	March 1991

- 6.21 To ascertain the least-cost solution three alternatives were considered: (i) with Salvajina in January 1984 ^{1/}; (ii) with a thermal station instead of Salvajina in January 1984, and (iii) delaying Salvajina to January 1985 and moving the other stations forward. Alternatives (i) and (iii) were assigned the costs attributable to the HS without including any common costs at all. The results of the appraisal are shown below (the calculations and assumptions are explained in Appendix Z):

Present Values of the Costs of the Expansion Alternatives
(millions of US\$ of January 1979)

<u>Alternatives</u>	<u>Present Value of Investment Costs and Operating and Maintenance Costs ^{2/}</u>
I. With Salvajina in January 1984	1,626.52
II. With thermal station in January 1984	1,689.43
III. With Salvajina in January 1985	1,632.42

- 6.22 As can be seen, Alternative I is more attractive than its equivalent, Alternative II. In its turn, a one-year delay in construction would cost the system approximately US\$6 million.

^{1/} The actual plant would be ready in January 1984; however, for practical reasons it would not enter commercial service until October of that year. This does not affect the economic appraisal since the same degree of uncertainty applies to both alternatives.

^{2/} Discounted to 1979 using a discount rate of 12%.

- 6.23 The calculation of the HS benefits (HSB) was made as follows. First the cost of the HS (CHS) for Salvajina were deducted from the cost of Alternative I (CAI), which was then subtracted from the cost of Alternative II (CAII) for each year of the project. The present value of the benefits thus calculated works out at US\$108 million at January 1979 prices.

BHS	=	CAII	-	(CAI - CHS)
Benefits of Hydropower Subproject	=	Cost of Alternative II	-	Cost of Alternative I excluding the cost of the HS

4. Water quality control subproject

- 6.24 There are two types of benefits under this head: (a) those deriving from the savings in capital costs on plants to treat the effluents of industries and entities that pollute the Cauca, and (b) those from the lower cost of treating raw water taken from the river by EMCALI for supply to Cali. 1/

(a) Benefits from lessened pollution

- 6.25 On the basis of various studies, CVC in 1973 requested a technical advice agreement with the Pan American Health Organization, which led to the issue of regulations for the control of discharges into the basin within the Corporation's jurisdiction. 2/ These regulations stipulate that sewage and industrial wastes discharged into the river shall be treated to certain quality indexes before January 1980. With the project, the capital cost requirements imposed on the industries and entities polluting the river will be less, thus permitting, with the flow controlled through the year, a higher dissolved oxygen content than in the situation without the project.
- 6.26 The capital and operating costs of the treatment plants with and without the project were estimated in this way. The difference between these cost figures was taken as the benefit from reduced pollution. In terms of present value at January 1979 prices, it was found that without Salvajina the capital and operating costs of the treatment plants would be US\$57.8 million, while with the project these costs would be brought down to US\$40.6 million. The present value of the benefits from lessened pollution would therefore be US\$17.2 million.

1/ It should be explained that the pollution does not affect the cost of treating the raw water because the intake is upstream of the pollution area.

2/ CVC, Agreement No. 14 of November 23, 1976.

(b) Benefits from the improvement in the quality of the raw water

- 6.27 The Empresa de Servicios Municipales de Cali (EMCALI) operates drinking water treatment plants located in the Cauca River at Juanchito; these plants supply almost all the water used in the city of Cali. The treatment process uses aluminum sulfate, chlorine and lime as basic reagents. The quantity of reagents depends on the impurities in the water. During the rainy season the river carries organic material and sediment because of its higher flow rate while in the dry season the concentration of minerals is higher because of the relatively slow flow. There are, therefore, optimum flow rates and river levels at which the reagent quantities needed are smallest. With the project, EMCALI will have to spend less on reagents because the flow will be less in the rainy season and higher in the dry season.
- 6.28 Without the project, the present value of the treatment costs, at January 1979 prices, is estimated at US\$10,391,000, while with the project this figure would be brought down to US\$10,325,000. Although the present value of the benefit (US\$66,000) is relatively insignificant, the analysis was made, in the first instance, as the impact of the project on EMCALI's costs was not known.

5. Other benefits

(a) Employment creation

- 6.29 During construction of the project at the Salvajina site and in the plain, it is estimated that approx. 1,990 and 583 jobs per year will be generated for unskilled labor at the two locations, respectively, during the five-year construction period. Operation of the project facilities, once constructed, will require a total of about 250 unskilled laborers.
- 6.30 As regards the project's area of influence, although precise data on the numbers of workers per crop and per improved and unimproved areas are not available, an estimate can be made based on average data for crops per area and the labor input coefficients for each crop. Without the project, an average annual total of 5,272,000 man-days is estimated, whereas with the project this total becomes 5,933,000. Bearing in mind that the agricultural work year consists of approx. 265 days, the average annual increase would be 2,494 new jobs.

(b) Fishery

- 6.31 Regulation of the Cauca's flows by means of Salvajina will make for a higher dissolved oxygen content in its waters, thus making them a better living environment for fish. On the basis of various studies, ^{1/} CVC has estimated the commercial fishery catch without the project at

^{1/} Summarized in CVC, Proyecto de regulación del Río Cauca: Evaluación económica.

960,336 kg (US\$1.12 million at January 1979 prices), while with the project the figures would be 1,333,800 kg (US\$1.56 million).

- 6.32 This benefit is not considered in the analysis due to: (a) the uncertainty regarding the information as to the present situation and marketing conditions, and (b) the lack of a study on the effects on human health of eating fish subjected to different industrial chemical pollutants.

6. Economic costs

- 6.33 The project costs have been adjusted to represent the real use of the resources by the project excluding transfers and financial payments. Depreciation has also been excluded, including the cost of replacing project equipment and materials on the date expected to be necessary. Depreciation and payments on those allocated to the dam zone have not been included, either. The costs incurred up to September 1979 in respect of studies for the project were not included in the evaluation, because if the project were not implemented these expenditures would not be recovered. The evaluation only considers the disbursement to be made, i.e. those that could be influenced by the findings of the evaluation.
- 6.34 The costs have been separated by purpose. Thus, the common costs are those necessary for all the purposes (whether one or as a whole), and the separable costs are those which relate to each specific purpose.

C. Results of the Appraisal

- 6.35 The table following shows the economic indicators for the project. The net present value (NPV) at a discount rate of 12% is seen to be negative by US\$0.8 million. This is compatible with the internal rate of return of 11.95%, which is slightly lower than the discount rate adopted by the Bank. On the other hand, if the cost of the project is considered in relation to the cost of its alternatives, it is seen to be the least costly. The present value of the project cost is US\$239.6 million, while the sum of the present value of the costs of the alternative projects totals US\$292.1 million (Appendix Z).

Present Values of the Project Costs and Benefits 1/
(Millions of January 1979 US\$)

<u>Item</u>	<u>Costs (-)</u>		<u>Benefits (+)</u>	<u>Net Benefit</u>
	<u>Invest- ment</u>	<u>2/ Operation and Maintenance</u>		
Common facilities	88.6	0.5	-	-89.1
Agriculture	40.8	13.6	62.2	7.8
Hydropower	43.1	2.0	108.3	63.2
Water quality	-	-	17.3	17.3
Total	172.5 =====	16.1 =====	187.8 =====	-0.8 =====

6.36 The foregoing analysis was made with market prices, corrected by the international prices of the products exported or imported to represent the opportunity cost to Colombia. However, the unskilled labor was not corrected to represent its real cost. Bearing in mind that the shadow price of labor is 0.49 times 3/ the wage of an unskilled worker (US\$2.56/day), the NPV of the project becomes positive and the internal rate of return works out at slightly over 12%.

6.37 With the aim of measuring the variations in the project economic indicators following changes in its costs and benefits, the following sensitivity tests were made:

Sensitivity of the Salvajina IRR to Changes in Project Costs and Benefits

	<u>+15%</u>	<u>-15%</u>	<u>Basic Case</u>	<u>+25%</u>	<u>-25%</u>	<u>Elasticity 4/</u>
Investment costs	9.8	15.2	11.95	8.4	17.4	-1.51
Operating costs	11.7	12.2	11.95	11.5	12.4	-0.14
Benefits	15.0	9.3	11.95	17.1	7.5	1.61

1/ Discounted to 1979 at 12%.

2/ Including replacement costs.

3/ Measured in terms of marginal productivity. See W. Thirsk, The Economics of Colombian Farm Mechanization, New Have, Thesis - Yale University, 1972.

4/ Defined as the proportional change in the IRR over the proportional change in the costs and benefits.

- 6.38 As may be seen, the project is very sensitive to: (1) a drop in investment costs; and (2) an increase in benefits. To a lesser degree, it is sensitive to: (1) a drop in benefits and (2) an increase in investment costs, but virtually insensitive to changes in operating and maintenance costs. These make the project attractive from the standpoint of unforeseen contingencies. In the first place, there will probably be no significant reduction in its investment costs, while benefits may be greater than originally believed, because estimates of the former were pessimistic and the latter, conservative. In the second place, even if investment costs were to increase, benefits would probably reflect the same or a greater upturn, thus offsetting any adverse effect on the project IRR.

D. Environmental Impact of the Project

- 6.39 As noted in paragraph 3.04, the lake formed by the Salvajina dam will cover a 2,200 ha of poor soils of low agricultural potential and little value for stockraising or forestry because of their slopes between 40° and 70°. The lake will not, therefore, flood an area of significant economic and/or ecological value in relation to the volume of water impounded.
- 6.40 The reservoir will be relatively deep, as it will be located in a narrow gorge, and will be far from populated or traveled areas. It is not therefore expected to form a major breeding ground for disease-transmitting mosquitoes or human parasites. Studies commissioned by CVC indicate that the water hyacinth (*Eichornia crassipes*) is not found in nature in the lake area and ecological conditions propitious for its propagation are not present there. If it were to be brought in, the high concentrations of dissolved nitrogen and the average water temperature would limit its reproduction, so that removal would be simple.
- 6.41 It is considered, moreover, that the lake will prove beneficial --from the ecological standpoint-- as it will provide a haven for migratory birds, especially ducks, for which it will serve as a sanctuary not easily reached by hunters. In addition, the flood control requires leaving at least two relief areas in the plain, that will serve as wildlife refuges.
- 6.42 The project, once the works in the plain are completed, will offer the advantage of reducing the stagnant pools commonly left behind after the uncontrolled flooding of the Cauca and its tributaries. These pools provide excellent breeding grounds for mosquitoes.

- 6.43 Control of the Cauca will not entail undesirable environmental or economic consequences for the areas in the northern part of the valley. Firstly, because in the Middle Cauca area the river flows through a narrow gorge at a steep gradient where there are no croplands or communities of any significance; and secondly, because in the Lower Cauca area, where the river flows through a plain subject to flooding, the timing of the rains is different from the upper basin and the floods occur in the July-November period, so that any additional high waters caused by the works in the plain would occur in the dry months in the northern area and would therefore be easily carried by the river's natural bed.

E. Post-Facto Evaluation of the Project

- 6.44 To compile the data for the respective evaluation and report it is recommended that, within twelve months of the effective date of the loan contract, the borrower should submit to the Bank:
- (a) The initial basic data, in the categories specified in paragraph 6.47.
 - (b) The description of the system for compiling and processing the information needed for the annual comparisons with the initial basic data, so as to be able to evaluate the results obtained in the execution and operation of the project.
- 6.45 From the second year of the effectiveness of the loan contract to five years after the date of the last disbursement, the borrower shall submit to the Bank the comparative annual data referred to in the preceding paragraph.
- 6.46 At the end of the sixth year after the date of the last disbursement, the borrower shall provide an evaluation report on the results of the project based on the methodology and guidelines agreed with the Bank.
- 6.47 To facilitate the preparation of this evaluation, the borrower shall compile and centralize the initial basic data and the annual data required on the project, as of the first year of execution through five years after the date of the last disbursement. As this is a multipurpose project, the data shall be compiled for the flood control, hydro-power and Cauca water quality control subprojects as follows:
- (a) The average monthly flow rates and those of major peaks at the Salvajina, La Bolsa, Juanchito, Río Frío and La Victoria gaging stations.
 - (b) The areas flooded by the peaks of the Cauca and its tributaries shall be determined and an estimate made of the net losses caused to agrolivestock production and fixed assets.

- (c) The length of the existing dikes shall be determined, differentiating between: (i) those approved by CVC; (ii) those built without such approval, noting in each case the areas protected by the dikes concerned. An estimate shall also be presented of the cost of building and maintaining the dikes.
- (d) The average yields per hectare and the areas sown with the crops of economic significance in the project's area of influence shall be estimated, together with the gross value of production and the related cultivation costs.
- (e) The dissolved oxygen content in the water shall be measured each month during the low-water period at the Juanchito, Media Canoa and Río Frío stations.
- (f) Reports shall be provided on the measures taken and the costs incurred to reduce pollution of the river through treatment of the waste discharges of the Cali urban area, the paper plants, the sugarmills and the other industries.
- (g) The monthly energy consumption in the CVC area of influence shall be reported, noting the major consumers and the sources from which this demand is met, specifying the changes made with the interconnected system.
- (h) The monthly volume of the sediments brought down by the Cauca shall be measured at the gaging station located immediately before it flows into the Salvajina reservoir, and at the outlet from the lake, to evaluate the protection works in the basin and measure the effects of this sedimentation on the useful capacity of the reservoir.

F. Analysis of Beneficiaries

- 6.48 To distinguish the project beneficiaries, Col\$22,000 (equivalent to US\$550 at May 1979 prices) was taken as the annual per capita income below which groups would be classified as low-income. Three categories of beneficiaries were identified, viz.: (1) the workers who would be employed in the construction and operation of the project, it being estimated that 4.8% of those costs would be intended for this income group; (2) the direct beneficiaries of the subproject, it being estimated that 7.8% of the possible benefits from the agricultural subproject and 10.8% of the net benefits of the power project would go to these low-income groups; and (3) benefits from public sector transfers, which are estimated to amount to US\$1.7 million equivalent (see Appendix AA).

VII. JUSTIFICATION OF THE PROJECT

A. Technical Feasibility

- 7.01 The technical analysis made indicates that the project has been properly designed and no major problems are expected to arise during its execution. Its technical feasibility has been demonstrated and the bidding documents are now ready. The main components of the project have been derived from comparative studies of alternatives based on economic and safety factors.
- 7.02 The project has been appropriately planned and dimensioned by CVC and its consultants to meet the requirements of flood control and the estimated demand of the interconnected system. Special care was taken in the project designs regarding the technical specifications for the works, for which the most recent seismic, hydrologic and geological data were used, obtained from studies made in the project area by experts with acknowledged international reputations. On the basis of the present status of the designs, it can be concluded that the project has been planned and its cost estimated with appropriate provision for contingencies, especially taking into account the fact that the unit prices have been revised in the light of the quotations received recently for similar projects in Colombia.
- 7.03 The organization of CVC's technical units is satisfactory; these were originally set up to meet the contract requirements for Loans 175/OC-CO and 13/CD-CO granted for the financing of the Alto Anchicayá project, and subsequently reorganized and strengthened on the basis of the experience gained in the supervision of that project. As part of that reorganization, CVC has formed an executing unit for the Salvajina project that has already taken charge of the supervision of preliminary works such as access roads, power supply, camps, etc.
- 7.04 The feasibility study, final designs and bidding documents for the dam have been completed and found acceptable by the Bank. CVC is currently in the process of selecting the consulting firm that will supervise the works, study and recommend on contract awards, draw up detail designs, etc.
- 7.05 It has been agreed with CVC that for certain specific technical aspects of the project, the services of a Board of Consultants possessing international experience will be used, the Bank reserving the right to revise the terms of reference for the services to be contracted and the draft contract.
- 7.06 The execution periods for the project were established in agreement with INGETEC and CVC and checked by the Analysis Mission, through the Project Execution Plan which sets realistic schedules for the different activities necessary for achieving the project's purposes.

- 7.07 It may therefore be concluded that the project is technically sound, that the design work has been carefully prepared to ensure appropriate dimensioning and security, that the costs have been recently checked and that the execution period is reasonable, in other words, that the project is technically feasible. An acceptable date for the entry into commercial service of the first generating unit is considered to be October 1984.
- 7.08 In view of the special features of this project and so that it may efficiently perform its threefold function--control of flooding in the plain, power generation and reduction of pollution in the Cauca--CVC intends to intensify and add to the hydrologic measuring stations forming the system by which it will obtain quick and reliable rainfall and flow data. This information will enable CVC to forecast the flows into the reservoir and to control those leaving it, thus fulfilling the threefold purpose for which the project is intended.
- 7.09 The basic operating conditions for the dam were checked out for the most critical periods by mathematical simulation of the dam's operation over the past thirty years. This showed that in the driest critical period the dam can maintain a minimum discharge of 75 m³/second and that the maximum flow volumes discharged by Salvajina can be kept below 500 m³/second. The latter volume was only exceeded once, by a little and for one day only, on December 25, 1966, at a time when the highest volume and peak discharge occurred between September 1 and September 30, 1976.

B. Institutional and Financial Feasibility

- 7.10 From the administrative standpoint, it is considered that CVC possesses the organization and specialized personnel needed for satisfactory execution of the project and operation of the facilities involved. Furthermore, to strengthen project execution capacity an executing unit has been set up that would have a board of high-level consultants as advisers and a consulting firm to inspect the construction.
- 7.11 The analysis of CVC's financial situation indicates that it is overcoming the financial problems that resulted from having its tariffs frozen from 1968 to 1974. Its level of indebtedness and cash position are showing signs of recovery. However, its results as of December 1978 put it in a difficult financial situation; nevertheless, this will change for the better with gradual increases in CVC's tariffs and improvements in EMCALI's collections, as is apparent from the financial projections.
- 7.12 The financial projections show that in the initial years CVC will have to contract additional long-term borrowings of US\$28 million equivalent. A part of this amount has already been requested and no difficulties are anticipated in obtaining the rest.

- 7.13 The projections show the Corporation moving into a sustained financial recovery that should enable it to satisfactorily meet its debt service obligations, cover the operating costs of its plants in service and generate a reasonable return. It is estimated that the income thus obtained plus the long-term borrowings already referred to, together with implementation of the financial recommendations included in this document, would be sufficient to enable CVC to satisfactorily meet the local counterpart commitments for the project under study.

C. Economic Feasibility

- 7.14 The project is considered attractive from the economic and environmental standpoints. Its economic effects will extend over a long period of time, making it possible to raise agricultural incomes, meet the growing demand for electric power and improve the quality of the river water. These effects will further faster development of the valley. Moreover, the project's unfavorable environmental impacts are considered minimal and far outweighed by its benefits.
- 7.15 The internal economic rate of return of the Salvajina project is 12%. It is important to note that: (a) the project will induce various secondary benefits that cannot easily be quantified and have not been included in the analysis, such as multiplier effects of the income and investment generated by the demand for inputs and the employment creation resulting from the project; (b) a conservative assumption has been adopted with regard to the agricultural benefits, the CVC implementation schedule being extended from five to nine years; (c) certain adjustments have not been included (such as correction by labor shadow price and inclusion of benefits for fisheries, recreation and free accommodation for project workers), and (d) another important benefit, that is also difficult to quantify, is the incentive the farmers will have to invest once the risk of flooding is eliminated. This latter factor will be taken out of the picture with the project and the benefits deriving from the larger investments will therefore be greater. Finally, the economic indicators for multipurpose projects (NPV and IRR) generally reflect the intensity of the capital expenditure over a relatively short space of time as compared with an economic life of very long duration with relatively small yearly benefits.

D. Legal Opinion

1. Capacity to execute the project

- 7.16 In the light of CVC's purposes and powers as enumerated in Chapter V, plus the fact that it is competent to construct such facilities as it needs for its purposes either directly or through contracts with third parties (Art. 20), and since the project is consistent with the requirements of Decree 1707, CVC is legally competent to execute the project.

It has already obtained the requisite approval from the National Economic Policy Council for contracting loans (Art. 5), as plans and projects adopted by CVC through its Management Board, together with the pertinent national currency and foreign exchange budgets, require that Council's approval to become effective and for formal incorporation into the national plans.

2. Capacity to contract the loan

- 7.17 CVC is expressly empowered to enter into all types of contracts and specifically to borrow funds (Arts. 16 and 17). Within CVC, it is the Executive Director, as representative of the Corporation, who authorizes the respective contracts (Arts. 45(i)(o), 49 and 50(a) and (b)).

3. Expropriation procedures

- 7.18 In most cases CVC is able to purchase the land it needs for carrying out its purposes. However, it can resort to expropriation when agreement cannot be reached with the owners concerned. The procedure to be followed in such cases is as follows:
- 7.19 Art. 12(g) of CVC's statutes specifies that property needed for achieving its purposes is in the public interest and expropriation may therefore be undertaken. Accordingly, the Legal Counsel's office, with assistance from the technical departments, prepares briefs concerning the areas in question (justification, location, reasons why normal purchase is impossible, etc.) for submission to the CVC Management Board. If the Board approves, it forwards them to the Office of the President of the Republic, which then issues the appropriate "declaration of necessity". This declaration opens the proceedings before the competent judicial authority. It is the responsibility of the CVC Legal Counsel's office to submit the application, a copy of which is then forwarded to the present owner. After three days, the court gives its decision. It is important to note that the property can be transferred to the applicant before the formal valuation is made, if the applicant so requests and deposits to the order of the court, by way of guarantee of payment of compensation, a sum equal to the current valuation plus 50%. The CVC Legal Counsel's office informs us that the entire process takes about two months (15 days for CVC to prepare the justification and submit the application to the Government, 30 days for the Government to issue the declaration of necessity and a further 15 days for the court proceedings).

4. Relocation of small landowners

(a) In the Salvajina area

- 7.19 The Salvajina area is a mountainous one and most of the people living there are farmers or miners (panning for gold along the banks of the river) who would not take readily to living in the plains. One suggestion

put forward by CVC for relocating those affected by the dam was as follows: CVC owns some property in the area, consisting of land acquired but not used for the widening of the Timba-Salvajina road, plus some pieces containing gravel deposits that have been purchased so that the gravel can be used in the construction of the dam. Once the gravel has been taken out, this land could be used for rehousing purposes.

(b) In the plains

- 7.21 There are small farmers along the river, many of them without legal title to the land they occupy, who form small communities, and also others with independent small-holdings.
- 7.22 CVC has considered various possible ways of relocating those who would be affected by the works in the plain, but has not yet settled on a specific plan. Firstly, and this could be done in a number of cases, the routing of canals could be varied slightly if this would make it possible to avoid demolishing groups of existing dwellings. Another alternative being considered is that, since all property owners with more than 3 ha have to pay a betterment levy, CVC--and this has already been done in similar projects such as Agua Blanca and Roldanillo-La Unión-Toro--would accept part of all of the payment in land. This land would then be sold to INCORA (Instituto Colombiano de la Reforma Agraria), with the stipulation that it could only be used for the relocation of displaced families. A further possibility analyzed would consist in CVC buying small unworked parcels in the area and using them for relocation, either directly or through INCORA.
- 7.23 In any event, although CVC does not presently have a specific plan for relocating the families affected, these would be displaced after 1984 by the civil works in the plain that do not form part of the Salvajina project. There is therefore sufficient time for an appropriate plan to be prepared.

5. Betterment levy

- 7.24 CVC, and specifically its Management Board, is empowered "to adopt the general regulations to govern the manner of assessing and collecting the betterment taxes or levies". In exercise of this power, CVC issued betterment levy regulations that were approved by the Executive Branch by Decree 1020 of June 5, 1978 and form some of the most advanced legislation on this subject. The operating mechanism of this levy is as follows: 1/
- (a) CVC can 2/ apply the levy in respect of works in the public interest that it undertakes and which benefit urban or rural real

1/ The articles quoted refer to Decree 1020.

2/ CVC's Betterment Office considers that application of the levy is optional for CVC.

property. However, it is left to CVC's discretion to collect the levy for all of a particular project, for a number of projects in combination, or just by sections of particular projects (Arts. 2 and 3).

- (b) The total amount of the levy must not exceed the cost or budget for a project plus 20% to cover additional costs connected with the assessment and collection of the levy (Art. 4). If on conclusion of a project the actual cost turns out to be less than estimated, a proportionate reduction will be made in the levy; if the actual cost proves to be higher than the estimate, the law specifies (i) that if the increase was due to execution of additional works, the increase shall be distributed as for an additional levy, whereas (ii) if the increase derived from inflation, it shall not be charged to those who paid up in cash at the start of the works, but shall be spread proportionately over the rest (Arts. 60 and 61).
- (c) When there are in the area of influence of a project, facilities constructed directly by the potential payers that can be incorporated into the project, the levy will be reduced in proportion to the benefit that such facilities represent for the project (Art. 64).
- (d) The actual levy may be calculated using just the "added value method" or the "factor method" (Art. 39). The decree defines added value (Art. 35) as the difference between the commercial value of a piece of property before and after the execution of the works, computed on the basis of general price levels for real estate and disregarding improvements resulting from causes other than the project. "Factors" are the indexes which, as they express the capacity to absorb the benefit on the part of properties located in the area of influence of a project, can be used in studies and the distribution of the assessments in order to arrive at the amount to be charged. Typical factors are location of the property in relation to the project, access, profitability or potential productivity, degree of improvement and protection of the land, changes and improvements in use and any other factors that may be specified in connection with a particular project (Art. 35).
- (e) If the factor method is used, the levy can be collected as of the start of the works. It may not continue to be collected beyond five years after completion of the project (Arts. 8 and 9).
- (f) The sums collected go into a special CVC fund called the Improvement Fund for which separate accounts have to be kept.
- (g) One of the very special features of CVC's Betterment Regulations is the active participation allowed to owners of properties located in the project area of influence who will be the ones to pay the levy. Through a Landowners' Committee that is elected according to strict

procedures and under the supervision of CVC, the property-owners can take an active part in the stages of the preparation of the project budget, the study of the proposed distribution of the assessments, fixing of the payment periods, supervision over the investment of the funds in the works and the actual construction process. The members of the Landowners' Committee receive fees and the expenses entailed in contracting specialized professionals, plus reimbursement of transportation and secretarial expenses.

7.25 The procedure for establishing and collecting the levy is as follows:

- (a) The Management Board of the Corporation has to order that a particular project be carried out by the betterment levy system. 1/
- (b) Next the property-owners who would be liable for the levy are invited to elect the Landowners' Committee.
- (c) The CVC Improvement Office 2/ which is responsible for all procedures regarding the levy (except for its collection), prepares the estimate for the project and the proposed distribution of the levy among those affected.
- (d) Copies of the estimate and proposed distribution are then provided to the Landowners' Committee, which has two months in which to comment on them. These comments are studied and taken into account by the Improvement Office, but it can either accept or reject them. In the latter case, the Office must state its reasons.
- (e) After the parties have been heard, the Executive Director of the Corporation and the chief of the Improvement Office issue a resolution specifying the distribution of the betterment levy. Collection is the responsibility of the CVC Treasury.
- (f) The landowners can appeal against the resolution by seeking reversal by the Executive Director and the chief of the Office and appealing to the Management Board of CVC.

7.26 It is recommended that the implementation and collection of the betterment levy be monitored through the following requirements: (a) before the first disbursement, CVC shall submit a detailed report setting out the scale and content of this levy, and (b) every six months, it shall inform the Bank regarding the results of the imposition of this levy (see paragraph 5.66).

1/ This order was given for Salvajina in May 1979.

2/ Organized in December 1978 and already functioning.

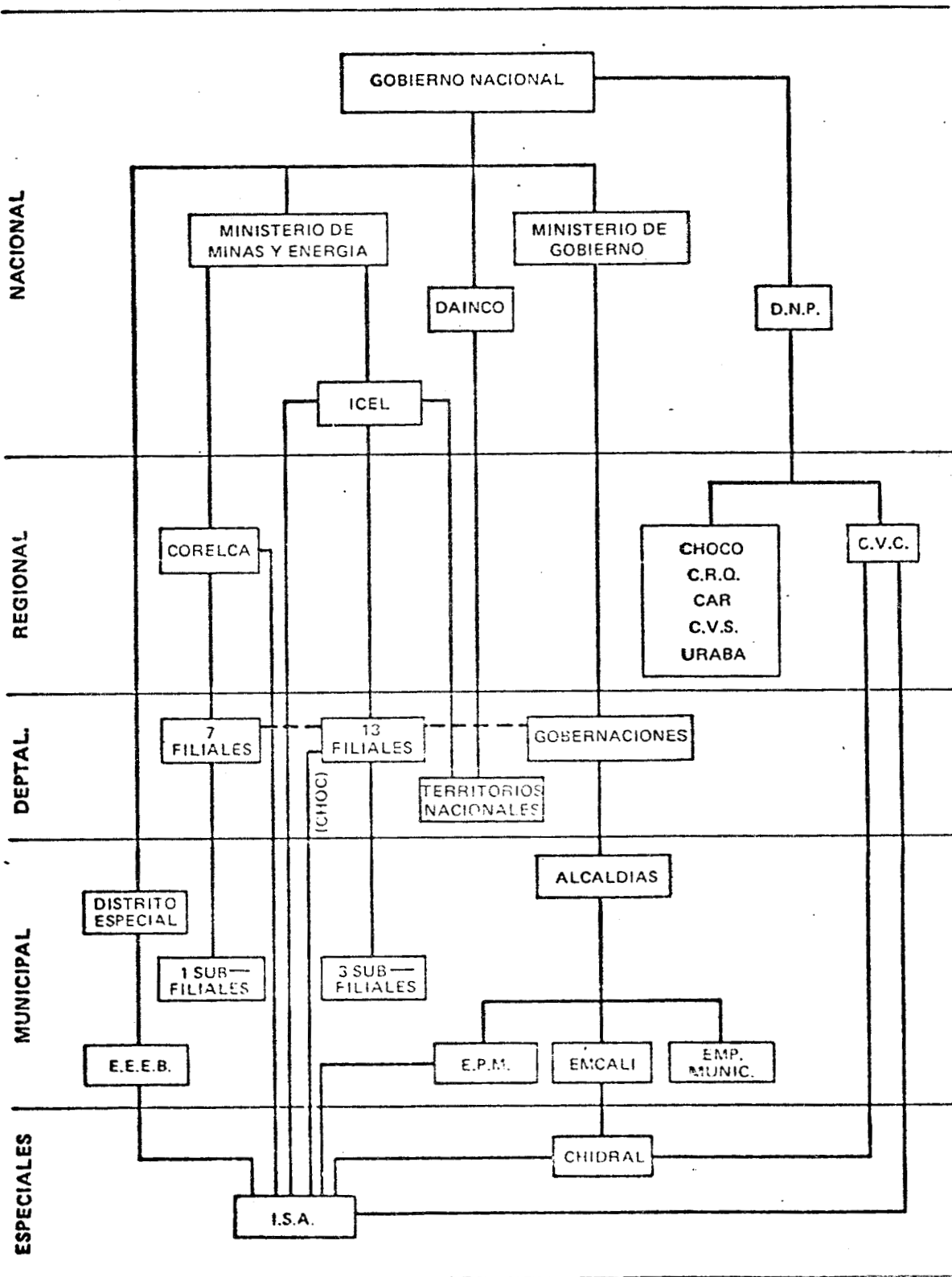
6. Tariffs

- 7.27 Concerning the power tariffs, it must be noted that the Management board is empowered to fix electric power tariffs (Art. 25 (C)(10)), but these must also be approved by the National Tariffs Board of the National Planning Department.

7. Participation by the Overseas Economic Corporation Fund of Japan

- 7.28 At the end of May a mission from the Japanese Overseas Economic Cooperation Fund visited Bogota and Cali to negotiate a draft contract with CVC and the Colombian Government for the financing of part of the Salvajina dam, and also to discuss with the IDB which part of the dam would be financed by each institution. The draft contract and the Japanese fund's rules for bidding and the contracting of services were analyzed with CVC and it was found that the Bank would not be able to participate jointly in bidding with the Japanese because the two institutions lists of eligible countries were not identical. It is recommended that before the first disbursement, CVC be required to submit evidence to the Bank that the loan contract with the Japanese Fund for approximately 12,300,000,000 yens has been formalized (see Resolution 8 c (i)).

ESTRUCTURA INSTITUCIONAL DEL SECTOR
ELECTRICO A NIVEL NACIONAL



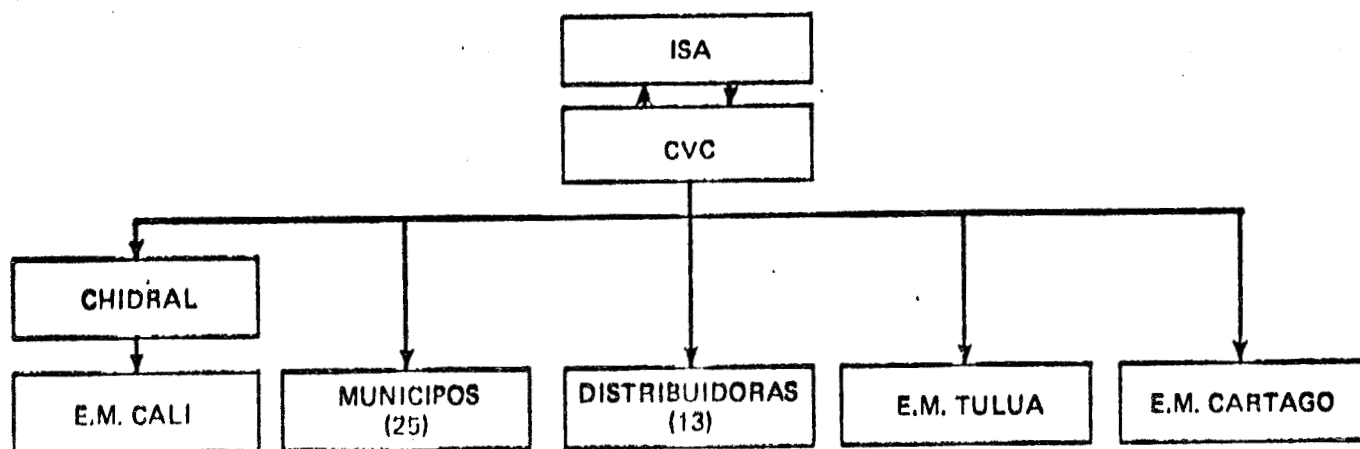
PROYECTOS DE GENERACION EN EL PERIODO 1979-1988

Central	Tipo	Estado	Capacidad instalada MW	Entidad ejecutora	Año de puesta en servicio
Guatapé II	H	Ejecución	280	EPM	1979
Insula (Ampl.)	H	Ejecución	12	CHEC	1979
Chivor II	H	Ejecución	500	ISA	1980 <u>1/</u>
Termo Barranquilla	T	Ejecución	132	CORELCA	1980
Termo Cartagena	T	Ejecución	66	CORELCA	1980
Termo Zipa (Ampl.)	T	Ejecución	66	ISA/EEEB	1981
Termo Paipa (Ampl.)	T	Ejecución	66	ICEL	1981
Guadalupe (Ampl.)	H	Ejecución	100	EPM	1981 <u>2/</u>
Ayurá	H	Ejecución	19	EPM	1982
El Paraíso-La Guaca	H	Ejecución	520	EEEB	1982
Troneras (Ampl.)	H	Ejecución	26	EPM	1982 <u>2/</u>
San Carlos I	H	Ejecución	620	ISA	1982
Cerrejón I	T	Ejecución	150	CORELCA	1983
San Carlos II	H	Ejecución	620	ISA	1983
Jaguas	H	Ejecución	120	ISA	1983
Tasajaero	T	Estudio	132	ICEL	1983
Salvajina	H	Ejecución	180	CVC	1984
Guadalupe IV	H	Estudio	260	EPM	1984
Cerrejón II	T	Estudio	150	ISA	1984
Julumito	H	Estudio	50	ICEL	1985
Betania	H	Estudio	500	ICEL	1985
Playas	H	Estudio	240	ISA	1986
Guavio	H	Estudio	975	ISA	1986
Urrá I y II	H	Estudio	1050	ISA	1988

1/ Las últimas informaciones indican la puesta en servicio, en 1981.

2/ Son obras civiles que no aumentan la capacidad instalada.

ESTRUCTURA DEL SECTOR ELECTRICO EN EL VALLE DEL CAUCA



DISTRIBUCION DE CENTRALES ELECTRICAS (HIDRAULICAS Y TERMICAS)

ISA	CVC	CHIDRAL	TULUA	CARTAGO
VOR (H) MW 500	ALTO ANCHICAYA (H) MW 339 CALIMA (H) MW 120	YUMBO (T) MW 50 BAJO ANCHICAYA (H) MW 64	3 PLANTAS (H) MW 5	PLANTA 1 (H)

PROYECTO DE REGULACION DEL RIO CAUCA

DATOS CLIMATOLOGICOS

PRECIPITACION MEDIA MENSUAL - mm

	Ene	Feb	Mar	Abr	May	Jun	Jul	Ago	Sep	Oct	Nov	Dic	Total
Suárez	181	183	225	340	273	202	116	91	170	299	390	296	2970
Cali	60	56	79	124	133	74	39	38	59	115	157	88	951
Manuelita	75	76	95	145	139	71	36	43	65	152	109	88	1058

TEMPERATURA MEDIA MENSUAL °C

	Ene	Feb	Mar	Abr	May	Jun	Jul	Ago	Sep	Oct	Nov	Dic
Cali	24.0	24.3	24.4	23.9	23.6	23.8	24.3	24.3	24.5	23.6	23.5	23.7
La Manuelita	23.5	23.7	23.8	23.6	23.4	23.4	23.6	23.6	23.7	23.3	23.3	23.2
La Unión	23.6	23.9	23.7	23.6	23.3	23.2	23.5	23.8	23.7	23.0	22.7	23.0

HUMEDAD RELATIVA MEDIA MENSUAL %

	Ene	Feb	Mar	Abr	May	Jun	Jul	Ago	Sep	Oct	Nov	Dic
La Manuelita	79.6	78.6	78.1	80.1	90.4	75.5	77.8	74.7	76.4	80.6	82.6	80.6
Cali	64.0	62.0	64.0	65.0	67.0	65.0	57.0	59.0	60.0	67.0	68.0	65.0

APENDICE D

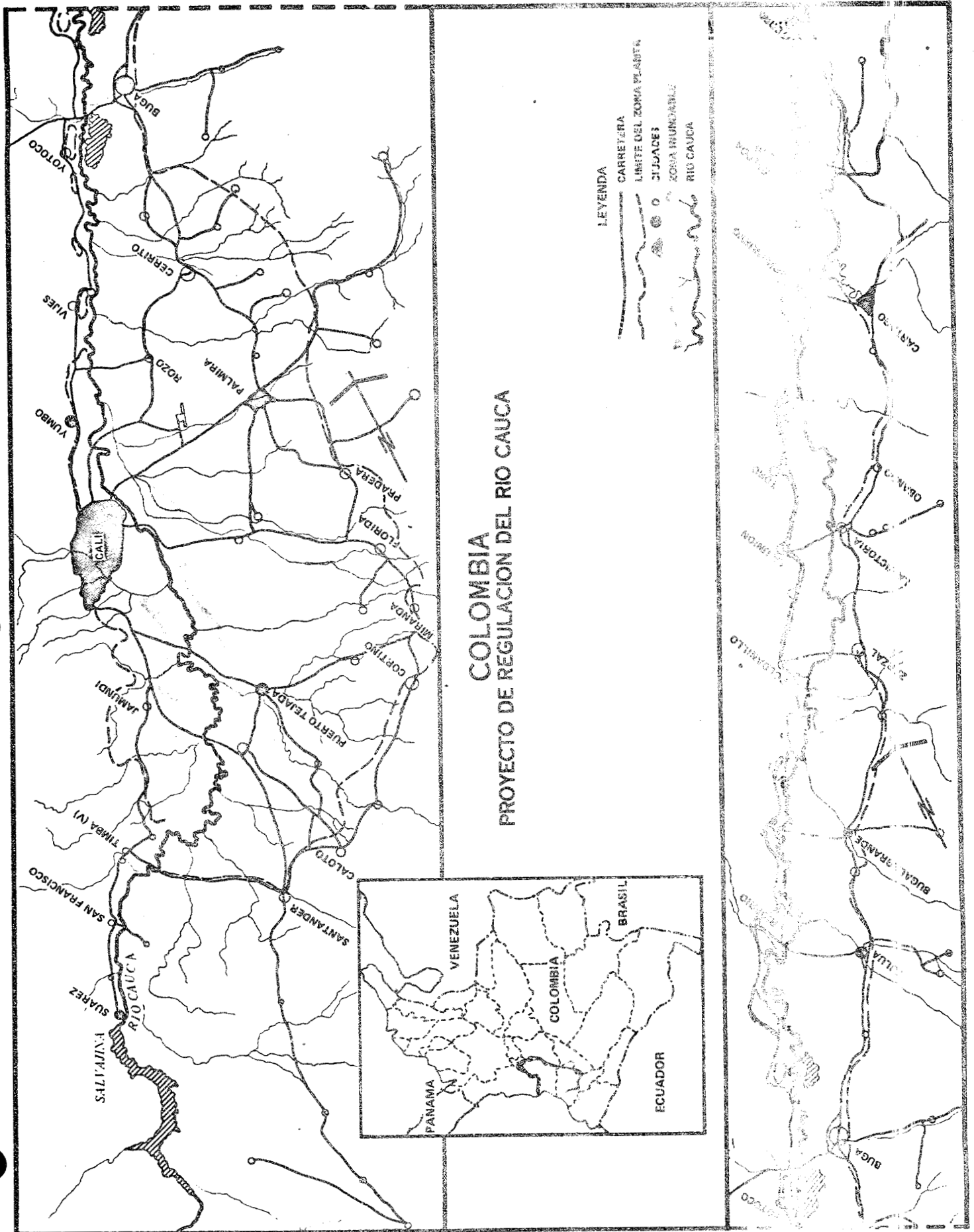
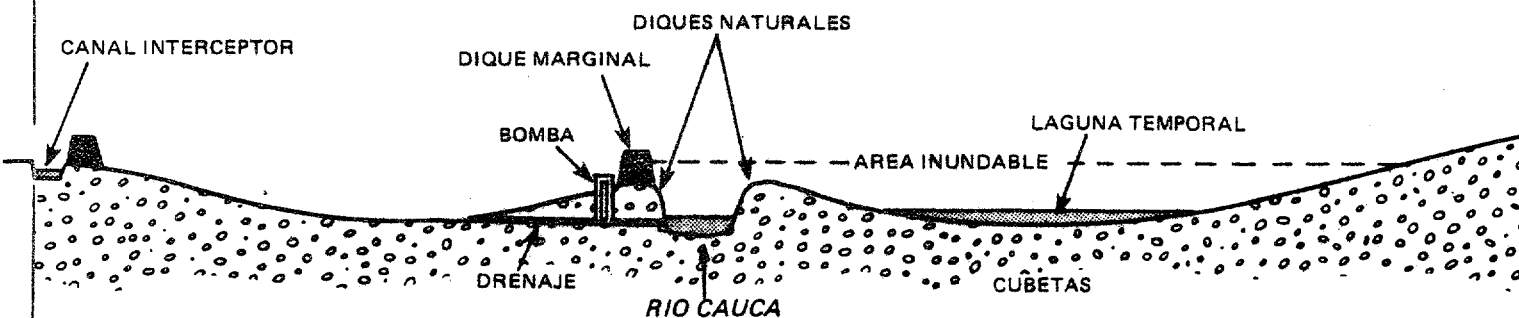


DIAGRAMA DE UN PERFIL TIPICO DEL VALLE

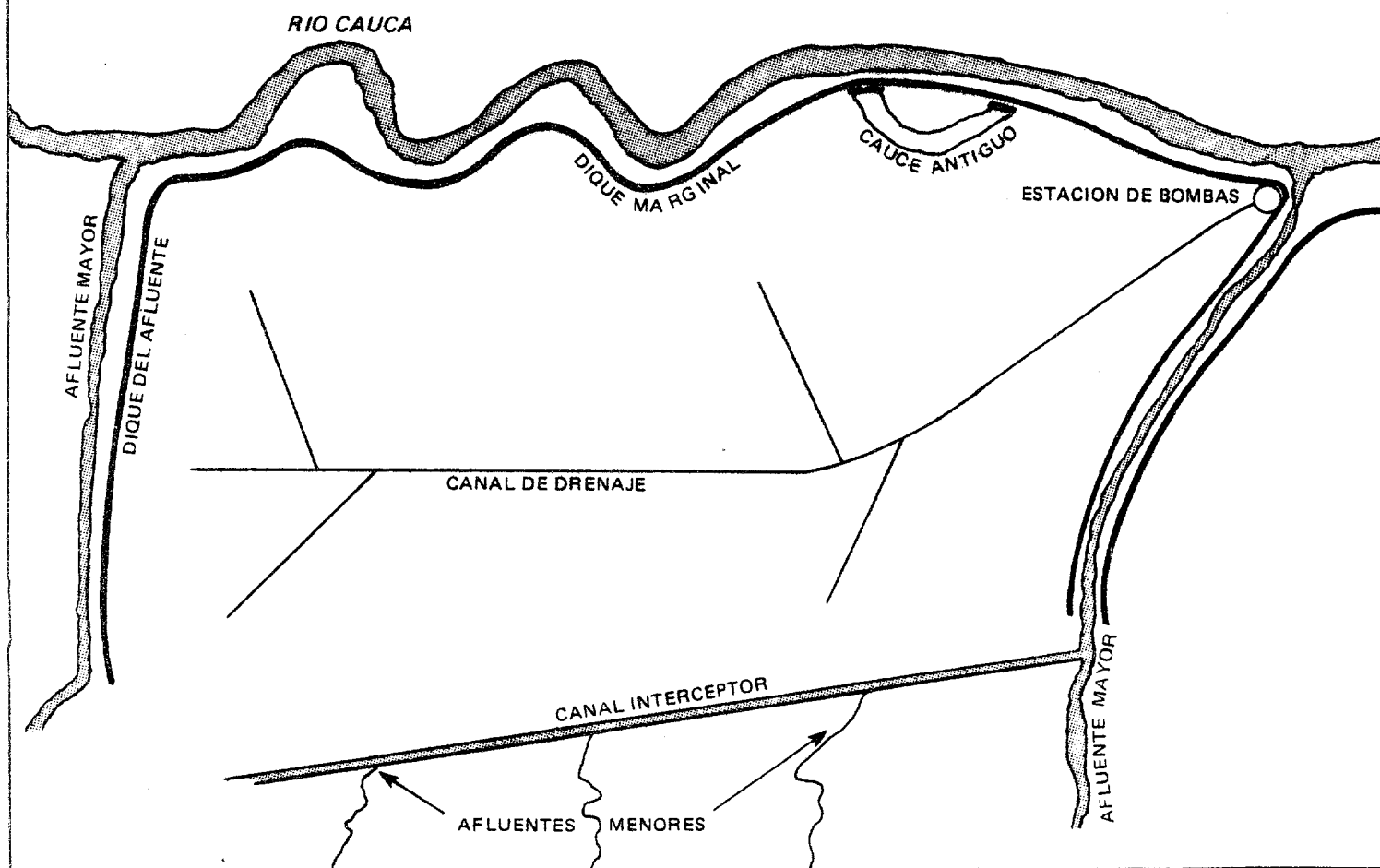
ZONA PROTEGIDA

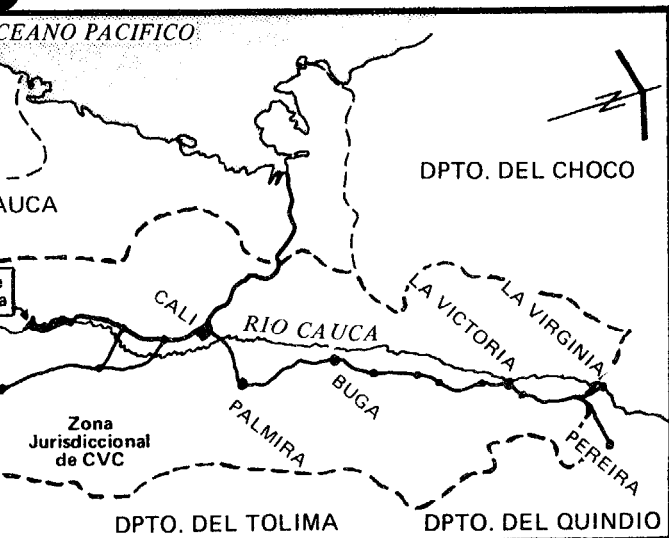
ZONA NO PROTEGIDA



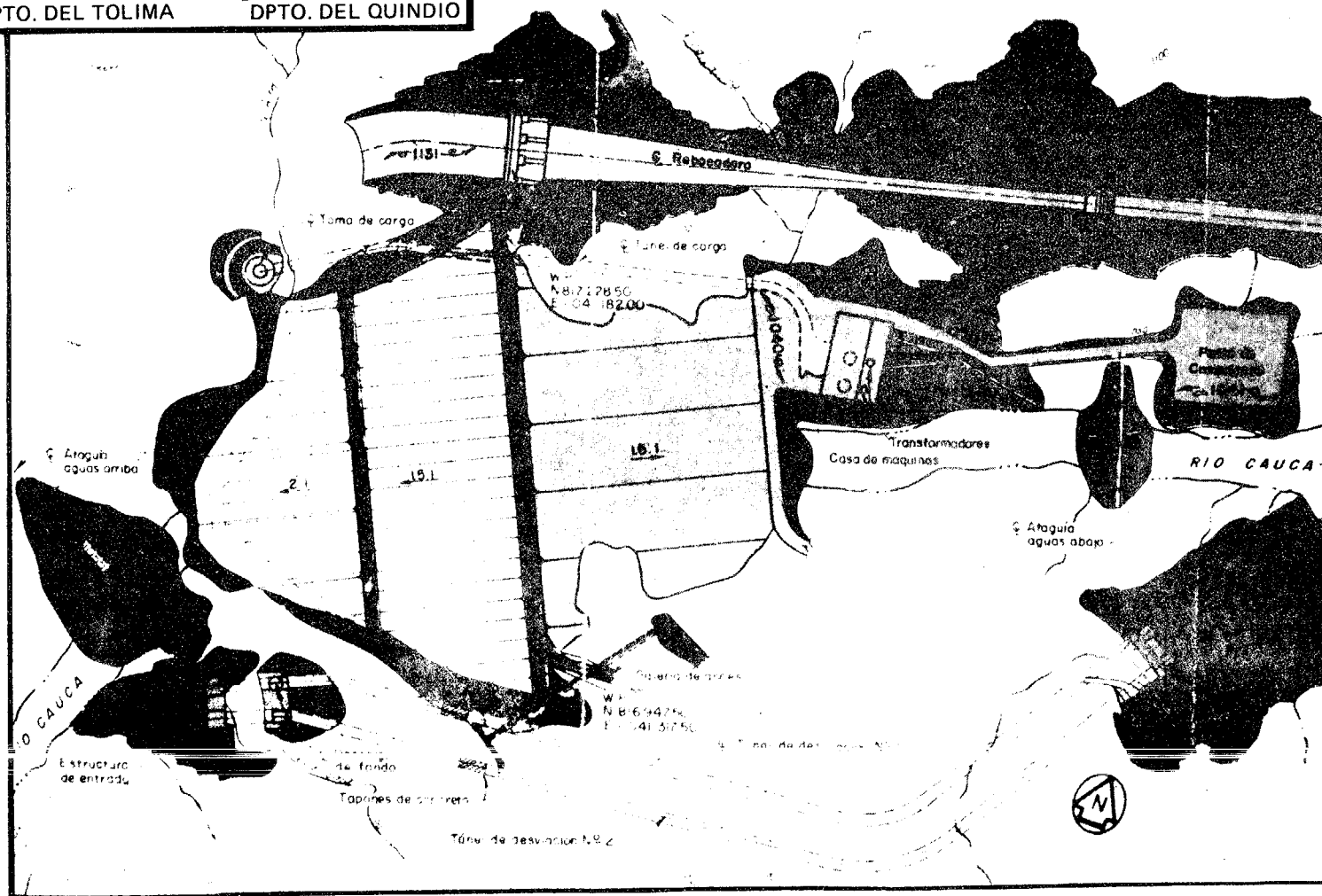
NOTA: ESCALA VERTICAL EXAGERADA

DIAGRAMA DE UN ANILLO DE PROTECCION





COLOMBIA PROYECTO DE REGULACION DE RIO CAUCA PRESA PLANTA GENERAL



DE INFLUENCIA PROYECTO DE REGULACION DEL RIO CAUCA

[illegible]

SIGNACION ESPECIAL		
ERIDORES	ACTUAL	
N	N	L

INFORME DE PROGRESO DE LOS PRESTAMOS

AL: 30 junio 1979
(CONFIDENCIAL)

PAIS: COLOMBIA

Página 28 de 32 Páginas

PRESTAMO No. 520/SF-CO

ORIGINAL		VIGENTE		(2) DATOS BASICOS		(3) CIFRAS BASICAS		ORIGINAL	ACTUAL
o Ejecutivo	20- X-77	n.c.		a. Deudar:	La República de Colombia	a. Costo Proyecto	US\$	78.000.000	78.000.
	5-XII-77	a) n.c.		b. Ejecutor:	Corporación Autónoma Regional del Cauca (CVC)	b. Monto del Préstamo	US\$	41.000.000	41.000.
	5- VI-78	5-IX-78		c. Corante:	La República de Colombia	c. Desembolsado:	US\$	AL: 31-III-78	ACTUAL
	5-XII-81	b) n.c.		d. Objeto:	Desarrollo Urbano de Buenaventura	d. % desembolsado.		1.359.992	1.411.9
	5-XII-84	n.c.				e. Monedas prestadas:		3,3%	3,4%
	5-XII-								
IA TECNICA DENTRO DEL PRESTAMO				a. Plazo amortización:	f. Intere:	%		27.000.000	27.000.
	b. Monto US\$	-		g. Comisión Compromiso	%	Comision Servicio	%	14.000.000	14.000.
	-								
	-								
	-								
	-								
	-								
	-								
ON BID	(6)	CONSULTORES		(7) INFORMES	FECHA	(8) PRORROGAS DEL ULTIMO DESEMBOLSO			
a Secto-				a. Representacion	31-III-79			17.000	51.0
gorta				b. Consultores	-			Col\$ Eq. US\$	1.360.9
				c. Deudar	-	a. Numero:	-		
				Progreso	31-III-78	b. Meses acumulados	-		
				Financiero	-	c. Fecha de la ultima:	-		
				Recuperaciones	-	por	- meses		
loza				(9)	FECHA ULTIMA VISITA				
				Del BID	OPS VIII-77	Prestatario al BID	IX-77		

ACTUAL: El estado de ejecución por subprogramas es el siguiente: Educación: Se adjudicaron e iniciaron tres núcleos escolares primarios. Próximamente se licitarán las 6 obras restantes. Urbanización: Continúan satisfactoriamente las obras de la primera urbanización. Está en vías de adjudicarse la segunda urbanización. Se prevé al fin de año la urbanización faltante. Saneamiento: Acueducto: Se efectúan obras de revisión, control de funcionamiento de redes existentes. Está en vías de adjudicación la nueva obra de conducción. Está terminándose la nueva planta potabilizadora en Venecia. La adjudicación de nuevos tanques de almacenamiento se encuentra en fase de estudio. Alcantarillado. Se está adelantando el diseño de las estaciones de bombeo. Se están terminando en 9 barrios. Faltan por iniciarse obras en otros barrios. Está en trámite la adquisición de equipo de recolección para los dispositivos de residuos sólidos. Vías: Se terminó la avenida Simón Bolívar-Isla y la pavimentación en Playeta, Los Alemanes, Viento Libre y Anillo Vial Bellavista. Se está iniciando la construcción en Periferia Continental. El mes de julio se abrirá la licitación para la pavimentación de la avenida Simón Bolívar-Continental. Durante el segundo semestre se licitará la rehabilitación de un tramo antiguo de la Avenida Simón Bolívar-Isla. Durante el segundo semestre se licitará la rehabilitación del puente Pinal. Aún no se ha decidido sobre la construcción del nuevo puente férreo.

Continúa

REQUERIDA: Representación: Seguir de cerca y mantener informada a la Sede el estado de disponibilidades de aprobación material de obras.

Asignación contrato: la misma.

Subproyecto de Vías y Saneamiento que será 5-XII-82. Fecha iniciación obras: 5-XII-79.

INFORME DE PROGRESO DE LOS PRESTAMOS
al 30 junio 1979

PAIS: COLOMBIA

página: 29 de 32

Préstamo: 520/SF

ales: Se prevé licitar durante el segundo semestre la pavimentación y construcción de la Central de Transportes. **os:** Se adjudicó la primera etapa de construcción del Mercado Central. Se preparan las licitaciones para la construcción de los mercados de Pueblo Nuevo y La Playita. Han surgido algunos problemas para la posesión de los predios que pueden afectar la iniciación de obras. **Electrificación:** Se terminaron las obras del alimentador principal del continente (primera etapa). También se terminaron tres redes de distribución en barrios del continente. Se inicia la segunda etapa de alimentador primario, así como de las obras de cambio de tensión en la isla. Se adjudicaron equipos para la subestación transformadora de 20 MVA. Están en vías de licitación las líneas de transmisión. **Promoción Industrial:** Están bajo estudio las propuestas técnicas y económicas de los consultores para los estudios generales en los sectores maderero y agroindustrial. Están bajo consideración del Banco los términos de referencia para los estudios específicos de pesca. **Mejoramiento Institucional:** Continúan las labores de asesoría en materia administrativa, educación, ordenamiento urbano, aseo urbano y asesorías a industrias existentes. Aún no se han iniciado las asesorías sobre régimen tarifario, control sanitario y operación de sistemas de agua y alcantarillado. El avance físico global del programa es del 13%. Las limitaciones de las asignaciones presupuestarias han afectado la ejecución del programa. Se espera que esta limitación quede resuelta con las asignaciones incluidas en el presupuesto adicional en trámite de aprobación. El proyecto tiene un atraso de 9 meses en los 18 transcurridos. En las finanzas actuales se anticipan problemas para la iniciación de todas las obras antes del 5 de diciembre próximo por el plazo contractual.

INGETEC

Enero 16, 1979

PROYECTO DE REGULACION DEL RIO CAUCA

OBRAS DE SALVAJINA

PRESUPUESTO ESQUEMA NUEVO

Item	Unidad	Cantidad	Precio Unitario US\$	Precio Total Miles de US\$
I. PRESA Y EMBALSE				
Adquisición de zonas	Ha	3.300	550.0 (1)	1815
Vías de acceso	SG			2180
Campamentos	SG			1160
Túneles de desviación				
Excavación				
a tajo abierto-entrada	m3	115.000	10.0 (2)	1150
a tajo abierto-salida	m3	250.000	6.0 (3)	1500
Subterránea	m3	81.700	80.0 (4)	6536
Concreto				
bocatomas	m3	4.800	160.0 (5)	768
revestimiento	m3	15.500	160.0 (5)	2480
estructuras de salida	m3	350	160.0 (5)	56
en pórtico para tablonos	m3	20	240.0 (6)	5
en tablonos de cierre	m3	50	240.0 (6)	12

Item	Unidad	Cantidad	Precio Unitario US\$	Precio Total Miles de US\$
Cemento	ton	7.252	90.0 (7)	653
Acero de refuerzo	ton	937	1190.0 (8)	1115
Concreto neumático	m3	5.700	170.0 (9)	969
Aditivo acelerante de fraguado	kg	66.000	2.0 (10)	132
Núcleos de prueba	SG			42
Inyecciones (en la presa)				
Soportes estructurales	ton	1.400	1360.0 (11)	1904
Pernos, cabezales y platinas	SG			378
Compuertas	ton	88	2330.0 (12)	205
Total túneles de desviación				17.905

Presa.

Excavación				
materia aluvial	m3	110.000	4.0 (13)	440
para fundación de la cara y zona 1				
remoción de talus	m3	145.000	3.0 (14)	435
excavación en rocas	m3	136.000	7.0 (15)	952
reconformación	m3	25.000	15.0 (16)	375
para zona 2A	m3	60.000	3.0 (14)	180

Preparación fundaciones en roca	m2	15.000	4.0 (13)	60
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Relleno compactado

Zona 1	m3	175.000	7.5 (17)	1312
Zona 2	m3	1.850.000	5.5 (17)	10.175
Zona 2 A	m3	470.000	7.0 (17)	3290
Zona 4	m3	1.100.000	4.5 (17)	4950
Zona 5	m3	210.000	3.0 (17)	630
Zona 5 A	m3	65.000	4.5 (17)	292
Zona 6	m3	160.000	4.0 (17)	640

Item	Unidad	Cantidad	Precio Unitario US\$	Precio Total Miles de US\$
Cemento	ton	7.252	90.0 (7)	653
Acero de refuerzo	ton	937	1190.0 (8)	1115
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Aditivo acelerante de fraguado	kg	66.000	2.0 (10)	132
Núcleos de prueba	SG			42
Inyecciones (en la presa)				
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Pernos, cabezales y platinas	SG			378
Compuertas	ton	88	2330.0 (12)	205
Total túneles de desviación				17.905

Presa

Excavación				
máterial aluvial	m3	110.000	4.0 (13)	440
para fundación de la cara y zona 1				
remoción de talus	m3	145.000	3.0 (14)	435
excavación en rocas	m3	136.000	7.0 (15)	952
reconformación	m3	25.000	15.0 (16)	375
para zona 2A	m3	60.000	3.0 (14)	180

Preparación fundaciones en roca	m2	15.000	4.0 (13)	60
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Relleno compactado

Zona 1	m3	175.000	7.5 (17)	1312
Zona 2	m3	1.850.000	5.5 (17)	10.175
Zona 2 A	m3	470.000	7.0 (17)	3290
Zona 4	m3	1.100.000	4.5 (17)	4950
Zona 5	m3	210.000	3.0 (17)	630
Zona 5 A	m3	65.000	4.5 (17)	292
Zona 6	m3	160.000	4.0 (17)	640

1630000

Item	Unidad	Cantidad	Precio Unitario US\$	Precio Total Miles de US\$
Relleno colocado en la zona na 3	m3	50.000	7.5 (17)	375
Varios (relleno)	SG			2050
Rellenos varios	SG			27
Excavación galería de inyección	m. l	810	80.0 (18)	65
Desviación del río	SG			1600
Instrumentación	SG			135
Inyecciones	SG			6000
Losa de concreto	m3	38.800	120.0 (19)	4656
Concreto dental	m3	1.200	100.0 (20)	120
Concreto portales galerías de inyección	m3	10	130.0 (21)	1
Cemento	ton	14.000	90.0 (7)	1260
Acero de refuerzo	ton	4.237	1190.0 (8)	5042
Sellos	SG			430
Concreto neumático	m3	750	160.0 (9)	120
Pernos y barras de anclaje	SG			133
Total presa:				45745

Rebosadero.

Excavación				
Zona A	m3	940.000	5.0 (22)	4700
Zona B	m3	625.000	5.0 (22)	3125
Zona C	m3	260.000	3.0 (14 y 14')	780
Concreto				
interior de la gola	m3	5.000	100.0 (23)	500
exterior de la gola	m3	700	140.0 (24)	98
pilas y muros estructura de control	m3	9.200	130.0 (24)	1196
vigas de apoyo del muelle	m3	90	190.0 (25)	17
vigas prefabricadas poente	m3	40	240.0 (6 y 25)	10
losa puente	m3	50	240.0 (6 y 25)	12
muros canal	m3	2.800	130.0 (24 y 26)	364
losa canal	m3	6.500	120.0 (23 y 26)	780

Item	Unidad	Cantidad	Precio Unitario US\$	Precio Total Miles de US\$
interior deflector	m3	1.000	100.0 (27)	100
exterior deflector	m3	200	140.0 (24)	28
muros deflector	m3	300	130.0 (24)	39
quebrada Salvajina	m3	70	130.0 (24)	9
Cemento	ton	9.100	90.0 (7)	819
Ceniza volátil	ton	500	240.0	120
Puzolana natural	ton	500	240.0	120
Acero de refuerzo	ton	1.015	1190.0 (8)	1208
Concreto neumático	m3	735	160.0 (9)	118
Concreto poroso	m3	50	70.0 (28)	4
Inyecciones (en la presa)				
Sellos	SG			173
Pernos y anclajes en roca	SG			317
Tensionamiento anclajes postensados	ton-m	164.300	1.0	164
Protección de taludes	SG			210
Compuertas guías y malacates	un	3	400000.0 (29)	1200
Total rebosaderos:				16211

Descarga de fondo.

Excavaciones

patio de las tomas	m3	25.000	10.0 (2)	250
portal galería de acceso	m3	1.000	10.0 (2)	10
pozos verticales	m3	3.520	200.0 (30)	704
zona de tapones	m3	6.200	90.0 (4)	558
galería de acceso	m3	2.300	100.0 (4)	230

Concreto

revestimiento primera etapa	m3	730	190.0 (25)	139
tapones	m3	1.550	130.0 (24)	202
cámara de válvulas y descarga	m3	200	150.0 (24)	30
detrás del blindaje	m3	260	130.0 (24)	34
tomas	m3	1.400	180.0 (25)	252
pozos verticales	m3	570	210.0 (30)	120
galería de acceso	m3	140	130.0 (24)	18

Item	Unidad	Cantidad	Precio Unitario US\$	Precio Total Miles de US\$
Cemento	ton	1.698	90.0 (7)	153
Acero de refuerzo	ton	258	1190.0 (8)	307
Inyecciones (en la presa)				
Soportes	ton	111	1360.0 (11)	151
Tubería	ton	86	2000.0 (31)	172
Rejas	ton	200	2000.0 (32)	400
Compuerta semiesférica	ton	30	3000.0 (33)	90
Válvulas Howell Bunger	un	2	300000.0 (34)	600
Válvulas de mariposa	un	2	300000.0 (35)	600
Total descarga de fondo:				5020
Sub-total presa y embalse				90036
Ingeniería e imprevistos 20%				18007
Total presa y embalse:				108043

II. CENTRAL HIDROELECTRICA

Bocatoma.

Excavación				
a tajo abierto	m3	21.000	10.0 (2)	210
pozo vertical	m3	3.070	200.0 (30)	614
Concreto				
toma	m3	1.800	190.0 (25)	342
pozo	m3	590	240.0 (6)	142
pedestales de izamiento	m3	15	160.0 (5)	2
Cemento	ton	842	90.0 (7)	76
Acero de refuerzo	ton	160	1190.0 (8)	190
Soportes estructurales	ton	65	1360.0 (11)	88
Rejas	ton	48	2000.0 (32)	96
Compuertas semiesféricas	ton	63	3000.0 (33)	189
Total bocatoma:				1949

Item	Unidad	Cantidad	Precio Unitario US\$	Precio Total Miles de US\$
<u>Túnel de carga y distribuidor.</u>				
Excavación túnel	m3	19.600	80.0(4)	1568
Concreto				
revestimiento	m3	2.500	160.0(5)	400
detrás del blindaje	m3	1.330	130.0(21)	173
Cemento	ton	1.340	90.0(7)	121
Acero de refuerzo	ton	20	1190.0(8)	24
Concreto neumático	m3	1.400	170.0(9)	238
Aditivo acelerante de fraguado	kg	24.000	2.0(10)	48
núcleos de prueba	SG			4
Soportes estructurales	ton	216	1360.0(11)	294
Pernos, platinas y cabezales	SG			92
Tubería de carga	ton	1.250	2000.0(31)	2500
Distribuidor	ton	400	4000.0(36)	1600
Total túnel de carga y distribuidor:				7062
<u>Casa de máquinas.</u>				
Excavación	m3	290.000	9.5(37)	2755
Relleno	m3	46.000	7.0(38)	322
Concreto				
subestructura debajo cota 1040-F	m3	10.000	130.0(39)	1300
subestructura debajo cota 1040-H	m3	6.900	130.0(39)	897
subestructura encima cota 1040-H	m3	750	160.0(40)	120
segunda etapa alrededor de caracoles	m3	6.000	130.0(41)	780
primera etapa distribuidor	m3	1.100	115.0(42)	127

Item	Unidad	Cantidad	Precio Unitario US\$	Precio Total Miles de US\$
segunda etapa distribuidor	m3	3.200	130.0 (24)	416
para pavimentos	m3	200	130.0 (24)	26
elementos prefabricados	m3	45	240.0 (6)	11
protección superficies	m3	130	60.0 (43)	8
viga carrilera (alternativa)	m3	80	270.0 (6)	22
Cemento	ton	9.942	90.0 (7)	895
Acero de refuerzo	ton	2.200	1190.0 (8)	2618
Concreto neumático	m3	315	170.0 (9)	54
Sellos	SG			122
Pernos y barras de anclaje	SG			100
Protección de taludes	SG			60
Acabados varios (19 a 24)	SG			640
Estructuras de acero (17 y 18)	SG			596
Turbinas y equipo mecánico	un	2	3.000.000.0 (44)	6000
Generadores y equipo eléctrico	un	2	4.200.000.0 (45)	8400
Transformadores	un	2	800.000.0 (46)	1600
Puente guía	un	2	600.000.0 (47)	1200
Compuertas, guías y malacates del canal de fuga	ton	45	3000.0 (33)	135
Total casa de máquinas				29204

Patio de conexiones.

Excavación	m3	9.000	4.0 (48)	36
Rellenos	m3	31.400	varios	190
Concreto	m3	600	130.0 (24)	78
Cemento	ton	210	90.0 (7)	19
Acero de refuerzo	ton	6	1187.0 (8)	7
Malla eslabonada y puerta	SG			20
Equipo eléctrico	SG		(49)	1400

Total patio de conexiones: 1750

<u>Item</u>	<u>Unidad</u>	<u>Cantidad</u>	<u>Precio Unitario US\$</u>	<u>Precio Total Miles de US\$</u>
Líneas de transmisión y subestación Pance	km	50	75000.0 (50)	3750

PROYECTO DE REGULACION DEL RIO CAUCA

FORMULARIO PMS 4-1

Objetivos (a)	Objetivos (b)	Breve Descripción (c)	Dimensiones Principales (d)	Duración en días (e)
<u>Objetivo Fundamental</u>	<u>Generación de Divisas</u>	<u>Obras en Salvajina</u>	<u>M</u>	
Contribuir al desarrollo económico y social de la zona mediante la incorporación de más de 100.000 hectáreas del Valle geográfico del río Cauca a formas productivas y menos riesgos de explotación.	Aproximadamente US\$ 63 millones anuales, tanto exportaciones de algodón, azúcar, soya US\$ 57 millones como por sustitución de importaciones de frijol, maíz, sorgo por aproximadamente US\$ 6 millones.	1 Presa de gravas y enrocado con losa de concreto en la cara de aguas arriba	altura 154 long. 354	99
<u>Objetivos Adicionales</u>	<u>Generación de Empleo Directo</u>	2 Túneles de desviación revestidos en concreto	Ø 8.20 Longitudes y 720	30
Incremento de la capacidad de generación de energía eléctrica de 180 Mw y finalmente 200 Mw.	Aproximadamente 2.500 nuevos empleos.	2 Pozos verticales conectados a los túneles de desviación, para descarga fondo del embalse, con dos válvulas disipadoras de energía	Ø de pozos 6.50 altura 34 Ø de válvula 2.70	1.11
Reducción de la contaminación de las aguas del río Cauca.	<u>Actividad Pesquera</u>	1 Rebosadero del tipo canal abierto con tres compuertas radiales	Long. rebos. 438 ancho 12 altura 13.7	1.2
Abastecimiento de agua para riego agrícola.	Beneficiarios 741 pescadores que obtendrían un beneficio Neto anual de US\$ 18 millones anuales para una población de 4.000 personas.	1 Túnel de carga revestido en concreto y parte con blindaje acero	Ø 8.20 Long. total 354 Long. bln. 107	57

Proyecto:	Regulación Río Cauca
Prestatario:	CVC
Ejecutor:	CVC
Original	Plan Preliminar
Revisión	Definición del Proyecto
Presentado	CVC

Agosto

FORMULARIO PMS 4-1

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	Objetivos (b)	Breve Descripción (c)	Dimensiones Principales (d)	Duración en días (e)	U\$ Co (f)
	<u>Control parcial de la Contaminación</u> Generando un ahorro de aproximadamente US\$ 13. millones (Valor presente de Enero 1979), para mejorar la calidad de agua del río Cauca.	1 Casa de máquinas a cielo abierto para instalar dos unidades, y patio de conexiones. 1 Línea Transmisión doble circuito a 115 Kv. Obras Preliminares: Campamentos, carreteras, zonas	<div style="text-align: right; margin-bottom: 5px;">M</div> Dimen. edificio 63x41 2 Unid. 90 MW c/u. long. 50 Km. Camp. 5000M2 Carr. 8Km	1.050 360 420	37 45 49

Proyecto:	Regulación Río Cauca	
Prestatario:	CVC	
Ejecutor:	CVC	
Original	Plan Preliminar de Ejecución	
Revisión	Definición del Proyecto.	
Presentado	CVC	Agosto 20, 1979

PLAN DE ACTIVIDADES
FORMULARIO PMS 4-2

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Descripción de la Actividad (b)	Duración (días) (c)	Costo Estima- do (d)	Actividad Predeceso- ra (e)	Entidad Responsable (f)	Código de Entidades Responsable (g)	
<u>FINALIZAR CONTRATO PRESTAMO</u>					PE PL PRPrestatario (CVC) AS EC EE UE	IE FC CO PB MH Minister PS Presiden
<u>Negociar</u>	60		-	PR, BID		
<u>Calificar</u>						
Presentar al Ministerio de Hacienda los documentos exigidos por el Decreto Ley 102 de 1966.	30		1010	PR		
Presentar al Ministerio de Hacienda los documentos exigidos por el Decreto Ley 100 de 1955.	30		1021	PR		
Laborar (Ministerio de Hacienda) Resolución Ejecutiva autorizando a la CVC para incluir las negociaciones.	30		1022	MH		
Mantener del Consejo de Ministros la aprobación de la Resolución anterior	15		1023	PR		
Comunicar BID	15		1024	PR		
<u>Formar el Contrato</u>						
Mantener concepto final del Comité Nacional de Política Económica y Social	30		1025	PR	Proyecto: Regulación del Río Cauca	
Mantener concepto final de la Junta Monetaria	30		1031	PR	Prestatario: CVC	
Presentar Informe a la Comisión Interparlamentaria de Crédito Público	30		1032	PR	Ejecutor: CVC	
						Plan Preliminar Ejecución
					Fecha Agosto 20, 1979	Plan de Actividad Leg X Fin
					Presentado CVC	Hoja 1

PLAN DE ACTIVIDADES
FORMULARIO PMS 4-2

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No. de la Actividad (a)	Descripción de la Actividad (b)	Duración (días) (c)	Costo Estimado (d)	Actividad Predecesora (e)	Entidad Responsable (f)	Código de Entidades Responsables (g)
1034	Firmar el contrato entre el BID y la CVC.	30		1033	PR, BID	PE PL PR Prestatario (CVC) AS EC EE UE
1035	Presentar al Consejo de Ministros para su recomendación al Presidente de la República.	30		1034	PR	IE FC CO PB MH Ministerio de Hsa. PS Presidente Republ.
1036	Aprobación del Presidente de la República	15		1035	PS	

Proyecto: Regulación del Río Cauca	
Prestatario: CVC	
Ejecutor: CVC	
Plan Preliminar de Ejecución	
Fecha 20, 1979	Plan de Actividades Leg X Fin Ins Tec
Presentado CVC	Hoja 2 De 2

PROYECTO DE REGULACION DEL RIO CAUCA
OBRAS DE SALVAJINA
PLAN PRELIMINAR DE EJECUCION LEGAL (P.E.P.)

<u>ACTIVIDAD</u>	<u>DURACION</u>	<u>ACTIVIDAD PREDECESORA</u>
1010	60	-
1021	30	1010
1022	30	1021
1023	30	1022
1024	15	1023
1025	15	1024
1031	30	1025
1032	30	1031
1033	30	1032
1034	30	1033
1035	30	1034
1036	15	1035

Agosto 20, 1979

PLAN DE ACTIVIDADES
FORMULARIO PMS 4-2

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Descripción de la Actividad (b)	Duración (días) (c)	Costo Estima- do (d)	Actividad Predeceso ra (e)	Entidad Responsable (f)	Código de Entidades Responsables (g)	
<u>Suficiencia Recursos</u>					PE PL PR Prestatario (CVC) AS EC EE UE Unidad Ejecutora	IE FC Firma Consumidora CO PB
Mostrar suficiencia de recursos locales para primer año de ejecución	30			PR		
Obtener aprobación BID	30		2010	PR		
Mostrar anualmente, durante todo el periodo de ejecución, suficiencia de recursos (flujo de caja)	30		—	PR		
Obtener aprobación BID	30		2020	PR		
<u>Contabilidad</u>						
Obtener compromiso Contraloría General de la República para auditar auditoría anual	30			PR		
Publicar BID	15		2030	PR		
<u>Plan de Cuentas</u>						
Elaborar Plan de Cuentas para el Proyecto	60			PR		
Obtener aprobación BID	30		2040	PR		
<u>Asesoría Financiera</u>						
Elaborar y presentar estados financieros auditados-anuales	120		2031	PR	Proyecto: Regulación Río Cauca Prestatario: CVC Ejecutor: CVC	Plan Preliminar de Ejecución
					Fecha Agosto 20, 1979	Plan de Actividades Legales Fin X Inspección Técnica
					Presentado CVC	Hoja 1 De

PROYECTO DE REGULACION DEL RIO CAUCA
OBRAS DE SALVAJINA
PLAN PRELIMINAR DE EJECUCION FINANCIERA (P.E.P.)

<u>ACTIVIDAD</u>	<u>DURACION</u>	<u>ACTIVIDAD PREDECESORA</u>
2010	30	-
2011	30	2010
2020	30	-
2021	30	2020
2030	30	-
2031	15	2030
2040	60	-
2041	30	2040
2050	120	2031

Agosto 20, 1979

Hoja 1 de 1

PLAN DE ACTIVIDADES
FORMULARIO PMS 4-2

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Descripción de la Actividad (b)	Duración (días) (c)	Costo Estima- do(d)	Actividad Predeceso ra (e)	Entidad Responsable (f)	Código de Entidades Responsables (g)	
Elaborar y presentar Plan de Ejecución del Proyecto (PEP)	90		1036,4033	PR, FC	PE PL PR Prestatario (CVC)	IE FC Firma Consult
Per aprobación BID	30		3010	PR	AS EC	CO PB
Registrar contratos, con- tratos y contratistas	1460		4320,4433, 4530,4620, 4720,4820, 4920,5020, 5120,5220, 5320,5420, 5520,5620, 5720.	PR,FC,UE	EE UEUnidad Ejecutora	
Trabajar obras,liquidar con- tratos	1550		6250,6260, 6150,7130, 6530,6630, 7030,6930, 6830,6730, 6320,6430,	PR,FC,UE		
Constituir unidad ejecutora del proyecto	60		-			
Per aprobación BID	30		3130	PR		
					Proyecto: Regulación del Rio Cauca	
					Prestatario: CVC	
					Ejecutor: CVC	
						Plan Preliminar de Ejecución
						Plan de Actividades Leg Fin Ins Tec
					Fecha Agosto 20,1979	
					Presentado CVC	Hoja 1 De 1

PROYECTO DE REGULACION DEL RIO CAUCA
OBRAS DE SALVAJINA
PLAN PRELIMINAR DE EJECUCION INSTITUCIONAL (P.E.P.)

<u>ACTIVIDAD</u>	<u>DURACION</u>	<u>ACTIVIDAD PREDECESORA</u>
3010	90	1036,4033
3011	30	3010
3110	1460	4320,4433, 4530,4620, 4720,4820, 4920,5020, 5120,5220, 5320,5420, 5520,5620, 5720.
3120	1550	6250,6260, 6150,7130, 6530,6630, 7030,6930, 6830,6730, 6320,6430.
3130	60	-
3131	30	3130

Agosto 20, 1979

Hoja 1 de 1

PLAN DE ACTIVIDADES
FORMULARIO FMS 4-2

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Código de la Actividad (a)	Descripción de la Actividad (b)	Duración (días) (c)	US\$10 ³ Costo Estimado (d)	Actividad Predecesora (e)	Entidad Responsable (f)	Código de Entidades Responsables (g)
4000	Obtener servicios firma consultora					PE PL PR Prestatario (CVC) AS EC EE UE
4010	Presentar Lista Firmas, Términos de Referencia y Procedimientos Selección					IE FC Firma Consultora CO PB
4011	Elaborar estos documentos	30			PR	
4012	Obtener aprobación BID	30		4011	PR	
4020	Seleccionar Firma Consultora				PR	
4021	Tramitar y recibir ofertas técnicas	45		4012	PR	
4022	Evaluar ofertas técnicas y recomendar selección	30		4021	PR	
4023	Obtener aprobación autoridad superior	15		4022	PR	
4030	Contratar Firma Consultora				PR	
4031	Negociar y elaborar contrato	30		4023	PR	
4032	Obtener aprobación del BID	30		4031	PR	
4033	Suscribir y legalizar contrato	30		4032	PR	
4100	Obtener Servicios Junta Consultores		9359			
4110	Presentar Lista Consultores, Términos Referencia y Procedimientos Selección					
4111	Elaborar estos documentos	60			PR	
4112	Obtener aprobación del BID	30		4111	PR	
				Proyecto: Regulación del Rio Cauca Prestatario: CVC Ejecutor: CVC		
				Plan Preliminar de Ejecución		
				Fecha Agosto 20, 1979		
				Plan de Actividades		
				Leg Fin Ins Tec X		
				Presentado CVC	Hoja 1	De 8

PLAN DE ACTIVIDADES
FORMULARIO PMS 4-2

No. de la Actividad (a)	Descripción de la Actividad (b)	Duración (días) (c)	US\$ x 10 ³ Costo Estimado (d)	Actividad Predecesora (e)	Entidad Responsable (f)	Código de Entidades Responsables (g)	
4120	Seleccionar Consultores					PE	IF
4121	Tramitar y recibir ofertas técnicas.	60		4112	PR	PL	FC Firma Consultora
4122	Evaluar ofertas técnicas y seleccionar adjudicatario	30		4121	PR	PR Prestatario (CVC)	CO
4123	Obtener aprobación del BID	30		4122	PR	AS	PB
4130	Contratar Consultores					EC	
4131	Negociar y elaborar contrato	60		4123	PR	EE	
4132	Obtener aprobación BID	30		4131	PR	UE	
4133	Suscribir y legalizar cto.	60	451	4132	PR		
4200	Ejecutar servicios consultoría						
4210	Elaborar Documento Licitación Obras Civiles, Pliegos Condiciones y Recomendación de Adjudicación				FC		
4220	Elaborar Documento Licitación Equipos, Pliego Condiciones y Recomendación Adjudicación			1036, 4033	FC		
4320	Elaborar Diseños Detalle			1036, 4033	FC		
4240	Supervisar Ejecución Obras			1036, 4033	FC		
4250	Elaborar y presentar Informe Final	90		7300, 2021, 2011, 2050, 2041, 3131, 4133, 3120, 3110, 4240, 4230, 3011,	FC		
4300	Obtener Servicios Construcción Obras Grupo C						
4310	Licitación Obras		5149		FC, PR		
4320	Contratar Obras			4310	FC, PR		
						Presentado CVC	Fecha 9 de mayo
						Proyecto: Regulación del Rio Cauca	
						Prestatario: CVC	
						Ejecutor: CVC	
						Plan Preliminar de Ejecución	
						Plan de Actividades	

PLAN DE ACTIVIDADES
FORMULARIO PMS 4-2

Descripción de la Actividad (b)	Duración (días) (c)	US\$ x 10 ³ Costo Estima- do (d)	Actividad Predecesora (e)	Entidad Responsable (f)	Código de Entidades Responsables (g)	
<u>Obtener Servicios Construcción Obras Grupo I</u>					PE PL PR Prestatario (CVC) AS EC EE UE Unidad Ejecutora	IE FC Firma C CO PB
<u>Precalificar Contratistas</u>	120		-	FC, PR		
<u>Licitación Obras</u>						
<u>Tramitar y recibir ofertas de contratistas Pre-calificados</u>	120		4410	FC, PR		
<u>Evaluar ofertas y seleccionar adjudicatario</u>	45		4421	FC, PR		
<u>Obtener aprobación BID</u>	30		4422	PR		
<u>Adjudicar contrato</u>	15		4423	PR		
<u>Contratos Obras</u>						
<u>Negociar y elaborar contrato</u>	30		4424	FC, PR		
<u>Obtener aprobación BID</u>	15		4431	PR		
<u>Suscribir y legalizar contrato</u>	30	37272	4432	PR		
<u>Obtener Servicios Construcción Obras Grupo II</u>						
<u>Precalificación Contratistas</u>	120		-	FC, PR		
<u>Licitación Obras</u>	180		4510	FC, PR		
<u>Contratar Obras</u>	60	73002	4520	FC, PR		
<u>Obtener Servicios Montaje Equipo Electromecánico</u>					Proyecto: Regulación del Río Cauca	
					Prestatario: CVC	
					Ejecutor: CVC	
<u>Licitación</u>	150		1036,4033	FC, PR		Plan Prelimi
<u>Contratar</u>	75	1096	4610	FC, PR		Ejecuci
<u>Obtener Servicios Montaje línea Transmisión</u>					Fecha Agosto 20, 1979	Plan de Activ Leg Fin
					Presentado CVC	Hoja 3 D

PLAN DE ACTIVIDADES
FORMULARIO PMS 4-2

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No. de la Actividad (a)	Descripción de la Actividad (b)	Duración (días) (c)	US\$ x 10 ³ Costo Estimado (d)	Actividad Predecesora (e)	Entidad Responsable (f)	Código de Entidades Responsables (g)
4710	Licitación	150	1036,4033	1036,4033	FC, PR	PE
4720	Contratar	75	165	4710	FC, PR	PL PR Prestatario (CVC) AS EC EE UE Unidad Ejecutora
4800	Obtener Servicio Suministro Equipo Estaciones Hidrológicas	150			FC, PR	IE FC Firma Consultora CO PB
4810	Licitación	75	4810		FC, PR	
4820	Contratar				FC, PR	
4900	Obtener Servicios Suministro Compuertas Rebosadero	150			FC, PR	
4910	Licitación	75	1290	4220	FC, PR	
4920	Contratar			4910	FC, PR	
5000	Obtener Servicios Suministro Blindajes y Distribuidor	150			FC, PR	
5010	Licitación	75	4408	4220	FC, PR	
5020	Contratar			5010	FC, PR	
5100	Obtener Servicio Suministro Equipo Bocanoma y Túneles	150			FC, PR	
5110	Licitación	75	2344	4220	FC, PR	
5120	Contratar			5110	FC, PR	
5200	Obtener Servicio Suministro Turbinas y Reguladores	150			FC, PR	
5210	Licitación	75	6451	4220	FC, PR	
5220	Contratar			5210	FC, PR	
5300	Obtener Servicio Suministro Generadores	150			FC, PR	
5310	Licitación	75	9032	4220	FC, PR	
5320	Contratar			5310	FC, PR	

Proyecto: Regulación del Río Cauca

Prestatario: CVC

Ejecutora: CVC

Plan Preliminar de Ejecución

Plan de Actividades

Fecha Proyecto 01, 1979

Hoja 4 De 8

PLAN DE ACTIVIDADES
FORMULARIO FMS 4-2

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No. de la Actividad (a)	Descripción de la Actividad (b)	Duración (días) (c)	US\$ x 10 ³ Costo Estimado (d)	Actividad Predecesora (e)	Entidad Responsable (f)	Código de Entidades Responsables (g)
5400	Obtener Servicio Suministro Equipos Auxiliares Casa de Máquinas	150		4220	FC, FR	PE PL PR Prestatario (CVC) AS EC EE UE Unidad Ejecutora
5410	Licitar con financiamiento	75		5410	FC, FR	IE FC Firms Consultora CO Contratista PB
5420	Contratar					
5500	Obtener Servicio Suministro Transformadores	150		4220	FC, FR	
5510	Licitar con financiamiento	75	1720	5510	FC, FR	
5520	Contratar					
5600	Obtener Servicio Suministro Equipos Patío Conexiones y Sub-Estación Pance	150		4220	FC, FR	
5610	Licitar con financiamiento	75	1505	5610	FC, FR	
5620	Contratar					
5700	Obtener Servicio Suministro Materiales Línea Transmisión	150		4220	FC, FR	
5710	Licitar	75	3960	5710	FC, FR	
5720	Contratar					
5800	Ejecutar Servicios Construcción Obras Grupo O	30		4320	CO, FR	Proyecto: Regulación Río Cauca
5810	Movilizar Contratista	270		5810	CO	Prestatario: CVC
5820	Excavar Portales					Ejecutor: CVC
5830	Excavar Patío Descarga de Fondo	60		5810	CO	
5840	Construcción Carretera	270		5810	CO	Plan Preliminar de Ejecución
5900	Ejecutar Servicio Construcción Campamento Interventoría	90			CO	Plan de Actividades Leg Fin Ins Tec X Fecha Agosto 20, 1979
					Presentado CVC	Hoja 5 De 8

PLAN DE ACTIVIDADES
FORMULARIO PMS 4-2

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No. de la Actividad (a)	Descripción de la Actividad (b)	Duración (días) (c)	US\$ x 10 ³ Costo Estimado (d)	Actividad Predecesora (e)	Entidad Responsable (f)	Código de Entidades Responsables (g)
6000	Ejecutar Servicio Construcción Línea Energía Construcción	90		-	CO	PE PL PR Prestatario (CVC) AS EC EE UE Unidad Ejecutora
6100	Ejecutar Servicios Construcción Obras Grupo I	90	5900-6000-7400-4433-5820-5830-5840		CO, PR	1E FC Firma Consultora CO Contratista PB Proveedor Bienes
6110	Movilizar Contratistas					
6120	Construir Túneles Desviación	270	6110		CO	
6130	Construir Túnel de Carga	210	6110		CO	
6140	Construir Casa Máquinas	810	6110		CO	
6150	Construir Descarga Fondo	225	6110		CO	
6160	Construir Patio Conexiones	180	6110		CO	
6200	Ejecutar Servicios Construcción Obras Grupo II	90	5900-6000-7400-4530		CO, PR	
6210	Movilizar Contratista					
6220	Construir Atagüa Desviación	150	6210		CO	
6230	Construir Presa Excavación	395	6220		CO	
6240	Construir Presa Relleno	600	6230		CO	
6250	Construir Cara Hormigón	660	6240		CO	
6260	Ejecutar Inyecciones	660	6220		CO	
6270	Construir Rebosadero	1140	6210		CO	
6300	Ejecutar Servicios Montaje Línea Transmisión					Proyecto: Regulación del Río Cauca Prestatario: CVC Ejecutor: CVC
6310	Montar Torres		4720-7220		CO	Plan Preliminar de Ejecución
6320	Tender Línea		6310		CO	Plan de Actividades Leg Fin Ins Tec X
6400	Ejecutar Servicios Suministro Componentes Rebosadero					Fecha Agosto 20, 1979
6410	Fabricar	270	4920		PS	Presentado CVC Hoja 6 De 8

PLAN DE ACTIVIDADES
FORMULARIO PMS 4-2

Descripción de la Actividad (b)	Duración (días) (c)	US\$ x 10 ³ Costo Estima- do (d)	Actividad Predeceso ra (e)	Entidad Responsable (f)	Código de Entidades Responsables (g)	
<u>Transportar</u>	90		6410	PB, PR	PE	IE
<u>Montar</u>	120		6270-6420	PB, CO	PL	FC Firma C
<u>Ejecutar Servicios Suminis-</u>					PR Prestatario (CVC)	CO Contrat
<u>tro Blindajes y Distribuidor</u>					AS	PB Proveed
<u>Fabricar</u>	210		5020	PB	EC	
<u>Transportar</u>	90		6510	PB, PR	EE	
<u>Montar</u>	120		6130-6520	PB, CO	UE Unidad Ejecutora	
<u>Ejecutar Servicios Suministro</u>						
<u>Equipo Bocatoma y Túneles de</u>						
<u>Desviación</u>						
<u>Fabricar</u>	450		5120	PB		
<u>Transportar</u>	90		6610	PB, PR		
<u>Montar</u>	150		6130-6120- 6620	PB, CO		
<u>Ejecutar Servicios Suminis-</u>						
<u>tro Turbinas y Reguladores</u>						
<u>Fabricación</u>	540		5220	PB		
<u>Transporte</u>	360		6710	PB, PR		
<u>Montaje</u>	300		6140-6720	PB, CO		
<u>Ejecutar Servicios Suminis-</u>						
<u>tro Generadores</u>						
<u>Fabricar</u>	540		5320	PB		
<u>Transportar</u>	360		6810	PB, PR		
<u>Montar</u>	300		6140-6820	PB, CO		
<u>Ejecutar Servicios Suminis-</u>						
<u>tro Equipos Auxiliares Casa</u>						
<u>Máquinas</u>						
<u>Fabricar</u>	540		5420	PB		
<u>Transportar</u>	360		6910	PB, PR		
<u>Montar</u>	300		6140-6920	PB, CO		
					Proyecto: Regulación del Río Ca	
					Prestatario: CVC	
					Ejecutor: CVC	
						Plan Prelim Ejecuci
					Fecha	Plan de Activ
					Agosto	Leg Fin
					20, 1979	
					Presentado CVC	Hoja 7 D

- 17 -

Descripción de la Actividad (b)	Duración (días) (c)	US\$ x 10 ³ Costo Estima- do(d)	Actividad Predeceso ra (e)	Entidad Responsable (f)	Código de Entidades Responsables (g)
<u>car Servicio Suministro</u> <u>Formadores</u> <u>car</u> <u>portar</u> <u>r</u>			5520 7010 6140-7020	PB PB, PR PB, CO	PE PL PR Prestatario (CVC) AS EC EE UE Unidad Ejecutora IE FC Firma Consultora CO Contratista PB Proveedor Bienes
<u>car Servicio Suministro</u> <u>os Patio Conexiones y</u> <u>tación Pance</u> <u>car</u> <u>portar</u> <u>r</u>			5620 7110 6160-7120	PB PB, PR PB, CO	
<u>car Servicio Suministro</u> <u>iales Línea Transmisión</u> <u>car</u> <u>portar</u>			5720 7210	PB PB, PR	
<u>car Servicios Protec-</u> <u>Cuencas</u>		6255	-	PR, FC	
<u>sición Terrenos</u>		2069	-	PR	

Proyecto: Regulación del Río Cauca

Prestatario: CVC

Ejecutor: CVC

		Plan Preliminar Ejecución	
	Fecha	Leg	Fin Ins
	Agosto		
	26, 1976		

Presentado: CVC 8

PROYECTO DE REGULACION DEL RIO CAUCA
OBRAS DE SALVAJINA
PLAN PRELIMINAR DE EJECUCION TECNICA
(P. E. P.)

<u>ACTIVIDAD</u>	<u>DURACION</u>	<u>ACTIVIDAD PREDECESORA</u>
4011	30	-
4012	30	4011
4021	45	4012
4022	30	4021
4023	15	4022
4031	30	4023
4032	30	4031
4033	30	4032
4111	60	-
4112	30	4111
4121	60	4112
4122	30	4121
4123	30	4122
4131	60	4123
4132	30	4131
4133	60	4132
4220	-	1036,4033
4230	-	1036,4033
4240	-	1036,4033
4250	90	7300,2021, 2011,2050, 2041,3131, 4133,3120, 3110,4240, 4230,3011
4310	-	-
4320	-	4310
4410	120	-
4421	120	4410
4422	45	4421
4423	30	4422
4424	15	4423
4431	30	4424
4432	15	4431
4433	30	4432
4510	120	-
4520	180	4510
4530	60	4520
4610	150	1036,4033
4620	75	4610
4710	150	1036,4033

PROYECTO DE REGULACION DEL RIO CAUCA
OBRAS DE SALVAJINA
PLAN PRELIMINAR DE EJECUCION TECNICA
(P E . P .)

<u>ACTIVIDAD</u>	<u>DURACION</u>	<u>ACTIVIDAD PREDECESORA</u>
4720	75	4710
4810	150	-
4820	75	4810
4910	150	4220
4920	75	4910
5010	150	4220
5020	75	5010
5110	150	4220
5120	75	5110
5210	150	4220
5220	75	5210
5310	150	4220
5320	75	5310
5410	150	4220
5420	75	5410
5510	150	4220
5520	75	5510
5610	150	4220
5620	75	5610
5710	150	4220
5720	75	5710
5810	30	4320
5820	270	5810
5830	60	5810
5840	270	5810
5900	90	-
6000	90	-
6110	90	5900, 6000, 7400, 4433, 5820, 5830, 5840
6120	270	6110
6130	210	6110
6140	810	6110
6150	225	6110
6160	180	6110
6210	90	5900, 6000, 7400, 4530
6220	150	6210
6230	395	6220
6240	600	6230
6250	660	6240

PROYECTO DE REGULACION DEL RIO CAUCA
OBRAS DE SALVAJINA
PLAN PRELIMINAR DE EJECUCION TECNICA
(P. E. P.)

<u>ACTIVIDAD</u>	<u>DURACION</u>	<u>ACTIVIDAD PREDECESORA</u>
6260	660	6220
6270	1140	6210
6310	-	4720, 7220
6320	-	6310
6410	270	4920
6420	90	6410
6430	120	6270, 6420
6510	210	5020
6520	90	6510
6530	120	6130, 6520
6610	450	5120
6620	90	6610
6630	150	6130, 6120, 6620
6710	540	5220
6720	360	6710
6730	300	6140, 6720
6810	540	5320
6820	360	6810
6830	300	6140, 6820
6910	540	5420
6920	360	6910
6930	300	6140, 6920
7010	-	5520
7020	-	7010
7030	-	6140, 7020
7110	-	5620
7120	-	7110
7130	-	6160, 7120
7210	-	5720
7220	-	7210
7300	-	-
7400	-	-

PROYECTO DE REGULACION DEL RIO CAUCA

OBRAS DE SALVAJINA

ADQUISICION DE TIERRAS EN EL AREA DE EMBALSE-POLITICA GENERAL

La CVC, de acuerdo con las directrices que el Consejo Directivo ha tomado en situaciones semejantes, como fueron Alto Anchicayá y Calima, ha decidido adoptar como política general la siguiente:

- 1.- Con los mineros residentes y los propietarios de tierras que no residen en la zona.

En este caso se adquirirán los predios de contado de acuerdo con valores comerciales razonables y justos, teniendo en cuenta los costos de la tierra, de los cultivos y de las mejoras.

- 2.- Con los propietarios de tierras que residen en la zona.

En este caso hay dos alternativas:

- a) Que el propietario, teniendo su vivienda en el área, no derive de la tierra los ingresos para su sustento y el de su familia, sino que trabaja como asalariado fuera de su propiedad.

- b) Que derive totalmente el sustento de la tierra que posee en la zona del embalse.

En el caso a), la CVC le comprará la tierra y las mejoras a un precio razonable y justo y entregará, como parte del pago y si el interesado lo desea, un lote de terreno en zona cercana para que pueda trasladar su vivienda; es decir que aunque en el precio de la compra está incluido el valor de la vivienda, se permitirá que el dueño del predio retire todos los materiales utilizables para la nueva construcción.

En el caso b), plenamente comprobado, el agricultor podrá decidir entre recibir pago de contado por su predio, incluyendo el valor de las mejoras, o tierra equivalente en valor, bien sea en una zona que la CVC adquiriría para el efecto o en tierras que los agricultores de la planicie entreguen como parte del pago de la contribución de valorización.

El censo de habitantes en el área del embalse llevado a cabo en 1977, indicó que en la zona vivían 1496 personas constituyendo 267 familias. Con la actualización de dicho censo que se está realizando en el momento, se espera determinar la situación socioeconómica de cada familia a fin de proceder en la forma antes anotada.

CVC - OBRAS DE SALVAJINA
CONTRATO 0- EXCAVACION PORTALES, TUNELES DE DESVIACION Y VIAS DE ACCESO
PROGRAMA DE CONSTRUCCION

CLASE DE ACTIVIDAD
 Firma del contrato
 Continúa: ☒
 Discontinúa: ☐

Julio, 1979

ACTIVIDAD	CANTIDAD	RENDIMIENTO MENSUAL	1979												1980												1981												1982												1983												1984												1985																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
			J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D

CONTRATO 1 - TUNELES DE DESVIACION, TUNEL DE CARGA, CASA DE MAQUINAS Y OBRAS COMPLEMENTARIAS

CLASE DE ACTIVIDAD

PROGRAMA DE CONSTRUCCION

Julio, 1979

[illegible]

ACTIVIDAD	1979												1980												1981												1982												1983												1984											
	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D	E	F	M	A	M	J	J	A	S	O	N	D																		
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o - Compuertas radiales																																																																								
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es y auxiliares de unidad																																																																								
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PATIO DE CONEXIONES																																																																								
PUESTA EN MARCHA																																																																								

COLOMBIA: PROYECTO SALVAJINA (CVC)

PROYECTO PRELIMINAR DE INVERSIONES Y PROGRAMA DE DESEMBOLSOS
(En miles de US\$)

INVERSION	INVERSIONES DEL PROYECTO			ANTES DE 1980		1980		1981		1982		1983		1984
	M.E.	M.L.	TOTAL	M.E.	M.L.	M.E.	M.L.	M.E.	M.L.	M.E.	M.L.	M.E.	M.L.	M.E.
Administración	2,900	9,600	12,500	-	350	354	1,749	1,009	1,866	755	1,842	450	1,976	332
de Construcción														
Estructura	2,106	7,734	9,840	692	3,000	1,414	4,734	--	--	--	--	--	--	--
Viales	69,189	26,700	95,889	--	--	19,848	3,545	13,804	6,785	18,513	8,862	13,664	6,083	3,360
Transmisión	22,898	2,176	25,074	--	--	1,310	130	2,927	281	14,233	1,351	2,706	248	1,722
Manejo de Cuencas	3,034	300	3,334	--	--	--	--	303	30	2,284	175	144	65	303
	2,404	4,671	7,075	--	--	--	--	--	--	565	1,447	603	1,577	1,236
Financieros														
Préstamo BID	8,538	--	8,538	--	--	280	--	802	--	1,585	--	2,545	--	3,326
Crédito BID	1,563	--	1,563	--	--	538	--	456	--	332	--	180	--	57
Vigilancia BID	467	--	467	--	--	93	--	93	--	93	--	93	--	95
Reservas	5,114	--	5,114	--	--	53	--	232	--	1,011	--	1,796	--	2,022
OECF	7,575	--	7,575	--	--	373	--	1,050	--	1,619	--	2,116	--	2,417
Específica														
Otros	14,266	7,568	21,837	104	503	3,373	1,517	2,560	1,330	4,741	1,984	2,500	1,480	991
Total	29,081	14,535	43,616	30	144	2,962	1,315	3,925	1,961	11,253	4,289	7,285	4,149	3,626
INVERSION PROYECTO	169,138	73,284	242,422	826	3,997	30,598	12,990	27,161	12,253	56,984	19,950	34,082	15,578	19,487
FINANCIAMIENTO														
Otros	46,700	--	46,700	--	--	7,095	--	6,119	--	13,695	--	10,618	--	9,173
Préstamos	55,237	--	55,237	--	--	16,567	--	13,554	--	11,719	--	10,345	--	3,052
Reservas	27,286	--	27,286	--	--	1,359	--	3,274	--	16,815	--	3,448	--	2,390
Total	39,915	73,284	113,199	826	3,997	5,577	12,990	4,214	12,253	14,755	19,950	9,671	15,578	4,872
FINANCIAMIENTO DEL DESEMBOLSO	169,138	73,284	242,422	826	3,997	30,598	12,990	27,161	12,253	56,984	19,950	34,082	15,578	19,487

ANEXO B

PROYECTO SALVAJINA

NORMAS Y PROCEDIMIENTOS GENERALES APLICABLES A
LICITACIONES Y CONTRATOS DE SUMINISTROS

I. NATURALEZA DE LAS LICITACIONES

En la adquisición de maquinaria, equipo y otros bienes relacionados con el Proyecto y en la adjudicación de contratos para la ejecución de obra, se utilizará el sistema de licitación pública en los casos en que el valor de dichas adquisiciones o contratos exceda el equivalente de cien mil dólares de los Estados Unidos de América (US\$100.000), salvo las excepciones establecidas en la Cláusula 6.01(c) del Contrato.

Se aplicará el procedimiento de licitación pública internacional siempre que se utilice divisas del préstamo y en tales casos las licitaciones se limitarán a los países miembros del Banco.

II. PRECALIFICACION

- (a) Se prevé precalificación para la licitación de las obras civiles. En los casos de adquisición de equipos eléctricos y mecánicos importantes también podrá realizarse la precalificación si se considera necesaria, o podrá exigirse a las empresas interesadas el cumplimiento de requisitos mínimos para poder presentar ofertas. Dichos requisitos deben establecerse en las bases de las respectivas licitaciones y en los avisos de convocatoria así como en las cartas de invitación respectivas.
- (b) A los efectos de la precalificación se requerirá a las empresas interesadas que presenten información sobre los siguientes aspectos:
 - (i) Naturaleza jurídica de la empresa y demás antecedentes legales pertinentes.

- (ii) Experiencia de la empresa en la materia objeto de la licitación para la cual se hace la precalificación.
 - (iii) Equipo y personal técnico que utilizará la empresa en la materia objeto de la licitación, si resultare adjudicataria.
 - (iv) Informe sobre la situación financiera de la empresa.
 - (v) Referencias de terceros con quienes la empresa haya contratado anteriormente en materias similares a las que serán objeto de la licitación, así como referencias bancarias y comerciales.
 - (vi) Nombre de la entidad bancaria o compañía que emitiría la garantía o póliza de cumplimiento del contrato.
- (c) Antes de calificar a las empresas que hayan presentado antecedentes, el Prestatario someterá a la aprobación del Banco la metodología de calificación.
- (d) La convocatoria o precalificación se publicará mediante tres avisos por lo menos en dos o más de los diarios de mayor circulación en Colombia, en tres días que no sean consecutivos, con intervalos no menores de dos días entre cada publicación. Asimismo, el Prestatario enviará cartas circulares a las embajadas o consulados de los países elegibles de conformidad con lo establecido en este Reglamento, en las cuales se notifique la convocatoria, con copia del texto de dichos avisos.
- (e) El texto de los avisos deberá incluir los siguientes aspectos:
- (i) Descripción de la materia que será objeto de la licitación.
 - (ii) Plazo dentro del cual las empresas interesadas deben presentar la información necesaria para su calificación.

Este plazo no será inferior a 30 días, contados desde la publicación del último aviso,

salvo que el Prestatario y el Banco acuerden otro plazo.

- (iii) Indicación de la participación del Banco en el financiamiento e indicación de los países elegibles para participar en las licitaciones.
- (f) Cuando el Prestatario haya evaluado la información presentada por las empresas para su calificación, presentará a la consideración del Banco un informe sobre el resultado de la precalificación. Una vez que el Banco haya manifestado su conformidad con el informe, juicios y comentarios del Prestatario, éste adoptará su decisión. Sin embargo, si el pronunciamiento del Banco no concordase con el juicio del Prestatario, se intentará lograr un entendimiento satisfactorio a ambas partes, antes de tomar una decisión.
- (g) El Prestatario consignará en acta la decisión final acerca de las empresas que sean calificadas y ordenará la notificación correspondiente a los interesados.
- (h) En la licitación para la cual se hizo la precalificación sólo participarán las empresas que resultaron precalificadas y para la respectiva adjudicación no se tomarán en cuenta los factores de capacidad y responsabilidad financiera, salvo que éstos hubieren cambiado fundamentalmente con posterioridad a la precalificación.

III. LICITACION

(a) Aviso

Para convocar a licitación el Prestatario publicará un mínimo de tres (3) avisos, en dos (2) o más de los diarios de mayor circulación en Colombia, y cuando la licitación sea de un millón de dólares (US\$1.000.000) o más publicará por lo menos un aviso en dos (2) revistas internacionales de reconocida circulación, enviando, en todo caso, cartas con copias de los avisos a las embajadas de los países elegibles por el Banco. Se enviará, asimismo, cartas de invitación a las firmas que hubieren sido precalificadas, cuando corresponda.

El texto de los avisos e invitaciones debe incluir los siguientes aspectos:

- (i) Descripción de las obras a construir o del suministro.
- (ii) Fechas de apertura de la licitación, lugar, fecha y hora de cierre de la misma y de recepción de las ofertas.
- (iii) Cuantía y validez de la garantía de seriedad de la propuesta.
- (iv) El sitio y la fecha a partir de la cual están disponibles los pliegos de cargos.
- (v) El valor no reembolsable de los pliegos.
- (vi) Información sobre la participación del Banco en el financiamiento de la licitación e indicación de los países elegibles para participar.

Las bases específicas de la licitación deberán someterse a la aprobación del Banco junto con el texto de la notificación o carta que simultáneamente con la publicación por la prensa de la convocatoria de la licitación, habrá de dirigirse a las embajadas o consulados de los países elegibles del Banco.

Copias de los avisos publicados y de las invitaciones para cada licitación deberán ser remitidas al Banco.

(b) Plazo de Licitación

El plazo para presentar ofertas será variable de acuerdo con la complejidad de la licitación, no será inferior a noventa días para las obras civiles principales y a sesenta días para equipos y demás licitaciones; en todos los casos, los plazos se contarán a partir de la fecha de publicación del último aviso en los diarios mencionados en el Párrafo III (a).

(c) Adquisición de Pliegos

Para adquirir los documentos de licitación, los interesados deben consignar a nombre del Prestatario el valor de los pliegos, en la cuenta corriente bancaria indicadas en los avisos. Con el recibo de consignación, podrán retirar la documentación en el lugar anunciado en los avisos.

Aquellos interesados que no residen en Cali, Colombia, podrán remitir al Prestatario un cheque certificado de Gerencia, por un valor igual al 125% del valor indicado en los avisos e invitaciones para cubrir el costo de la documentación y el porte por correo aéreo recomendado.

(d) Registro de Entidades que Retiren la Documentación

El Prestatario llevará un registro de las entidades que han retirado pliegos, indicando la fecha de retiro, el número de ejemplares retirados y la dirección y teléfono de la entidad.

IV. PLIEGOS DE CONDICIONES Y PROCEDIMIENTOS

Alcance y Contenido de los Pliegos de Condiciones

Los pliegos de condiciones deberán ser redactados en tal forma que permitan la libre competencia internacional. Se describirán con toda claridad y precisión las obras a ejecutarse, y los equipos y servicios que se soliciten. Igualmente, se indicarán los principales factores que se tendrán en cuenta en la evaluación y comparación de las propuestas.

Cuando se trate de equipos o materiales, se debe hacer mención a las normas a las cuales deben ceñirse las propuestas y en lo posible, no se mencionarán marcas registradas, número de catálogo o tipos de equipo de un fabricante determinado.

Los pliegos de condiciones de cada licitación constarán de las siguientes seis partes:

Parte I. Información a los Proponentes

Debe contener información general para los licitantes, la invitación, descripción del Proyecto, financiamiento del suministro, países elegibles por el Banco y condiciones especiales.

Parte II. Instrucciones a los Proponentes

(a) Presentación de ofertas, precios y escalamientos

Deberán darse instrucciones completas para la preparación y presentación de las ofertas con la información necesaria de todos los documentos que deben presentarse con la oferta; asimismo, se darán instrucciones y aclaraciones sobre la forma como deben presentarse los datos e informaciones requeridos en los pliegos de especificaciones de la licitación. Todas las ofertas deberán ser presentadas con una garantía de seriedad de la oferta, en un monto no inferior al 5% del valor total de la propuesta. Los precios de las ofertas deberán indicar separadamente el componente en moneda extranjera y moneda nacional. Los precios en moneda extranjera podrán ser en la moneda del país del licitante, del país de la firma cabeza de consorcio, en ese caso, o en dólares. Se deben dar indicaciones claras sobre cláusulas escalatorias si se consideran, plazos de entrega máximos, alternativas opcionales, planos, etc. Se exigirá que los licitantes suministren información sobre experiencia, capacidad de producción y estados financieros. En el caso de que fuera necesario introducir modificaciones en las especificaciones o en los plazos, el Prestatario y el Banco decidirán de común acuerdo sobre el plazo requerido en el Párrafo III(b) y el Prestatario comunicará las modificaciones a todas las firmas que hubieren retirado pliegos, las cuales deberán acusar recibo de las enmiendas. Las modificaciones que se hagan quedarán formando parte de los pliegos de especificaciones. También se enviarán copias de los cambios a las embajadas.

En el estudio de las propuestas, el Prestatario rechazará las ofertas que no cumplan con los pliegos de condiciones. Sin embargo, si el incumplimiento recayera sobre aspectos menores, el Prestatario podrá inhibirse de rechazar las ofertas siempre que

cuenta con el acuerdo del Banco al respecto. Además, el Prestatario se reserva el derecho de poder declarar desierta una licitación cuando no convenga a sus intereses, debiendo existir previamente un acuerdo con el Banco en base a la presentación de elementos justificativos. En este caso, el Prestatario revisará los pliegos y bases utilizadas en la licitación, a fin de analizar los factores que condujeron a declararla desierta; de acuerdo a los resultados de esta revisión y previa aprobación del Banco, el Prestatario convocará a una segunda licitación siguiendo, de ser aconsejable, el mismo procedimiento utilizado en la primera convocatoria. Si esta segunda convocatoria fuese igualmente declarada desierta, el Prestatario efectuará las consultas del caso con el Banco para definir el futuro curso de acción.

(b) Evaluación de Propuestas y Adjudicación

Contendrá las consideraciones para evaluar las ofertas y para adjudicar el pedido.

En el análisis y comparación de las ofertas y en la selección se tomarán en cuenta lo precios, plazos de entrega y cláusulas escalatorias si se trata del contrato principal para obras civiles; en las licitaciones para maquinaria y equipo y en las licitaciones menores para obras civiles, se tendrán en cuenta además las características técnicas de la oferta y la experiencia de los licitantes.

El Prestatario sólo considerará las propuestas que, a su juicio, se ajusten básicamente a las condiciones de licitación contenidas en los avisos o en los pliegos de especificaciones que hayan sido presentadas por proponentes con adecuada experiencia y solidez financiera.

Cuando en una licitación el Prestatario solicite la presentación de una oferta básica, sin perjuicio de que se presenten ofertas opcionales, el Prestatario comparará y evaluará las ofertas básicas y determinará cuál de ellas es la mejor para adjudicar la licitación al proponente que la presentó; sin embargo, una vez hecha dicha determinación, el Prestatario podrá comparar las alternativas opcionales presentadas por el proponente que hizo la mejor oferta

básica, y en vez de ésta, podrá escoger la alternativa opcional que fuere más conveniente.

Cuando en una licitación el Prestatario solicite la presentación de ofertas "alternativas requeridas" el Prestatario determinará cual "alternativa requerida" es la más conveniente, la cual una vez hecha dicha determinación, se denominará "alternativa básica requerida". Luego el Prestatario comparará y evaluará las ofertas "alternativas básicas requeridas" de todos los proponentes y seleccionará la mejor de ellas. Esta podrá ser comparada por el Prestatario con las ofertas "alternativas opcionales" que hayan sido presentadas por el mismo proponente que presentó la mejor "alternativa básica requerida" que ya había sido seleccionada. En este caso el Prestatario podrá escoger una de esas "ofertas alternativas opcionales", si fuere más conveniente que la básica requerida correspondiente.

Una vez que el Prestatario haya formado su criterio sobre la adjudicación de una licitación, deberá presentar al Banco toda la información pertinente, incluyendo el cuadro comparativo de ofertas y el Acta de Resolución correspondiente de su Junta Directiva. Después de comunicada por escrito la conformidad del Banco, podrá anunciar públicamente el resultado de la licitación y comunicar lo pertinente a la firma o firmas que resulten favorecidas enviando el proyecto de contrato o la orden de compra con sus anexos, la cual deberá ser devuelta por el contratista debidamente firmada y acompañada de la documentación requerida, tal como factura proforma, garantías exigidas, etc.

(c) Márgenes de Preferencia

Podrá aplicarse un margen de preferencia en favor de ofertas de bienes originarios en Colombia o, según corresponda, en países miembros de la Asociación Latinoamericana de Libre Comercio (ALALC) y/o del Grupo Andino, conforme con las siguientes normas:

(a) Margen de preferencia nacional

- (i) Se considerará que un bien es originario de Colombia cuando el costo de los materiales, mano de obra y servicios de Colombia empleados en su fabricación represente por lo menos el 40% del costo total del bien.
- (ii) A los efectos de comparación de ofertas, se tendrá como precio de los productos de origen de Colombia, el precio de éstos, puestos en obra, una vez deducidos los siguientes importes: (1) los derechos de importación pagados sobre materias primas principales o sobre componentes manufacturados, y (2) los impuestos nacionales sobre ventas al consumo y al valor agregado, incorporados al costo del artículo ofrecido. El oferente deberá proporcionar la prueba documentada de las cantidades que, de conformidad con los incisos (1) y (2) anteriores, deben deducirse con el solo objeto de facilitar el cotejo de propuestas.
- (iii) También a los efectos de comparar las ofertas, se tendrá como precio de los productos de origen extranjero, el precio CIF del producto, sumándole los gastos de manipulación portuaria, y los de transporte desde el puerto o lugar fronterizo de entrada hasta la obra, y restándole el importe de los derechos de importación, consulares y portuarios.
- (iv) Para comparar ofertas de productos de origen colombiano y extranjero se observará lo siguiente:
 - (1) los costos expresados en moneda extranjera se expresarán en su equivalente en pesos colombianos, utilizando el tipo de cambio pactado entre el Prestatario y el Banco en el Contrato de Préstamo; y

(2) al precio de los productos extranjeros, calculado conforme se estipula en el inciso (iii) anterior, se sumará un margen del 15% o el derecho aduanero real, según cual sea menor.

(v) Cuando aplicando las normas anteriores resulte que la oferta del producto nacional es más conveniente que la del producto extranjero, podrá hacerse uso para su adquisición de las divisas que formen parte del Préstamo.

(b) Margen de preferencia regional

- (i) Se considerará que un bien es de origen regional cuando sea producido en un país miembro de la ALALC y/o del Grupo Andino y cumpla con los requisitos establecidos en los instrumentos jurídicos que gobiernan la ALALC y/o el Grupo Andino, en cuanto a origen y otras materias vinculadas con los programas de liberalización del comercio regional.
- (ii) El valor local añadido no es inferior al 40% del costo total del bien.
- (iii) A los efectos de comparar ofertas, al precio CIF del producto, se le sumará el importe de los gastos de manipulación portuaria y los de transporte desde el puerto o lugar fronterizo de entrada hasta la obra.
- (iv) A los efectos de comparar precios de bienes originarios de países miembros de la ALALC y/o del Grupo Andino y de bienes originarios de países no miembros de la ALALC y/o del Grupo Andino, se observará lo siguiente:
 - (1) Se convertirán a su equivalente en pesos colombianos los precios expresados en moneda extranjera,

sobre la misma base de cálculo establecida en el inciso (a)(iv)(1) anterior; y

- (2) se sumará al precio de los productos originarios de países no miembros de la ALALC y/o del Grupo Andino, un margen del 15%, o bien la diferencia entre los derechos aplicables a bienes originarios de ese mercado y los derechos aplicables a bienes no originarios del mismo, cualquiera sea menor.
- (v) Cuando aplicando las normas anteriores resulte que la oferta del producto originario de un país miembro de la ALALC y/o del Grupo Andino es más conveniente que la del producto originario de un país que no sea miembro de la ALALC y/o del Grupo Andino, podrá hacerse uso para su adquisición de las divisas que formen parte del Préstamo.

Parte III.

(a) Contratos de Ejecución de Obras

Se deben incluir disposiciones sobre los siguientes aspectos: Objeto del contrato, documentos del contrato, valor del contrato, precios del contrato y costos del contratista, cantidades de obra, forma de pago, fórmulas de reajuste, garantías y seguros, programa de trabajo, plazo de terminación de la obra y multas, información sobre el trabajo y manifestaciones hechas por el contratista, zonas, vías de acceso y otras obras provisionales a cargo del contratista, trabajos extras y adicionales, planos, especificaciones y replanteos, suministro de elementos y servicios, importación de elementos para construcción de la obra, cambios, interventoría técnica de los trabajos, dirección técnica de las obras y personal del contratista, materiales y calidad de la obra, subcontratos, proveedores y cesión del contrato, relaciones con otros contratistas, indemnidad del Prestatario, responsabilidad del contratista y normas legales, modificaciones del programa de trabajo y de la forma de pago y suspensiones de la obra, situaciones imprevistas, daños o retardos debidos a fuerza

mayor, actas y pagos parciales de obra ejecutada, reclamos, causas de caducidad del contrato, sanción penal pecuniaria, pruebas e inspecciones para la entrega final de las obras, entrega final y recibo de las obras, pagos finales y liquidación del contrato, estabilidad de la obra y período de garantía, jurisdicción-domicilio, solidaridad-indivisibilidad, cláusula compromisoria, lenguaje, comunicaciones, perfeccionamiento de contrato. Se incluirán, además, los formularios modelo de la orden de compra y de las condiciones especiales de la garantía de cumplimiento.

(b) Contratos de Suministro de Equipo

Se deben incluir disposiciones sobre los siguientes aspectos: lenguaje de los documentos, impuestos, garantías de cumplimiento, anticipo y mantenimiento, forma de pago, responsabilidad del contratista, programas de avance, cambios dentro del alcance general de la orden de compra, subcontratistas, presentación y aprobación de planos, inspección, plazos de entregas, empaque y protección de los equipos, limitaciones de transporte, servicios de montaje y pruebas de campo, cooperación con otros contratistas, interventoría, incumplimiento de características garantizadas, demoras y extensiones de plazo, indemnizaciones por incumplimiento, resolución de disputas, leyes aplicables, derecho a operar equipo no satisfactorio, revisión y aceptación final y mantenimiento.

Se incluirán además, los formularios modelos de la Orden de Compra y de las condiciones especiales de la garantía de cumplimiento.

(c) Condiciones Aplicables a los Contratos

El proyecto de contrato a celebrarse con la firma que resultare favorecida en la licitación, deberá ser sometido a consideración del Banco a efecto de que éste exprese sus observaciones si las tuviere. El Prestatario enviará al Banco copia del contrato una vez firmado a satisfacción del Banco. Toda modificación a dicho contrato deberá ser sometida previamente a la aprobación del Banco.

Parte IV. Condiciones Generales

Parte V. Especificaciones Técnicas y Planos

Parte VI. Formulario de Propuesta

(a) Aspectos Generales.

El texto debe incluir informaciones generales válidas para cualquier alternativa sobre los siguientes aspectos: carta de presentación, experiencia del licitante, subcontratistas propuestos y cláusulas escalatorias.

(b) Formatos.

Deben incluir toda la información requerida para cada alternativa, incluyendo precios, listas de repuestos, herramientas y planos, plazos de entrega garantizados, programa de entrega de planos básicos y de montaje y pruebas de campo y las características garantizadas.

Funciones, Atribuciones y Organización de la CVC

A. Funciones

Son funciones principales de la CVC:

- a) La generación, transmisión y distribución de energía eléctrica y la coordinación de los sistemas para lograr una mayor economía y eficiencia.
- b) La regulación, utilización, distribución y reglamentación de las aguas de uso público dentro del territorio de su jurisdicción para objetos domésticos, agropecuarios, industriales o de abastecimiento público.
- c) La recuperación y mejoramiento de las tierras y la conservación de los suelos.
- d) Reglamentar la explotación de los recursos naturales en su jurisdicción.

B. Atribuciones

Para el cumplimiento de sus fines la CVC tiene todas las atribuciones necesarias y especiales, las que en forma resumida son:

- a) Celebrar toda clase de contratos en que se obligue o adquiera derechos.
- b) Adquirir bienes muebles o inmuebles, conservarlos, mejorarlos, gravarlos y enajenarlos.
- c) Contraer créditos con garantías de sus bienes o sin ella, emitir bonos y obligaciones en general para su financiación. 1/
- d) Expropiar, de acuerdo a las normas legales del país, los bienes necesarios para alcanzar los fines de la corporación.
- e) Cobrar tasas y tarifas, previamente aprobadas por los órganos nacionales competentes, por los servicios que preste.

1/ A los efectos del eventual Contrato de préstamo CVC debe cumplir con requisitos de Ley y obtener las aprobaciones pertinentes de los órganos de la administración nacional.

- f) Proponer al Gobierno Nacional para su aprobación reglamentos para el cobro de impuestos por valorización o similares

C. Organización 1/

El órgano principal de dirección de la CVC es el Consejo Directivo, el cual lo forman siete miembros; tres son "por-oficio": el Ministro de Agricultura y los Gobernadores de los Departamentos del Cauca y del Valle del Cauca; dos designados directamente por el Presidente de la República; y los dos miembros restantes son elegidos por diversas entidades agrícolas, industriales, bancarias y profesionales de la Región. Su período, con excepción de los casos "por-oficio", está fijado en dos años, pudiendo ser reelegidos indefinidamente. Las facultades principales de éste órgano son: aprobar los contratos de empréstitos internos y externos; adoptar el reglamento general sobre la manera de establecer y cobrar los impuestos o contribuciones por valorización o similares; delegar funciones en otros organismos o entidades descentralizadas; formular la política general del organismo; aprobar el presupuesto y balances anualmente; controlar el funcionamiento general de la Corporación y; fijar las tarifas de los servicios, las cuales deberán ser sometidas a los órganos competentes nacionales. Para toda decisión se requieren por lo menos cuatro votos favorables.

además

La Corporación tiene/un Director Ejecutivo, agente del Presidente de la República, de su libre nombramiento y remoción, quien tiene la representación legal de la CVC y es su primera autoridad ejecutiva. Dirige y coordina las diferentes secciones de la Corporación asegurando la ejecución de la política y las decisiones del Consejo Directivo.

1/ En el Apéndice ____ se presenta el Organigrama de la Corporación.

Secretaría General: El Secretario general, además de las funciones que le asigne el Director Ejecutivo es Secretario General a la Corporación, del Consejo-Directivo y del Director Ejecutivo, dirige los aspectos jurídicos y de comunicación externa e interna de la Corporación y administra el archivo de la Dirección Ejecutiva.

Oficina de Planeación: Formula y coordina la programación a largo plazo y la evaluación de los distintos programas que adelanta la Corporación.

Consejo Asesor Plan Buenaventura: Asesora al Director en materia del Programa de desarrollo de la ciudad de Buenaventura.

Oficina de Valorización: Coordina y dirige los aspectos técnicos y legales relacionados con la distribución de los costos de las obras que la Corporación decida ejecutar por sistema de valorización.

Sub-Dirección Técnica: Planea, organiza, dirige y controla todo lo relacionado con la construcción de las obras de infraestructura requeridas para la operación de los diversos programas de la CVC, así como promover el desarrollo de nuevos programas, administrándolos en su fase pre-operativa. Asiste en aspectos de consultoría técnica a las unidades orgánicas de la Corporación que demanden sus servicios.

Programa de Desarrollo de Buenaventura: Coordina y dirige todas las labores de planeación, técnicas, operativas y administrativas que contribuyan a fomentar condiciones físicas, sociales y económicas adecuadas para el desarrollo de la ciudad de Buenaventura.

Subdirección Operativa: Dirige el planeamiento a corto plazo, el diseño, la construcción, operación y mantenimiento del sistema eléctrico y las ventas de energía a consumidores.

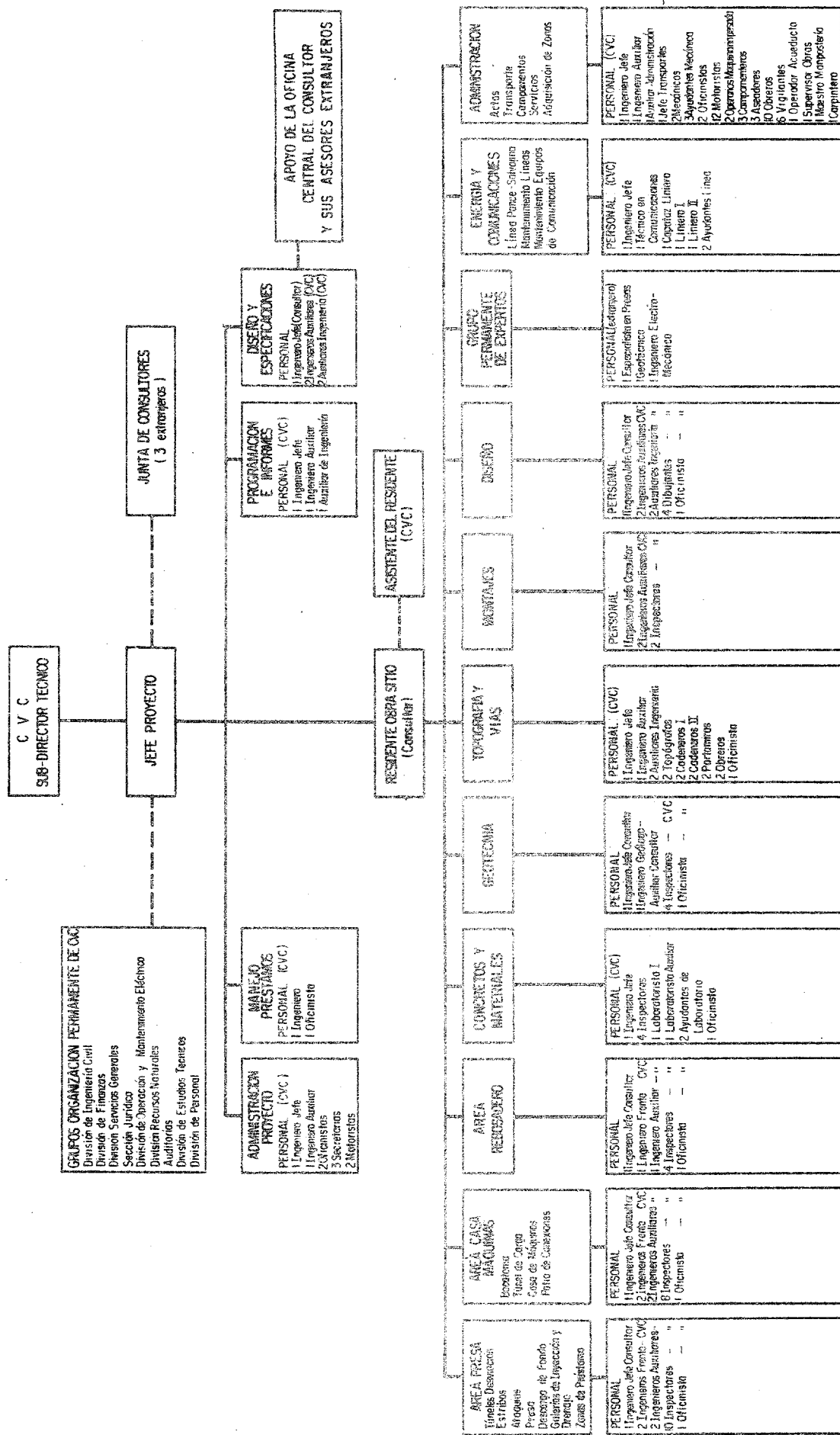
Subdirección de Desarrollo: Planea, organiza, dirige y controla los programas permanentes de la CVC que tengan como fin promover el desarrollo integral económico y social del Valle del Cauca.

Subdirección Administrativa: Planea, organiza, dirige y controla todas las labores de apoyo de índole administrativa, financiero-contable y servicios generales para la operación de las diversas dependencias de la CVC.

CORPORACION AUTONOMA REGIONAL DEL CAUCA



PROYECTO DE REGULACION DEL RIO CAUCA - OBRAS DE SALVAJINA
ORGANIGRAMA DE LA UNIDAD EJECUTORA



C.V.C.
Estados de Situación
(Millones de Pesos Colombianos - Col.\$)

	1 9 7 4		1 9 7 5		1 9 7 6		1 9 7 7		1 9 7 8	
	Col.\$	%	Col.\$	%	Col.\$	%	Col.\$	%	Col.\$	%
Activo										
<u>Fijo</u>										
Planta y equipo de servicio	254.3	5	3,692.1	69	4,136.0	71	4,498.8	66	5,044.9	6
Menos: Depreciación acumulada	53.5	1	152.3	3	258.7	4	374.9	5	517.1	
Pl. y Eq. de Servicio Neto	200.8	4	3,539.8	66	3,877.3	67	4,123.9	61	4,527.8	6
Activos en uso por CHIDRAL	979.6	20	1,044.6	20	1,124.6	20	1,168.9	17	1,240.7	1
Menos: Depreciación acumulada	161.0	3	188.2	4	222.7	4	256.1	4	282.0	
Act. en Uso por CHIDRAL - Neto	818.6	17	856.4	16	901.9	16	912.8	13	958.7	1
Bienes raíces	15.9	-	15.9	-	17.2	-	15.1	-	15.0	
Construcciones en proceso	3,154.2	66	149.7	3	123.5	2	100.6	2	172.9	
Total activo fijo	4,189.5	87	4,561.8	85	4,919.9	85	5,152.4	76	5,674.4	7
<u>Realizables Mediano y Largo Plazo</u>										
Inversiones (neto)	369.2	8	505.3	9	576.5	10	1,140.9	17	1,106.5	1
Inventarios	68.6	1	81.1	2	75.2	1	92.2	1	197.4	
Cuentas por cobrar CHIDRAL (Neta)a/	-	-	-	-	-	-	19.9	-	162.5	
Impuesto valorización:Agusblanca	7.2	-	6.9	-	6.6	-	6.4	-	6.1	
Cuentas por cobrar EMCALI (Neta)b/	6.7	-	7.0	-	5.0	-	30.2	1	18.5	
Otros	30.5	1	0.8	-	0.6	-	1.1	-	5.4	
Total realizables mediano y largo plazo	482.2	10	601.1	11	663.9	11	1,290.7	19	1,496.4	2
<u>Corriente</u>										
Caja y Banco	19.5		24.1	1	50.3	1	72.8	1	139.1	
Obligaciones por cobrar	2.5		2.2		5.5		54.0	1	57.8	
Cuentas por cobrar energía	18.8		34.0	1	41.7	1	42.4	1	80.0	
Otras cuentas por cobrar	13.3		24.8		33.2		43.3	1	82.1	
Depósitos y anticipos	7.3		18.2		13.9		32.5		33.6	
Total corriente	61.4	1	103.3	2	144.6	2	245.0	4	392.6	
<u>Diferidos</u>	98.7	2	86.2	2	89.7	2	90.6	1	92.6	
<u>Otros Activos</u>	1.7		1.7		1.7		36.7		36.5	
TOTAL ACTIVO	4,833.5	100	5,354.1	100	5,819.8	100	6,815.4	100	7,692.5	100

a/ Cuentas por cobrar CHIDRAL (Neta): Saldo neto de la cuenta corriente y del pasivo a largo plazo. En cuenta corriente se abona a CHIDRAL valor energía comprada y el alquiler por derecho de uso de equipos y se abona los pagos recibidos. En el pasivo a largo plazo a favor de CHIDRAL se abona los fondos adicionales recibidos para atender la amortización de los pasivos.

b/ Cuentas por cobrar EMCALI (Neta): Saldo neto de la cuenta corriente y otras obligaciones inter-instituciones.

	1 9 7 4		1 9 7 5		1 9 7 6		1 9 7 7		1 9 7 8	
	Col.\$	%	Col.\$	%	Col.\$	%	Col.\$	%	Col.\$	%
Patrimonio y Pasivo										
Patrimonio										
Aportes y Donaciones	554.8	12	667.4	12	732.3	13	750.2	11	796.0	10
Impuestos y Valorizaciones	192.9	4	197.9	4	208.8	4	253.4	4	462.4	6
Utilidades retenidas	63.0	1	79.3	2	136.9	2	329.9	5	863.1	11
Superavit Revaluación Inversiones c/	-	-	-	-	-	-	369.8	5	282.7	4
Total patrimonio	<u>810.7</u>	<u>17</u>	<u>944.6</u>	<u>18</u>	<u>1,078.0</u>	<u>19</u>	<u>1,703.3</u>	<u>25</u>	<u>2,404.2</u>	<u>31</u>
Pasivo										
A largo plazo										
Bonos	169.7	4	195.2	4	226.0	4	262.1	4	110.3	2
Obligaciones en moneda local	373.1	8	533.0	10	494.5	8	726.2	11	634.1	8
Obligaciones en moneda extranjera	2,507.0	52	2,858.0	54	3,414.8	59	3,396.6	50	3,464.6	45
Anticipos recibidos	7.7	-	8.1	-	6.5	-	13.9	-	26.1	-
Otros	8.0	-	12.1	-	25.7	-	30.0	-	17.5	-
Por pagar a favor de CHIDRAL d/	115.9	2	73.4	1	57.2	1	-	-	-	-
Total a largo plazo	<u>3,181.4</u>	<u>66</u>	<u>3,679.8</u>	<u>69</u>	<u>4,224.7</u>	<u>72</u>	<u>4,428.8</u>	<u>65</u>	<u>4,252.6</u>	<u>55</u>
Corriente										
Porción cte. deuda largo plazo e/	123.3	3	176.8	3	326.3	6	544.0	8	741.2	10
Obligaciones y ctas. por pagar										
ISA f/	70.2	1	14.1	-	17.1	-	-	-	173.8	2
Otras obligaciones y ctas. por pagar	554.5	11	430.6	8	101.4	2	20.6	-	31.2	1
Otros	43.2	1	49.4	1	9.7	-	16.8	-	26.4	-
Total corriente	<u>791.2</u>	<u>16</u>	<u>670.9</u>	<u>12</u>	<u>454.5</u>	<u>8</u>	<u>581.4</u>	<u>8</u>	<u>972.6</u>	<u>13</u>
Diferido	<u>50.2</u>	<u>1</u>	<u>58.8</u>	<u>1</u>	<u>62.6</u>	<u>1</u>	<u>101.9</u>	<u>2</u>	<u>63.1</u>	<u>1</u>
Total Pasivo	<u>4,022.8</u>	<u>83</u>	<u>4,409.5</u>	<u>82</u>	<u>4,741.8</u>	<u>81</u>	<u>5,112.1</u>	<u>75</u>	<u>5,288.3</u>	<u>69</u>
Total Patrimonio y Pasivo	<u>4,833.5</u>	<u>100</u>	<u>5,354.1</u>	<u>100</u>	<u>5,819.8</u>	<u>100</u>	<u>6,815.4</u>	<u>100</u>	<u>7,692.5</u>	<u>100</u>

c/ Superavit Revaluación Inversiones: En 1977 la suscripción de acciones en ISA tuvo un costo adicional al valor nominal por prima de colocación en \$100.0/acción, esto llevó al Consejo Directivo de CVC a aprobar una revaluación de las inversiones en ISA, la que representó un superavit de \$369,800.0 correspondiente a 3.698 acciones suscritas a diciembre de 1976.

d/ Por pagar a favor de CHIDRAL: Ver nota a/.

e/ Porción cte. deuda largo plazo: Incluye gastos e intereses devengados no vencidos de la deuda a largo plazo.

f/ Obligaciones y ctas. por pagar ISA: Saldo neto de la cuenta corriente y otras obligaciones inter-instituciones.

CVC - Relaciones Financieras Históricas

	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>
<u>Situación de Liquidez</u>					
Relación corriente	0.16	0.27	0.48	0.58	0.60
Prueba ácida	0.08	0.15	0.32	0.42	0.40
<u>Grado de Endeudamiento</u>					
Deuda total a Patrimonio neto	4.9	4.6	4.4	3.0	2.2
Pasivo L.P/Pasivo corriente a total deuda (%)	80/20	85/15	90/10	89/11	82/18
<u>Rendimiento</u>					
Ingreso neto oper./Total ingresos (%)	17	49	42	48	48
<u>Generación Interna de Fondos</u> (Col\$ mill.)	33.8	435.0	499.2	746.8	1,037.2
Veces que cubre el servicio de deuda	0.11	0.79	1.10	0.80	1.04
<u>Rentabilidad sobre la Inversión</u>					
<u>Inmovilizada (%)</u>	-	-	4.6	7.2	9.9

Composición del Seldo Cuentas por Cobrar Energía 1974-1978
(Miles de Col.\$)

	1 - 60 No Vencido	61 - 90	91 - 120	121 - 360	Más de 360	TOTAL
1974 Distribuidoras de Energía 1/	92					92
Depto. del Valle y Municipios 2/	400	20	14	32	75	541
Gobierno Nacional	381					381
Administradores y Recaudadores 3/	3.517					3.517
Otras Empresas de Servicio Público 4/	4.055	3.844				7.899
Particulares 5/	6.361					6.361
Total	<u>14.806</u> 79%	<u>3.864</u> 21%	<u>14</u> -	<u>32</u> -	<u>75</u> -	<u>18.791</u> 100%
1975 Distribuidoras de Energía	497					497
Depto. del Valle y Municipios	543					543
Gobierno Nacional	643					643
Administradores y Recaudadores	5.331					5.331
Otras Empresas de Servicio Público	9.231	4.288	5.328			18.847
Particulares	8.174					8.174
Total	<u>24.419</u> 72%	<u>4.288</u> 13%	<u>5.328</u> 15%			<u>34.035</u> 100%
1976 Distribuidoras de Energía	551					551
Depto. del Valle y Municipios	750	37				787
Gobierno Nacional	794	33	16	100	16	959
Administradores y Recaudadores	12.674	61	9			12.744
Otras Empresas de Servicio Público	9.855	3.625				13.480
Particulares	13.114		22			13.136
Total	<u>37.738</u> 91%	<u>3.756</u> 9%	<u>47</u> -	<u>100</u> -	<u>16</u> -	<u>41.657</u> 100%
1977 Distribuidoras de Energía	523	112				635
Depto. del Valle y Municipios	1.654	38	27	25		1.744
Gobierno Nacional	1.060	65	32	147	139	1.443
Administradores y Recaudadores	9.732	409	75			10.216
Otras Empresas de Servicio Público	7.703	264				7.967
Particulares	19.228	1.080	132			20.440
Total	<u>39.900</u> 94%	<u>1.968</u> 5%	<u>266</u> 1%	<u>172</u> -	<u>139</u> -	<u>42.445</u> 100%
1978 Distribuidoras de Energía	2.744	247				2.991
Depto. del Valle y Municipios	1.014	179	173	27		1.393
Gobierno Nacional	2.391	122	43	63	35	2.654
Administradores y Recaudadores	14.887	808	135			15.830
Otras Empresas de Servicio Público	13.006	539	598	521		14.664
Particulares	38.855	3.392	210			42.457
Total	<u>72.897</u> 91%	<u>5.287</u> 7%	<u>1.159</u> 1%	<u>611</u> 1%	<u>35</u> -	<u>79.969</u> 100%

1/ Facturación de 23 entidades distribuidoras.

2/ Facturación de 22 entidades municipales distribuidoras de energía.

3/ Facturación por venta al detalle (residencial, industrial, comercial, etc.) en zonas rurales y corregimientos a cargo de administradores y recaudadores.

4/ Facturación por cobrar a EMCARTACO, Compañía Eléctrica

5/ Fundamentalmente facturación a grandes consumidores industriales.

CVC -- Relaciones Financieras Históricas

	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>
<u>Situación de Liquidez</u>					
Relación corriente	0.16	0.27	0.48	0.58	0.60
Prueba ácida	0.08	0.15	0.32	0.42	0.40
<u>Grado de Endeudamiento</u>					
Deuda Total a Patrimonio Neto	4.9	4.6	4.4	3.0	2.2
Pasivo L.P./Pasivo corriente a total deuda (%)	80/20	85/15	90/10	89/11	82/18
Deuda Largo Plazo/Patrimonio	3.9	3.9	3.9	2.6	1.8
<u>Rendimiento</u>					
Ingreso neto operación/Total ingresos (%)	17	49	42	48	48
Generación Interna de Fondos (Col.\$ Millones)	33.8	435.0	499.2	746.8	1,037.2
Veces que cubre el servicio de deuda	0.11	0.79	1.10	0.80	1.04
<u>Rentabilidad sobre la Inversión</u>					
<u>Immovilizada (%)</u>	-	-	4.6	7.2	9.9

C. V. C.
Estados de Resultados
(Millones de Pesos)

	1974		1975		1976		1977		1978	
Venta de Energía	Gwh	%	Gwh	%	Gwh	%	Gwh	%	Gwh	%
CHIDRAL	49.0	11	1,143.1	64	1,210.2	65	1,407.2	68	1,034.7	68
ISA	2.0	-	167.9	9	154.5	8	152.2	7	154.5	6
CEDELCA	-	-	36.3	2	-	-	-	-	-	-
En Bloque (Municipios)	131.5	30	145.6	8	158.1	9	167.1	8	209.7	9
Industrial	127.0	29	143.2	8	160.8	9	173.7	8	183.4	8
Residencial	87.7	20	98.5	6	112.7	6	126.3	6	153.4	6
Otros	44.9	10	47.5	3	52.6	3	58.7	3	64.3	3
Total Venta Energía	442.1	100	1,762.1	100	1,848.9	100	2,055.2	100	2,400.0	100
(Mills)										
Tarifas	Col.\$	US\$	Col.\$	US\$	Col.\$	US\$	Col.\$	US\$	Col.\$	US\$
CHIDRAL	261.2	9.5	283.5	9.2	373.3	10.3	493.4	13.3	640.0	13.4
ISA	250.0	9.1	232.9	7.6	300.3	8.7	304.9	8.2	262.3	6.7
CEDELCA	-	-	209.4	6.8	-	-	-	-	-	-
En Bloque	247.1	9.0	331.0	10.8	394.7	11.4	532.6	14.3	703.4	17.9
Industrial	363.8	13.3	475.6	15.5	686.6	19.8	1,034.0	27.8	1,353.2	34.4
Residencial	367.2	13.4	436.5	14.2	506.7	14.6	642.1	17.3	837.0	21.2
Otros	358.6	13.1	446.3	14.5	520.9	15.0	678.0	18.3	861.8	22.3
Tarifa Promedio	317.3	11.6	309.4	10.1	408.6	11.8	542.0	14.6	699.3	17.7
T/C Promedio US\$ 1 =	27.36		30.77		34.64		37.14		39.46	
(Millones)										
Ingreso de Explotación	(Col.\$)	%	(Col.\$)	%	(Col.\$)	%	(Col.\$)	%	(Col.\$)	%
CHIDRAL	12.8	8	324.1	51	451.8	53	694.3	56	1,050.0	59
ISA	0.5	-	39.1	6	46.4	6	46.4	4	40.6	2
CEDELCA	-	-	7.6	1	-	-	-	-	-	-
En Bloque	32.5	22	48.2	8	62.4	7	89.0	7	147.5	8
Industrial	46.2	31	68.1	11	110.4	13	179.6	15	249.1	14
Residencial	32.2	21	43.0	7	57.1	7	81.1	7	125.4	7
Otros	16.1	11	21.2	3	27.4	3	39.8	3	56.7	3
Sub-Total Ingresos Explotación	140.3	93	551.4	87	755.5	89	1,130.2	92	1,678.3	94
Otros ingresos de explotación	-	-	61.7	10	66.6	8	63.3	5	58.9	3
Alquiler activos a CHIDRAL	-	-	3.6	1	1.7	-	3.4	-	6.3	1
Venta Servicios a CEDELCA	-	-	14.2	2	26.9	3	31.9	3	39.5	2
Otros ingresos	11.2	7	-	-	-	-	-	-	-	-
Total Ingresos Explotación	151.5	100	630.9	100	850.7	100	1,220.8	100	1,783.1	100

	1974		1975		1976		1977		1978	
	Col.\$	%	Col.\$	%	Col.\$	%	Col.\$	%	Col.\$	%
Total Ingresos de Explotación: Energía	151.5	100	630.9	100	850.7	100	1,228.8	100	1,783.1	100
Gastos de Explotación: Energía										
Generación: Operación y Mantenimiento	.8	-	26.1	4	38.8	4	56.8	5	58.5	3
Costo Operación y Mantenimiento ISA	-	-	27.2	4	32.7	4	26.7	2	71.7	4
Compra de Energía	87.6	57	119.5	19	238.1	28	347.6	28	548.3	31
Distribución: Operación y Mant.	22.6	15	19.9	3	26.1	3	33.3	3	43.7	3
Gastos Facturación y Cobranza	2.5	2	3.4	1	4.5	1	6.4	1	8.3	1
Gastos Administración y Gastos Generales	4.1	3	5.6	1	13.6	1	14.9	1	24.9	1
Depreciación	8.9	6	120.2	19	142.5	17	150.4	12	163.7	9
Total Gastos Explotación: energía	126.5	83	321.9	51	496.3	58	636.1	52	918.1	52
Ingreso neto explotación: energía	25.0	17	309.0	49	354.4	42	592.7	48	865.0	48
Otros Egresos: energía										
Intereses pagados	2.5	2	268.8	43	254.8	30	346.2	28	404.5	22
Transf. fondos aplicados a Rec. Nat.	-	-	-	-	19.5	3	30.0	2	32.2	2
Energía	22.5	15	40.2	6	80.1	9	216.5	18	427.3	24
PROGRAMAS										
Protección de Tierras										
Costo de operación y mantenimiento	2.9	-	3.1	-	4.3	-	4.9	-	7.3	-
Ingresos propios	0.1	-	0.6	-	0.9	-	0.8	-	0.7	-
Costo Neto	2.8	2	2.5	-	3.4	-	4.1	-	6.6	-
Desarrollo Regional										
Costos:										
Asistencia Técnica	6.6		7.9		8.7		8.1		5.4	
Manejo de Aguas	12.5		16.7		21.8		28.3		32.3	
Recursos Naturales	10.1		11.1		16.0		21.3		42.4	
Adm. cuencas hidrográficas	11.7		15.6		35.2		41.3		62.7	
Oficina de planeación	3.4		3.3		4.0		5.6		9.2	
Otros programas	-		0.2		1.1		0.6		1.6	
Total Costos	44.3		54.8		86.8		105.2		153.6	

	1974		1975		1976		1977		1978	
	Col.\$	%	Col.\$	%	Col.\$	%	Col.\$	%	Col.\$	%
Ingresos										
Asistencia Técnica	1.1		0.6		1.2		1.7		1.7	
Recursos Sector Energía	-		0.7		20.5		30.1		32.2	
Aportes de la Nación	10.5		3.0		-		24.0		13.0	
Tasa Concesión de Aguas	5.3		7.7		13.0		14.2		14.3	
Contribuciones de entidades oficiales	2.8		2.7		4.6		5.6		4.0	
Licencias	0.8		1.4		1.7		1.5		2.3	
Aportes CHIDRAL	0.3		1.0		1.7		1.9		1.5	
Servicios	0.7		1.6		2.6		8.2		6.9	
Impuesto Predial	22.8		36.1		41.5		18.0		77.7	
Total Ingresos	<u>44.3</u>		<u>54.8</u>		<u>86.8</u>		<u>105.2</u>		<u>153.6</u>	
Otros Ingresos (egresos) neto	(2.6) (2)		36.9 6		(19.1) (2)		(19.4) (2)		112.5 6	
Utilidad Neta	<u>17.1</u>	<u>11</u>	<u>74.6</u>	<u>12</u>	<u>57.6</u>	<u>7</u>	<u>193.0</u>	<u>16</u>	<u>533.2</u>	<u>30</u>

C.V.C.

Estados de Fuentes y Usos de Recursos
(Millones de Pesos)

	1975		1976		1977		1978	
	Col.\$	%	Col.\$	%	Col.\$	%	Col.\$	%
FUENTES								
<u>Internas</u>								
Ingreso neto explotación energía	309.0	20	354.4	23	592.7	31	864.0	40
Depreciación y otras reservas a/	126.0	8	144.8	10	154.1	8	173.2	8
Recursos específicos Programas:								
- Impuesto predial b/	66.2	4	82.9	5	99.9	5	135.2	6
- Tasa concesión aguas	7.7	1	13.0	1	14.2	1	14.2	1
- Aportes de la Nación	3.0	-	-	-	24.0	1	13.0	1
- Contribución cuencas, valorización y otros	7.8	1	12.6	1	18.8	1	16.4	1
Otros ingresos netos	38.3	3	(17.2)	(1)	(18.6)	(1)	113.3	5
Total fuentes internas	558.0	37	590.5	39	885.2	46	1,329.3	62
Externas								
<u>Donaciones</u>								
Aportes de la Nación y Depto. del Valle	15.8	1	21.0	1	16.4	1	34.8	2
Total donaciones y aportes	96.7	6	43.9	3	1.4	-	11.0	-
	112.5	7	64.9	4	17.8	1	45.8	2
Préstamos Locales								
<u>Bancos locales</u>								
Anticipos y otros	312.6	20	3.0	-	613.8	32	84.3	4
Total Préstamos Locales	56.6	4	82.6	6	92.9	5	139.8	7
	369.2	24	85.6	6	706.7	37	224.1	11
Préstamos Externos								
<u>BID 175/CC-CO</u>	22.0	2	57.3	4	-	-	-	-
BID 13/CD-CO	23.7	2	348.6	23	-	-	-	-
Chase Manhattan Bank	142.9	9	-	-	-	-	-	-
Siemens Contrato No. 1090	-	-	21.6	-	2.5	-	-	-
Penells Curaqueo	-	-	-	1	-	-	18.5	1
Ajuste por diferencia de cambio	287.6	19	338.2	23	295.7	16	511.3	24
Total préstamos externos	476.2	32	765.7	51	298.2	16	529.8	25
Total Fuentes de Recursos	1,515.9	100	1,506.7	100	1,907.9	100	2,129.0	100

a/ Depreciación y otras Reservas: Neta de retiros e incluye otras reservas que no significan salida de recursos.
b/ Impuesto Predial: Por Ley No. 25 de 1959, CVC debe entregar a los contribuyentes bonos de una porción del impuesto recaudado de acuerdo a ciertas proporciones dependiendo la zona de ubicación del predio. En promedio el 40% del impuesto recaudado está sujeto a devolución, el 50% restante se invierte en los programas de desarrollo.

	1 9 7 5		1 9 7 6		1 9 7 7		1 9 7 8	
	Col.\$	%	Col.\$	%	Col.\$	%	Col.\$	%
USOS								
Programa de Inversiones								
inversión directa sector energía	154.9	10	161.1	11	101.5	5	188.1	9
Programas de desarrollo c/	57.9	4	91.1	6	110.0	6	160.9	7
Revaluación del año d/	343.3	22	337.9	22	280.6	15	502.0	23
Inversiones en ISA	100.9	7	85.4	6	116.1	6	54.4	3
Otras inversiones netas	35.2	2	(14.2)	(1)	78.5	4	(1.7)	-
Total programa de inversiones	692.2	45	661.3	44	655.7	36	903.7	42
Variación neta en cuentas del activo	71.1	5	11.4	-	155.5	8	241.9	11
Variación neta en cuentas del pasivo	(8.6)	-	(3.7)	-	(39.1)	(2)	56.5	3
Servicio de deuda								
Amortización e/	281.5	19	197.3	13	585.7	31	588.9	28
Gastos financieros	275.8	18	263.0	17	393.5	20	409.8	19
Total servicio de deuda bruta	557.3	37	460.3	30	979.2	51	998.7	47
Menos: intereses capitalizados	(2.8)	-	(2.3)	-	(43.5)	(2)	(1.6)	-
intereses cargados a operación f/	(4.2)	(1)	(5.9)	-	(3.8)	-	(3.7)	-
Total servicio de deuda neto	550.3	36	452.1	30	931.9	49	993.4	47
Aumento (disminución) Capital de Trabajo	210.9	14	385.6	26	172.9	9	(66.5)	(3)
Total Aplicación de recursos	1,515.9	100	1,506.7	100	1,907.9	100	2,129.0	100

c/ Programa de Desarrollo: Representa el costo invertido en operaciones de: adecuación de tierras, asistencia técnica, manejo de recursos naturales (aguas y otros), y otras inversiones y asistencias prestadas por CVC a la región.

d/ Revaluación del año: Incremento al valor de planta y equipo en servicio por diferencias de cambio de la deuda a largo plazo en moneda extranjera. Excluye diferencia de cambio de los intereses devengados no vencidos.

e/ Amortización: Incluye la amortización de anticipos recibidos.

f/ Intereses cargados a operación: Intereses de préstamos para programas de desarrollo incluidos en el costo de los programas, ver nota c/.

CVC - Bases para la Formulación de
la Proyección Financiera

- I. La proyección financiera incluye los años 1979 a 1988 inclusive, período que cubre los años de ejecución del proyecto en estudio.
- II. Los valores consignados para 1978 se convirtieron con las siguientes tasas de cambio: Col\$ 39.48 los estados de resultados y flujo de caja; y Col\$ 41 el balance general. Los valores consignados para 1979-88 se convirtieron en tasa de cambio promedio asumida para 1979 de Col\$ 42.64.
- III. La proyección financiera que se incluye en este documento se formuló con base en los siguientes supuestos y fue preparada con la participación de la Oficina de Planificación de CVC.
 1. Venta en GWh

Se utilizó la proyección de demanda de energía en GWh formulada en el estudio de optimización del sistema nacional interconectado, formulado por ISA para definir el programa de ejecución de obras de generación, revisado a diciembre de 1978.
 2. Tarifa Promedio por KWh

Se asume en primer término que la tarifa real a junio de 1979 es el promedio para ese año y un crecimiento del 7% real por año para el período 1980-82. A partir de 1983 se mantiene constante el nivel tarifario.

3. Otros ingresos de explotación

- a) Alquiler equipo en uso por CHIDRAL. Según contrato vigente con CHIDRAL.
- b) Venta de servicios. Según contrato de servicios a CEDELCA utilizando la tarifa vigente a julio 1979 y mantenida constante.
- c) Venta de servicios a distribuidores. Equivalente al 25% del costo asociado por operación y mantenimiento del sistema.

4. Gastos de Explotación

- a) Generación: operación y mantenimiento. En base al costo histórico por KWh en operación y mantenimiento para cada planta. Para la planta objeto de este proyecto, se utilizaron los costos históricos de la planta Alto Andicaya por ser plantas de características técnicas semejantes.
- b) Operación y mantenimiento ISA. Según proyección de operación de ISA de acuerdo a los contratos de interconexión vigentes.
- c) Compra de energía. En función al balance energético y a precios acordados en convenio con ISA a julio 1979.
- d) Distribución: operación y mantenimiento. En base al costo histórico por KWh en distribución para el sistema.
- e) Gastos de facturación y cobro. Los costos históricos en dólares a diciembre 1978 se incrementaron en función al crecimiento esperado

del numero de clientes a atenderse.

f) Administración y gastos generales. Para 1979 y 1980 según valores presupuestados por CVC. De 1981 en adelante en relación a los costos de operación y mantenimiento (generación, distribución e ISA) y gastos de facturación y cobro. Los programas de desarrollo y otros incluyen en sus costos la porción estimada por administración y gastos generales.

g) Depreciación. Lineal según metodología de CVC por activo. Para las obras del proyecto en estudio se asume 2.8% por año sobre un costo de US\$ 240.00 millones.

5. Otros egresos energía

- a) Intereses. Según proyección del servicio de deuda.
- b) Transferencias de fondos a los programas de desarrollo regional. Para 1979 según actualización del presupuesto en ejecución. Para 1980-83 se asume no hay transferencias. Para 1984 en adelante se proyecta aproximadamente el 5% de los ingresos por ventas de energía a distribución.

6. Programas

- a) Desarrollo Regional. Los ingresos, con excepción de las transferencias del sector eléctrico (Ver. 5b), se mantienen constantes al nivel que se espera habrá de ejecutarse en 1979. El costo de los programas no debe superar los ingresos previstos.

- b) Adecuación de tierras, Aguablanca. Los ingresos y costos constantes al nivel a ejecutarse en 1979.
- c) Obras en la planicie. Las obras según cronograma de ejecución y los ingresos según condiciones de los créditos asumidos que serían transferidos a los beneficiarios.

7. Capital de Trabajo

- a) Inventarios: Aproximadamente el 3.5% del valor en libros del activo fijo.
- b) Cuentas por cobrar CHIDRAL: se asume se pagan en tiempo dado el excedente de caja proyectado por CHIDRAL y las recomendaciones que en el documento se proponen. El saldo en cuenta corriente es neto de la transferencia de recursos prevista ^{de CHIDRAL} para 1979.
- c) Cuentas por cobrar EMCALI: el saldo a diciembre 1978 se cobraría en 4 años por cuotas iguales.
- d) Otros activos. el saldo a diciembre 1978, constituido fundamentalmente por préstamos al personal, se cobrará en 3 años.
- e) Caja y bancos. Se asume aproximadamente el equivalente al 2.5% del total de gastos de operación y mantenimiento más servicio de deuda como saldo requerido en cada año.
- f) Obligaciones por cobrar: constituida principalmente por ^{que} deuda de EMCALI por capitalización en CHIDRAL, /se recupera en 1979.
- g) Cuentas por cobrar energía. Aproximadamente representan el

16.6% de la facturación a detalle y distribuidoras.

8. Programa de Inversiones

Se ha proyectado de acuerdo al programa de inversiones que se presenta en el Cuadro I de este apéndice. El período de construcción del proyecto en estudio se estimó de fines 1979 a 1984. El programa de inversiones se presenta sin costos por escalación, con excepción del proyecto en estudio el cual se escaló con las siguientes factores: 1979, 7.5%; 1980-84, 7%.

9. Servicio de deuda

de este Apéndice

En los Cuadros II y III/se presentan las condiciones y montos utilizados para la proyección del servicio de deuda a largo plazo de CVC. El Cuadro II contiene la deuda contraída y a contratar en moneda nacional. En igual forma el Cuadro III contiene la deuda en moneda extranjera. El proyecto aquí en estudio se financiaría parcialmente con recursos del Capital Ordinario del Banco, recursos del Fondo de Cooperación Económica a Ultramar de Japón (OECE) y proveedores. Las condiciones asumidas fueron:

	<u>BID</u>	<u>OECE</u>	<u>Proveadores</u>
Monto de los recursos (equivalentes US\$ millones)		US\$55.2	US\$27.3
- Capital Ordinario	US\$46.7		
Intereses (financiados con re- cursos del préstamo)			
- En el período de gracia (p.a.)	7.9%	4.5%	7 3/4%
- En el período de amor- tización (p.a.)	7.9%	4.5%	7 3/4%
Plazo (años)	20	20	15
Período de gracia (años)	5 1/2	7	5
Comisión de crédito (a finan- ciar con recursos locales)	1 1/4 pa -		-
Plazo de desembolso (años)	5	5	5

10. Impuestos y Valorización

Incluye ingresos aproximados al 41% del recaudo por impuesto predial, el cual se proyectó con un crecimiento vegetativo del 3%. El ingreso por valorización a recaudarse de los beneficiados por el proyecto en estudio, sector agropecuario, se determinó asumiendo se alcance un acuerdo del monto a ser recaudado en el primer trimestre de 1980. Al no conocerse los resultados del eventual acuerdo con los agricultores, los ingresos se proyectaron asumiendo como cuenta por cobrar un monto de US\$62.7 millones que es equivalente al 53% del costo de las obras comunes, en los siguientes términos: interes del 5.83%, plazo 15 años con 7 de gracia.

11. Bonos

En 1979 se transfieren por el equivalente a US\$663 mil de deuda a largo plazo a capital y en 1984 se proyecta una nueva emisión por Col \$50 millones.

CUADRO I
C.V.C.
Programa de Inversiones y su Financiamiento
1979 - 1988
 (En miles de US\$)

	Inversion Obras y Estudios		CVC		Aportes Estado		FONADE		BID		OECE		Proveedores	
	US\$	%	US\$	%	US\$	%	US\$	%	US\$	%	US\$	%	US\$	%
1. En Ejecución														
Inversiones en GTP y SD	37.406	100	37.406	100										
Electrificación Rural	10.500	100	1.925	18	5.572	53			3.003	29				
Inversiones en ISA	133.516	100	133.516	100										
Estudios	1.958	100	195	10			1.763	90						
2. Proyecto Propuesto	242.422	100	113.199	47					46.700	19	55.237	23	27.286	11
3. A ser ejecutados														
Centro de control	9.586	100	1.885	20										
Electrificación Rural	3.520	100	1.760	50	1.760	50							7.701	80
Inversiones en ISA	83.541	100	83.541	100										
Estudios	2.400	100	240	10			2.160	90						
	524.249	100	373.667	71	7.332	1	3.923	1	49.703	10	55.237	10	34.987	7

CUADRO II

Obligaciones por Pagar en Moneda Nacional
(En miles de US\$ al T/C de 41)

<u>Acreedor</u>	<u>Objeto</u>	<u>Fecha</u>	<u>Monto US\$</u>	<u>% de Participación</u>	<u>Garantía</u>	<u>Interés Anual (%)</u>	<u>Plazo Años</u>	<u>Período de Gracia</u>
<u>Contratados</u>								
Instituto Fomento Industrial #1	Calima	1965	731.7	CHIDRAL 100	No tiene	10 - 12	5	-
Instituto Fomento Industrial #2	Calima y Transmisión	1967	631.7	C.V.C. 100	No tiene	11.5 - 13.5	7	-
Resolución 51/76 (F.D.E.)	Alto Anchicayá	1976	11,183.9	C.V.C. 100	Pignoración Venta Energía	20.0	5	-
Resolución 51/73	Alto Anchicayá	1976	4,579.1	C.V.C. 100	Codeudor Centrel Anchicayá	7.0	10	3
Gobierno Nacional	Alto Anchicayá	1975	3,931.7	C.V.C. 100	No tiene	15.0	7	3
CECEL	Alto Anchicayá	1977	6,759.9	C.V.C. 100	No tiene	15.0	6.5	3-1
Banco de Bogotá (I.F.I.)	Alto Anchicayá	1974	124.2	C.V.C. 100	No tiene	19.0	7	-
FONADE 147	Regulación Río Cauce	1975	195.1	C.V.C. 100	Hipoteca Hotel Lago Calima	15.0	6	-
Corporación Financiera	Promotora Forestal	1976	6.2	C.V.C. 100	No tiene	22.85	5	2
<u>Deuda por Contratar</u>								
FONADE (Negociado)	Estudios de generación y C. Control	1979	1,763.0	C.V.C. 100		7.0	5	-
FONADE (Por negociar)	Estudios de generación y C. Control	1980	2,160.0	C.V.C. 100		7.0	5	-

Cuadro III

Obligaciones por Pagar en Moneda Extranjera
(En miles de US\$)

	<u>Objeto</u>	<u>Fecha</u>	<u>Monto Inicial US\$</u>	<u>% de Participación</u>	<u>Garantía</u>	<u>Interés Anual (%)</u>	<u>Plazo Años</u>	<u>Período de Gracia Años</u>
<u>Estados</u>								
255-CO	Calima y Transmisión	1960	25,000	C.V.C. 82.95 CHIDRAL 17.05	Gobierno Nacional	6.0	25	3
339-CO	Calima y Transmisión	1963	8,800	C.V.C. 90.75 CHIDRAL 9.25	Gobierno Nacional	5.5	20	3
75/OC-CO	Alto Anchicaya	1969	43,300	C.V.C. 100	Gobierno Nacional	8.75	20	6
3/CD-CO	Alto Anchicaya	1969	15,000	C.V.C. 100	Gobierno Nacional	0.5	50	9-1/2
Bank of California	Alto Anchicaya	1976	10,000	C.V.C. 100	Gobierno Nacional	Com.C. 1-3/4	5	2
ese Manhattan Bank	Alto Anchicaya	1975	5,000	C.V.C. 100	Gobierno Nacional	S/LIBOR 1-7/8	6	2
as A.G.	Alto Anchicaya	1975	1,457	C.V.C. 100	Letras de Cambio	S/LIBOR 9.0	6	1
514-L-035	Electrificación Rural	1964	1,027	C.V.C. 100	Gobierno Nacional	2.0	25	7
Curacao	Subest. Ponce y Palmira	1978	14,032	C.V.C. 100	Letras de Cambio	8.25	5	
National City Bank	Subestación Palmira	1973	250	C.V.C. 100	Gobierno Nacional	11.5	5	2
<u>por Contratar</u>								
	Selvajina	1979	55,237	C.V.C. 100	Nación	4.5	20	7
	Selvajina	1979	46,700	C.V.C. 100	Nación	9.15	20	5
	Electrificación Rural	1980	3,003	ICEL - C.V.C.	Nación	2.0	30	7
dores	Selvajina	1980	27,286	C.V.C. 100	C.V.C.	7.5	10	4
dores	Centro de Control	1981	7,701	C.V.C. 100	C.V.C.	11.0	9	4
yal Bsk of Canada	Refinanciación Deuda	1979	10,000	C.V.C. 100	C.V.C.	3/4 S/LIBOR	8	2
o p/refinanciar deuda	Refinanciación Deuda	1980	7,000	C.V.C. 100	C.V.C.	1.0 S/LIBOR	7	2

CHIDRAL

Estado de Fuentes y Usos de Recursos Proyectado

(En Miles de US\$)

	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>
<u>FUENTES</u>										
Utilidad de Operación	3,424	4,144	3,350	3,006	2,965	2,745	2,042	1,116	1,134	990
Disminución Activo	72									
Depreciación: Equipo	664	684	704	724	744	764	784	804	824	844
Depreciación: Mina	96	107	117	128	139	150	161	172	182	193
Disminución Porción Cte. Deuda L.P.	180	634	22	23	172	189	143	(1)	(7)	4
Total Fuentes	4,436	5,569	4,193	3,881	4,020	3,848	3,130	2,091	2,133	2,031
<u>USOS</u>										
Inversiones ISA	221	244	286	354	370	380	489	489	489	489
Ampliaciones y Mejoras:										
Sector Energía	400	400	400	400	400	400	400	400	400	400
Mina de Carbón	200	200	200	200	200	200	200	200	200	200
Disminución Ctas. por Pagar	3,962	-	-	-	-	-	-	-	-	-
Servicio Deuda:										
Amortización	1,392	1,213	579	557	534	360	171	28	29	32
Gastos Financieros	343	224	140	106	72	43	23	18	16	14
Total Serv. Deuda Bruto	1,735	1,437	719	663	606	403	194	46	45	46
Menos: Int. dur. Const.	-	-	-	-	-	-	-	-	-	-
Total Serv. Deuda	1,735	1,437	719	663	606	403	194	46	45	46
Aumento Ctas./C. Largo Plazo 1/	3,382	4,353	3,068	2,144	2,243	2,138	1,543	785	820	703
Aumento (Dism.) Cap. Trabajo	(5,464)	(1,065)	(480)	120	201	327	304	171	179	193
Total Usos	4,436	5,569	4,193	3,881	4,020	3,848	3,130	2,091	2,133	2,031
Transferencias a CVC	3,348	4,353	3,068	2,144	2,243	2,138	1,543	785	820	703

1/ Incluye transferencias a CVC cuyo monto se indica en la última línea.

Fuente: CHIDRAL, Finanzas.

METODOLOGIA PARA EL CALCULO DE LA RENTABILIDAD

1. La rentabilidad indicada en la Cláusula deberá ascender por lo menos al 9.0% y se calculará anualmente como una relación entre el ingreso neto de explotación del negocio eléctrico de la empresa en el año considerado y el valor de la inversión inmovilizada respectiva. El cómputo de esta relación se llevará a cabo con base en los siguientes elementos:
 - (a) El "Ingreso Neto de Explotación" se obtendrá deduciendo del total de los ingresos de explotación todos los gastos de explotación, incluidos administración, impuestos (excluyendo impuestos sobre utilidades), operación, mantenimiento y depreciación.
 - (b) La "Inversión Inmovilizada" de la empresa en el negocio eléctrico (GTP y SD) será la suma del "Activo Fijo Neto" correspondiente a los bienes en servicio más el "Capital de Explotación" vinculado con dicho negocio.
 - (c) El "Activo Fijo Neto" se obtendrá restando del valor del "Activo Fijo" correspondiente a los bienes en servicio la "Reserva de Depreciación" respectiva.
 - (d) La provisión anual por depreciación no será inferior al 2.8% por ciento del valor del "Activo Fijo" durante el año.
 - (e) El "Capital de Explotación" estará constituido por $\frac{2}{12}$ del ingreso de explotación obtenido en el negocio eléctrico de la

Empresa más el inventario promedio durante el año considerado.

Cuando una empresa de energía eléctrica transfiera el exceso de costo de combustible al consumidor, el cálculo del capital de trabajo -para efectos de la rentabilidad sobre la inversión inmovilizada- podrá excluir el monto de dicho sobre costo, según lo acostumbrado o establecido en la empresa correspondiente.

(f) El "Activo Fijo Neto" y la "Inversión Inmovilizada" se determinarán, para cada año calendario, de la siguiente manera:

- (i) Del monto del "Activo Fijo" al comienzo del año se deducirá la "Reserva de Depreciación", ambos revalorizados por efecto de la variación de costo ocurrida en el año precedente de conformidad con la metodología de revaluación acordada durante la misión y que más adelante se incluye.
- (ii) La "Reserva de Depreciación" se ajustará en la misma proporción en que se revalore el "Activo Fijo".
- (iii) La diferencia entre el "Activo Fijo" y la "Reserva de Depreciación" así revalorizados constituye el "Activo Fijo Neto" al comienzo del año.
- (iv) En la misma forma indicada en (i) y (ii) se revalorizará el "Activo Fijo" y la Reserva de Depreciación" para establecer el "Activo Fijo Neto" al comienzo del año siguiente.
- (v) El valor promedio entre los activos fijos netos al comienzo del año considerado y al comienzo del siguiente constituirá

el "Activo Fijo Neto" correspondiente al año. Este promedio podrá ser ponderado cuando ocurran incorporaciones importantes de bienes durante el curso del año.

(vi) Sumando al "Activo Fijo Neto" definido en el párrafo (e), se obtendrá la "Inversión Inmovilizada", base para el cómputo de la rentabilidad del año.

(g) Se tomarán como valores iniciales del "Activo Fijo" y de la "Reserva de Depreciación" los correspondientes al 31 de Diciembre de 1976, que fueron establecidos durante la negociación del Préstamo. Con base en estos valores, y sus ajustes por adición o retiro de bienes, provisión para depreciación y revalorizaciones, se determinará el "Activo Fijo Neto" en los años subsiguientes. Dichos valores son los siguientes:

(i) Activo Fijo, al 31 de Diciembre de 1976, Col\$ 9,459.0 millones (equivalente a 260.4 millones U.S. dólares a esa fecha).

(ii) Reserva de Depreciación, al 31 de Diciembre de 1976, Col\$ 1,387.0 millones (equivalente a 38.2 millones U.S. dólares a esa fecha).

2. Metodología para Revaluación de las Inversiones y la Unidad de Valor Constante (UVC)

Con el fin de determinar el costo revaluado de las inversiones que realiza CVC, de forma que se tenga en cuenta el efecto de la inflación interna colombiana, la devaluación del peso y la inflación externa en equipos y obras civiles sobre las inversiones en pesos y moneda extranjera, se creó por razones prácticas una unidad de valor constante (UVC), basada en los siguientes supuestos:

- (a) Una forma práctica de revaluar una inversión es expresarla en una unidad de valor constante y revisar permanentemente la tasa de cambio de esta unidad de valor constante a pesos corrientes.
- (b) Para esto es necesario tener en cuenta dos factores que influyen en el aumento de los costos expresados en pesos corrientes:
- La inflación interna, que determina en buena parte el aumento de costos de las inversiones en moneda nacional.
 - La inflación externa en la parte de equipos y obras civiles más la devaluación interna, que determinan el aumento del costo, expresado en moneda nacional, de las inversiones en moneda extranjera.
- (c) En forma simplificada, se consideran representativos de estos factores, los siguientes índices:
- El "Índice Nacional de Precios al Consumidor - Obreros" dado por el DANE, para la inflación interna.
 - La "Tasa de cambio del dólar de los Estados Unidos a pesos colombianos, venta, tasa principal" dada por el Banco de la República, para la devaluación.
 - El índice del costo de los equipos dado por el Bureau of Reclamation de los Estados Unidos, para la inflación externa - equipos.
 - El índice de costo de obras civiles dado por el Bureau of Reclamation de los Estados Unidos, para la inflación externa - obras civiles.

(d) Del análisis de la inversión en proyectos de generación en Colombia se ha encontrado que de cada peso invertido, \$0.40 corresponde a moneda nacional, \$0.20 a moneda extranjera - equipos y \$0.40 a moneda extranjera - obras civiles.

(e) Dado que los índices mencionados son relativos a un año en particular, se toma el año 1968 como año de referencia.

En estas condiciones, la tasa de cambio de UVC a pesos corrientes para la fecha i , se define como:

$$\$_{UVC}(i) = .4t_1(i) + .2t_2(i) + .4t_3(i)$$

donde:

$$t_1(i) = IIC(i) * \frac{TC(1968)}{IIC(1968)}$$

y $IIC(i)$: Índice de costo de la vida obrera en Colombia dado por la Revista del Banco de la República, para la fecha i , bajo la denominación "Índice Nacional de Precios al Consumidor", columna "Obreros Total".

$TC(i)$: Tasa de cambio del dólar de los Estados Unidos a pesos colombianos, para la fecha i , dada en la Revista del Banco de la República bajo la denominación "Tasa de cambio del dólar de los Estados Unidos, venta, tasa principal".

$$t_2(i) = TC(i) * \frac{IEE(i)}{IEE(1968)}$$

IEE(i) : Indice del costo de los equipos para la fecha i, según lo indicado por el Bureau of Reclamation de los Estados Unidos.

$$t_3(i) = TC(i) * \frac{IEO(i)}{IEO(1968)}$$

IEO(i) : Indice del costo de obras civiles, para la fecha i, según lo indicado por el Bureau of Reclamation de los Estados Unidos.

La inversión se revalúa de acuerdo al siguiente procedimiento:

- (a) Cuando sea posible las inversiones se discriminan en moneda nacional y moneda extranjera (obras civiles y equipos) de acuerdo al semestre en que fue hecha la inversión.
 - Los gastos en moneda nacional se expresan en UVC, dividiendo la cantidad en pesos por el índice $t_1(i)$ definido anteriormente, dónde i corresponde a la fecha de la inversión.
 - Los gastos en moneda extranjera, equipos y obras civiles, se expresan en dólares americanos y estas cantidades se convierten a UVC, dividiéndolas por los índices $\frac{t_2(i)}{TC(i)}$ y $\frac{t_3(i)}{TC(i)}$ respectivamente.
- (b) Cuando las inversiones en libros estén expresadas en su equivalente en pesos colombianos, se convierten a UVC dividiéndolas por el valor de la tasa de cambio de UVC a pesos vigente para la fecha de la inversión.
- (c) Una vez expresadas en UVC, se pueden sumar las inversiones de los diferentes años para obtener la inversión total.

De esta forma, las inversiones expresadas en UVC, se pueden expresar en pesos corrientes multiplicando por la tasa de cambio de UVC a \$ vigente para la fecha de interés.

Bases y Supuestos de la Evaluación Económica

I. Introducción

1. El propósito de este apéndice es el de suministrar las bases empíricas y metodológicas que fueron utilizadas en la evaluación económica del Proyecto de propósito múltiple Salvajina. La metodología empleada consistió en comparar todos los costos del proyecto (definido éste como las obras en Salvajina y en la planicie del Cauca) con los beneficios resultantes de su implementación y así estimar los indicadores económicos del proyecto (VPN y TIR). Segundo, se comparó el VP de la suma total de costos del proyecto con el VP de la suma de los costos de los proyectos alternativos, y así verificar que el proyecto de propósito múltiple era el de menor costo.
2. Este apéndice está dividido en cuatro secciones. En la primera se presentan las bases y cifras de los estimativos de costos económicos del proyecto; en la segunda, las bases de los cálculos de los beneficios. En la tercera, se muestra un resumen de los costos y beneficios del proyecto. Finalmente, se presentan los resultados del método de Costos Separables-Beneficios Remanentes, que generalmente se requieren para efectos de valorización y de análisis financiero.

II. Costos Económicos

3. Los costos económicos del proyecto no incluyen: (1) gastos financieros; (2) escalación; (3) depreciación; (4) impuestos; (5) los gastos por concepto de estudios del proyecto ya realizados; y (6) los pagos en efectivo ni gastos de relocalización a los afectados por el embalse y la construcción de diques en la planicie (pues, se considera estos como una transferencia de la CVC a los afectados). Se incluyeron en los costos los gastos por manejo y protección de la cuenta alta del río y los gastos de reposición del equipo y materiales del proyecto, suponiendo una vida económica de estos componentes (esencialmente electromecánicos) de 25 años; estos últimos se registran en los flujos de costos del proyecto, en el momento en que se considera se incurrirían los gastos de reposición.
4. Los costos se dividieron en costo común y costos separables. El costo común comprende aquellos gastos comunes a todos los subproyectos. Esto es, si el proyecto se diseña sólo para el propósito A tendrá que incurrirse en un costo que también se haría si el proyecto se diseña sólo para el propósito B o el C. A su vez, si se añaden otros propósitos al que originalmente fue concebido, el costo común del proyecto no se altera. Los costos que no son comunes son función de cada propósito y de su escala: estos son los costos separables.

5. El costo común del proyecto comprende todos los gastos relativos a una presa de una altura de 154 metros sobre el lecho del río para almacenar un volumen útil de 620 millones de metros cúbicos. Este sería el diseño del proyecto si sólo sirviese para control de inundaciones o para generación de electricidad o para control de calidad del agua.
6. El costo separable atribuible al subproyecto agrícola comprende de los costos de inversión y de operación de las obras en la planicie: diques a lo largo del Río Cauca y sus tributarios canales interceptores y de drenaje. Estas son las obras complementarias necesarias para lograr una protección de 30 años y, en consecuencia, beneficiar 96.900 hectáreas de manera directa (82.945) e indirecta (13.955).
7. El costo separable atribuible al subproyecto hidroeléctrico incluye los costos de inversión y de operación de las obras civiles y equipos de la central hidroeléctrica, de los patios de conexiones, de la toma de carga y de la línea de transmisión y subestación. En el cuadro 12 se presentan los flujos año por año de estos costos y en el cuadro 13, sus valores presentes.

III. Beneficios

A. Subproyecto Agrícola

8. En la situación sin el proyecto se adoptaron los siguientes supuestos: (1) que la superficie adecuada y no adecuada dedicada a cada cultivo crecía de manera lineal de acuerdo a las perspectivas de los ingresos netos por cultivo y a las restricciones impuestas por las características de los suelos; (2) que los rendimientos por hectárea crecían en ambas áreas de manera lineal por motivo de mejoras técnicas en la explotación y de acuerdo con la tendencia observada en el pasado; (3) que los precios y los costos de explotación se mantenían constantes (o que variaban en la misma proporción en términos reales). En los cuadros 1 y 2 se presentan las cifras usadas en el cálculo de los ingresos netos sin el proyecto.
9. Los precios utilizados en el análisis se escogieron con base en si los productos en cuestión eran o no exportados o importados. De tal manera, para los productos de exportación se seleccionó el precio FOB y para los de importación el precio CIF prevaleciente en enero de 1979.
10. Los costos de explotación por hectárea se discriminaron en cuanto a área adecuada y no adecuada, incluyendo en la primera los costos de mantenimiento de las obras de adecuación a nivel de predio. Los insumos de fertilizante utilizados en cada cultivo, se valoraron de acuerdo a su precio CIF internacional (US\$263 ton de urea y compuestos), dado que parte de estos se importan. A los costos de explotación, se les aplicó el 12%

CUADRO 1

DATOS AGRICOLOS PARA LA SITUACION SIN PROYECTO

		Superficie (Has.)		Rendimientos (Tons/Has)		Precio/Ton. a/ US\$	Costos/Has. ^{B/} (US \$)	
		Adecuada	No Adecuada	Adecuada	No Adecuada		Adecuada	No Adecuada
Algodón:	1978	3 173	3 983	3.0	2.0	630	857.30	850.30
	1979	3 275	3 824	3.0	2.0	630	857.30	850.30
	1985	3 961	2 996	3.12	2.12	630	857.30	850.30
	2000	6 373	1 627	3.4	2.4	630	857.30	850.30
	2034	6 373	1 627	3.6	2.6	630	857.30	850.30
Arroz:	1978	2 364	1 576	5.3	4.2	219	586.10	579.10
	1979	2 366	1 548	5.33	4.23	219	586.10	579.10
	1985	2 375	1 389	5.54	4.44	219	586.10	579.10
	2000	2 400	1 060	6.1	5.0	219	586.10	579.10
	2034	2 400	1 060	6.1	5.0	219	586.10	579.10
Frijol:	1978	1 368	912	1.7	1.1	464	486.70	479.70
	1979	1 369	898	1.71	1.12	464	486.70	479.70
	1985	1 378	819	1.79	1.21	464	486.70	479.70
	2000	1 400	650	2.0	1.5	464	486.70	479.70
	2034	1 400	650	2.3	1.5	464	486.70	479.70
Maíz:	1978	2 964	1 976	4.0	2.6	116	374.90	367.90
	1979	2 966	1 972	4.03	2.63	116	374.90	367.90
	1985	2 975	1 951	4.18	2.83	116	374.90	367.90
	2000	3 000	1 900	4.6	3.4	116	374.90	367.90
	2034	3 000	1 900	4.6	3.4	116	374.90	367.90
Mango:	1978	13 944	9 296	4.5	3.0	110	353.35	346.35
	1979	13 946	9 282	4.5	3.02	110	353.35	346.35
	1985	13 962	9 201	4.5	3.12	110	353.35	346.35
	2000	14 000	9 000	4.5	3.4	110	353.35	346.35
	2034	14 000	9 000	4.5	3.4	110	353.35	346.35
Naranja:	1978	22 920	15 280	2.4	2.0	243	460.70	453.40
	1979	22 924	15 267	2.42	2.0	243	460.70	453.40
	1985	22 945	15 190	2.52	2.03	243	460.70	453.40
	2000	23 000	15 000	2.8	2.1	243	460.70	453.40
	2034	23 000	15 000	3.0	2.1	243	460.70	453.40
Caña de azúcar:	1978	20 520	13 680	120	88	11	524.70	517.20
	1979	21 250	12 900	121.07	88.09	11	524.70	517.20
	1985	26 209	4 296	127.73	88.63	11	524.70	517.20
	2000	44 275	275	146	90	11	524.70	517.20
	2034	44 275	275	150	90	11	524.70	517.20

Precios a enero de 1979.

Cuadro 2

Ingreso Neto por
Hectárea Cosechada: Sin el Proyecto
(US\$ de enero 1979)

	Area Adecuada		Area No Adecuada	
	1978	2034	1978	2034
Algodón	1032.7	1284.7	409.7	661.7
Arroz	574.6	749.8	340.7	515.90
Frijol	302.1	441.30	30.7	216.30
Maíz	89.1	158.70	-66.3	26.50
Sorgo	141.65	141.65	-16.35	27.65
Soya	122.50	219.70	32.60	56.90
Caña de Azúcar	795.30	1081.30	450.80	472.80

de imprevistos. En el cuadro 1 se presentan los costos de explotación así estimados para la situación sin proyecto. Se supuso que los mismos costos en el área adecuada (a nivel de predio) prevalecerían con el proyecto.

11. En el cuadro 3 se presentan las cifras utilizadas para el cálculo del ingreso neto con el proyecto. La CVC había estimado un cambio gradual de cultivos conforme se fuesen terminando las obras de adecuación del 60% en 1985 y aumentando en incrementos de 10% hasta llegar al 100% de adecuación en el año 1989. Sin embargo, se consideró que ese calendario de adecuación era optimista porque existen problemas de capacidad institucional y de aceptación por parte de los agricultores. Por ello, se alargó el calendario de adecuación hasta 1993, creciendo en incrementos del 5% a partir del 60% en 1985.
12. En lo que toca a los beneficios por control de inundaciones, la CVC había estimado una cifra demasiado alta de US\$ 21 millones constantes año por año. Los problemas principales con esa estimación eran que: (1) no se habían descontado los costos de explotación en caso de que se hubiese logrado la producción; (2) se usaban los datos suministrados por los damnificados, que incluían los precios que esperaban recibir por las cantidades que esperaban producir más los costos de explotación que ya habían incurrido

Cuadro 3

Datos Agrícolas para la Situación Con Proyecto

		Superficie (Ha.)	Rendimientos (Ton/Ha.)	Precio/Ton. (US\$)	Costos/Ha. (US\$)	Ingreso Neto Total (US\$ Miles)
1. Algodón	1985	4.800	3,12	630	857,30	5.319,84
	1986	5.200	3,14	"	"	5.828,68
	1987	5.600	3,16	"	"	6.347,60
	1988	6.000	3,18	"	"	6.876,60
	1989	6.400	3,19	"	"	7.375,36
	1990	6.800	3,21	"	"	7.922,00
	1991	7.200	3,23	"	"	8.478,22
	1992	7.600	3,25	"	"	9.045,52
	1993	8.000	3,27	"	"	9.622,40
	2000	8.000	3,40	"	"	10.277,60
	2034	8.000	3,60	"	"	11.285,60
2. Arroz	1985	2.364	5,54	219	586,10	1.482,61
	1986	2.561	5,58	"	"	1.628,59
	1987	2.758	5,61	"	"	1.771,99
	1988	2.955	5,65	"	"	1.924,44
	1989	3.152	5,69	"	"	2.080,35
	1990	3.349	5,72	"	"	2.232,38
	1991	3.546	5,76	"	"	2.394,76
	1992	3.743	5,80	"	"	2.560,59
	1993	3.940	5,83	"	"	2.721,24
	2000	3.940	6,10	"	"	2.954,21
	2034	3.940	6,10	"	"	2.954,21
3. Frijol	1985	1.368	1,79	464	486,70	470,40
	1986	1.482	1,80	"	"	516,48
	1987	1.596	1,82	"	"	571,02
	1988	1.710	1,83	"	"	619,74
	1989	1.824	1,84	"	"	669,52
	1990	1.938	1,86	"	"	729,35
	1991	2.052	1,87	"	"	781,77
	1992	2.166	1,89	"	"	845,30
	1993	2.280	1,90	"	"	900,37
	2000	2.280	2,00	"	"	1.006,16
	2034	2.280	2,30	"	"	1.323,54
4. Maíz	1985	2.868	4,18	116	374,90	315,42
	1986	3.107	4,21	"	"	352,52
	1987	3.346	4,24	"	"	391,28
	1988	3.585	4,26	"	"	427,55
	1989	3.824	4,29	"	"	469,36
	1990	4.063	4,32	"	"	512,83
	1991	4.302	4,34	"	"	552,98
	1992	4.541	4,37	"	"	599,50
	1993	4.780	4,40	"	"	647,69
	2000	4.780	4,60	"	"	758,59
	2034	4.780	4,60	"	"	758,59
5. Sorgo	1985	13.800	4,50	110	353,35	1.954,77
	1986	14.950	"	"	"	2.117,67
	1987	16.100	"	"	"	2.280,57
	1988	17.250	"	"	"	2.443,46
	1989	18.400	"	"	"	2.606,36
	1990	19.550	"	"	"	2.769,26
	1991	20.700	"	"	"	2.932,16
	1992	21.850	"	"	"	3.095,05
	1993	23.000	"	"	"	3.257,95
	2000	23.000	"	"	"	3.257,95
	2034	23.000	"	"	"	3.257,95
6. Soya	1985	22.800	2,52	243	460,70	3.457,85
	1986	24.700	2,54	"	"	3.866,04
	1987	26.600	2,56	"	"	4.292,71
	1988	28.500	2,57	"	"	4.668,59
	1989	30.400	2,59	"	"	5.127,57
	1990	32.300	2,61	"	"	5.605,02
	1991	34.200	2,63	"	"	6.100,94
	1992	36.100	2,65	"	"	6.615,33
	1993	38.000	2,67	"	"	7.148,18
	2000	38.000	2,80	"	"	8.348,60
	2034	38.000	3,00	"	"	10.195,40
7. Caña de Azúcar	1985	26.854	127,73	11.0	460,70	25.359,04
	1986	29.092	128,87	"	"	27.837,26
	1987	31.330	130,02	"	"	30.375,06
	1988	33.568	131,19	"	"	32.976,87
	1989	35.806	132,36	"	"	35.636,28
	1990	38.043	133,55	"	"	38.360,66
	1991	40.281	134,74	"	"	41.144,62
	1992	42.519	135,95	"	"	43.996,54
	1993	44.757	137,17	"	"	46.912,94
	2000	44.757	146,00	"	"	51.210,19
	2034	44.757	159,00	"	"	53.224,60

antes de la inundación; (3) se consideraba dichos beneficios constantes, una vez que se adecuaba el 100% de la zona, no obstante que lo más probable que sucedería, si no se hace el proyecto, es que la adecuación por iniciativa privada supervisada y complementada por la CVC, continuaría, y (4) se pronosticaba el ingreso neto con el proyecto considerando ya los beneficios por control de inundaciones en la zona beneficiada indirectamente por el proyecto. De tal manera, había por un lado sobrestimación y, por el otro, doble conteo.

13. Con base en los razonamientos anteriores se corrigieron los estimativos de beneficios por control de inundaciones, considerando:
(1) los precios internacionales; (2) los costos de explotación; (3) la parte de daños en activos fijos y capital de trabajo; (4) el proceso de adecuación previsto sin el proyecto (el cual disminuiría las pérdidas por daños de inundaciones), y (5) el beneficio por este concepto ya incorporado en el cálculo del ingreso neto con el proyecto. En el cuadro 12 se presenta la evolución anual de estos beneficios y en el cuadro 13, su valor presente.

B. Subproyecto Hidroeléctrico

14. La metodología adoptada para la evaluación del subproyecto hidroeléctrico (SH) y el computo de sus beneficios consistió de los siguientes pasos: (1) revisión de los pronósticos de demanda y de

oferta de energía y de potencia en el sistema interconectado; (2) verificación de la secuencia de equipamiento propuesta para satisfacer los requerimientos de energía y potencia del sistema como la de costo mínimo; y (3) estimación de los beneficios del SH.

1. Demanda

15. El documento de ISA fundamenta su análisis de demanda con información histórica hasta diciembre de 1977 1/ No obstante, como los datos de consumo durante 1978 son casi idénticos a los pronosticados se aceptaron los resultados del estudio de ISA.
16. Las demandas históricas de cada uno de los mercados que forman el sistema interconectado se estudiaron mediante: (1) ajustes de tendencia por mínimos cuadrados; (2) la consideración de las demandas industriales esperadas; (3) el supuesto de que el mercado de CORELCA se interconecta al sistema central a partir de enero de 1981. Las proyecciones de demanda de energía y de potencia se hicieron para cada mercado por separado, las cuales son resultado de 100 casos diferentes creados de manera estocástica por el modelo de demanda de ISA. Posteriormente, se integraron esas proyecciones

1/ ISA, Verificación y actualización del programa de expansión del sistema interconectado, periodo 1984-1988: Generación y Transmisión (Medellín, diciembre 1978)

para el sistema interconectado. El cuadro 4 muestra los pronósticos de energía y de potencia para el sistema interconectado.

2. Oferta

17. La información hidrológica histórica de los ríos que alimentan las centrales hidroeléctricas en operación, construcción y estudio del sistema interconectado se actualizó hasta diciembre de 1977. Lo mismo se hizo con la información referente a los embalses. El cuadro 5 presenta los característicos de los embalses y los factores de conversión de caudal a potencia de las centrales asociadas a ellos.

Cuadro 4

Pronósticos de Demanda en el sistema Interconectado

<u>Año</u>	<u>Energía (TWh)</u>			<u>Potencia (Gw)</u>		
	<u>Mínima</u>	<u>Promedio</u>	<u>Máxima</u>	<u>Mínima</u>	<u>Promedio</u>	<u>Máxima</u>
1978	14,11	14,36	14,57	2,70	2,77	2,82
1980	17,18	17,58	18,24	3,24	3,35	3,45
1985	32,34	33,80	35,50	6,13	6,40	6,68
1990	47,94	51,77	53,99	9,13	9,82	10,29
1995	71,31	79,46	84,66	13,73	15,12	15,95

Tasas de Crecimiento

1978-1985	12.6	13.0	13.6	12.5	12.7	13.1
1985-1995	8.2	8.9	9.1	8.4	9.0	9.1

Fuente: ISA, Op. cit, Cuadro 18.

CUADRO 5

CARACTERISTICAS DE LOS EMBALSES Y FACTORES DE CONVERSION

EMBALSE	Volumen Util (Millones de M ³)	Factor Conversión kW/m ³ /seg)	Energía equivalente almacenada (GWh)
A. Embalses de Regulación Anual (o mayor)			
1. Bogota			
(Antes de El Paraíso-La Guaca)	888	13,100	3,231
(Con El Paraíso-La Guaca)	888	13,806	3,405
2. Calima	411	1,700	194
3. Chivor	635	6,300	1,111
4. Prado	428	446	53
5. Santa Rita			
(Antes de San Carlos)	1,168	6,931	2,249
(Con San Carlos)	1,168	11,781	3,822
(Con San Carlos y Playas)	1,168	13,235	4,294
6. San Lorenzo			
(Con San Carlos)	140	6,790	264
(Con San Carlos y Playas)	140	8,244	321
7. Miraflores			
(Antes de Guadalupe IV)	140	5,000	194
(Con Guadalupe IV)	140	8,060	313
8. Guavio	778	8,933	1,931
9. Patía	8,350	1,768	4,101
10. Urra I	1,054	505	148
Urra II			
(Antes de Urra I)	14,300	1,032	4,099
(Con Urra I)	14,300	1,537	6,105
B. Embalses de Regulación Mensual			
1. Muña			
(Antes de El Paraíso-La Guaca)	41	13,100	149
(Con el Paraíso-La Guaca)	41	13,806	157
2. Alto Anchicaya	30	3,600	30
3. Sistema CQR	3.2	2,927	3
4. Punchina	50	4,850	67
5. Troneras			
(Antes de Guadalupe IV)	36	5,000	50
(Con Guadalupe IV)	36	8,060	81
6. Peñol			
(Sin Santa Rita)	27	6,700	50
7. Betania	1,042	586	170
8. San Juan	6,000	256	427
9. Playas			
(Con San Carlos)	102	6,304	179
C. Centrales Sin Embalse			
1. Rio Grande		2,420	
2. Anchicaya		575	

18. La capacidad térmica existente, en construcción y estudio se incluyó en el análisis considerando sus características de operación y sus fechas probables de retiro.

3. Demanda y Oferta

19. Se formularon 3 alternativas de expansión del sistema necesarias para satisfacer las demandas de energía y de potencia del sistema. Se buscó en cada alternativa que las probabilidades de ocurrencia del déficit de energía(o de potencia)no fueran mayores del 5% en ningún mes durante el período de simulación. Los ejercicios de simulación se hicieron para el periodo 1979-91, tomándose los resultados desde 1984. La simulación se hizo con los modelos de planeación que posee ISA para tal fin. El cuadro 6 muestra las centrales que componen cada una de las alternativas, y el cuadro 7, los balances de energía del sistema para cada alternativa.

C U A D R O N° 6

ANALISIS DE SALVAJINA:

ALTERNATIVAS CONSIDERADAS

ALTERNATIVA 1		ALTERNATIVA 2		ALTERNATIVA 3	
<u>Central</u>	<u>Fecha</u>	<u>Central</u>	<u>Fecha</u>	<u>Central</u>	<u>Fecha</u>
Tasajero	Ene.83	Tasajero	Ene.83	Tasajero	Ene.83
Salvajina	Ene.84	Térmica <u>a/</u>	Ene.84	Cerrejón II	Ene.84
Guadalupe IV	Jul.84	Guadalupe IV	Jul.84	Guadalupe IV	Jul.84
Cerrejón II	Oct.84	Cerrejón II	Oct.84	Salvajina	Ene.85
Betania	Oct.85	Betania	Oct.85	Betania	Oct.85
Playas	Ene.86	Playas	Ene.86	Playas	Ene.86
Guavio	Nov.86	Guavio	Nov.86	Guavio	Nov.86
Urrá 1 y 2	May.88	Urrá 1 y 2	May.88	Urrá 1 y 2	May.88
Patía	Jul.89	Patía	Jul.89	Patía	Jul.89
San Juan	Mar.91	San Juan	Mar.91	San Juan	Mar.91

a/ Térmica de 120 MW por Salvajina

Nota: Todas las alternativas incluyen: Cerrejón I en junio 1983,
San Carlos II en julio 1983, Jaguas en julio 1983.

CUADRO 7

RESULTADO DEL BALANCE ENERGETICO EN EL SISTEMA INTERCONECTADO:
ALTERNATIVAS DE EXPANSION Nº 1, 2 Y 3

FECHA DE OCURRENCIA	DEMANDA PROMEDIO (GWH)	ALTERNATIVA Nº 1 SALVAJINA ENERO 1984					ALTERNATIVA Nº 2 CENTRAL TERMICA POR SALVAJINA					ALTERNATIVA Nº 3 SALVAJINA ENERO 1985					
		REQUERIMIENTO DE CAPACIDAD (MW)	DEFICIT (GWH)	GENERACION TOTAL (GWH)	ENERGIA TOTAL (GWH)	REQUERIMIENTO DE CAPACIDAD (MW)	DEFICIT (GWH)	GENERACION TOTAL (GWH)	ENERGIA TOTAL (GWH)	REQUERIMIENTO DE CAPACIDAD (MW)	DEFICIT (GWH)	GENERACION TOTAL (GWH)	ENERGIA TOTAL (GWH)				
Enero 1984	2392	1	2.9	5224	68.8	1	2.6	5261	66.4	1	2.8	5291	61.5				
Febrero 1984	2454	2	5.4	4715	59.1	2	7.9	4690	51.8	1	7.3	4710	52.1				
Marzo 1984	2469	4	8.6	4249	47.0	4	7.8	4216	49.6	1	6.9	4245	45.9				
Abril 1984	2485	1	4.0	4026	47.8	1	3.9	4291	47.5	1	3.3	4231	47.8				
Diciembre 1984	2253			8260	71.6			6529	71.2			6493	70.6				
TOTAL ANUAL	30059		24.1	7203			22.1	7945			20.2	7202					
Enero 1985	2629			6990	68.4			5940	64.6			5925	56.7				
Febrero 1985	2705			6186	55.4			5113	55.8			5139	55.9				
Marzo 1985	2724	4	2.9	4439	46.4	2	1.4	4361	47.8		3.4	4357	47.9				
Abril 1985	2741	2	3.3	4331	47.3	2	1.4	4272	45.6	2	2.8	4293	45.7				
Diciembre 1985	2929			6380	62.7			5338	62.1			5375	59.5				
TOTAL ANUAL	33734		5.0	7993			2.0	8556			6.2	8011					
Enero 1986	2657			6043	66.6			6266	64.7			6331	55.3				
Febrero 1986	2750			5581	57.4			5475	56.5			5547	57.2				
Marzo 1986	2970	3	9.1	4690	60.4	3	7.8	4793	48.5	3	8.3	4857	52.2				
Abril 1986	2988	2	7.0	4682	59.2	2	6.9	4775	48.3	2	7.4	4850	50.0				
Diciembre 1986	3192			7321	83.0			7867	82.5			7315	53.0				
TOTAL ANUAL	59842		18.1	8021			14.2	8535			16.7	8030					
Enero 1987	3124	2	3.9	6735	57.9	1	2.2	6894	57.3	2	3.9	5730	57.3				
Febrero 1987	3215	3	5.1	5828	50.1	2	4.5	5754	48.6	3	5.4	5922	50.1				
Marzo 1987	3237	5	15.4	5223	45.0	5	14.0	5151	44.3	5	16.0	5224	45.0				
Abril 1987	3256	2	3.8	5793	48.9	2	4.8	5375	46.3	2	5.8	5452	45.6				
Diciembre 1987	3478			6954	77.0			6902	76.6			6950	77.0				
TOTAL ANUAL	40143		30.2	7792			25.0	8363			31.1	7794					
Enero 1988	3395			6053	69.3			7972	65.8			8049	68.8				
Febrero 1988	3494	1	2.4	5303	58.8	1	2.3	5716	57.8	1	2.4	5802	58.8				
Marzo 1988	3517	5	10.8	5804	48.8	4	10.0	5712	49.2	5	10.9	5801	49.9				
Abril 1988	3539	1	2.8	5914	48.3	1	2.5	5924	47.6	1	2.8	5911	48.2				
Diciembre 1988	3779			11931	75.2			11587	84.8			11549	65.2				
TOTAL ANUAL	43528		15.0	6276			14.6	6032			15.8	6278					
Enero 1989	3896			10782	60.4			10712	59.8			10790	60.4				
Febrero 1989	3934			9454	52.9			9370	52.4			9452	52.9				
Marzo 1989	3920	3	9.9	8364	48.7	3	9.2	8266	46.2	3	9.0	8352	48.7				
Abril 1989	3953			8234	48.2			8155	45.7			8253	48.2				
Diciembre 1989	4114			18098	68.6			14934	69.1			15055	68.6				
TOTAL ANUAL	47497		8.9	9370			8.2	8979			8.0	9370					
Enero 1990	4028	1	2.9	14280	64.9	1	2.3	14141	64.4	1	2.8	14259	64.9				
Febrero 1990	4147	4	5.7	12893	58.1	4	5.3	12837	55.6	4	6.7	12992	59.1				
Marzo 1990	4173	3	11.6	11372	54.0	3	6.7	11741	55.4	3	11.6	11573	54.0				
Abril 1990	4200	2	9.2	11783	59.6	2	9.4	11643	53.0	2	9.1	11782	53.5				
Diciembre 1990	4584			18065	73.1			18265	72.8			18065	73.1				
TOTAL ANUAL	51770		32.4	7715			26.9	8291			32.3	7715					
Enero 1991	4390	2	21.3	14743	67.1	2	20.3	14500	66.4	2	21.2	14744	67.1				
Febrero 1991	4510	2	38.2	13016	59.2	4	39.3	12853	55.5	3	39.2	13013	59.2				
Marzo 1991	4538	5	38.6	11540	52.5	4	33.7	11376	51.8	5	36.8	11539	52.5				
Abril 1991	4567	2	14.5	11076	60.4	2	13.9	10912	49.7	2	14.3	11075	60.4				
Diciembre 1991	4876			18537	70.3			15339	70.1			15327	70.3				
TOTAL ANUAL	56297		110.3	7895			103.4	8463			110.5	7895					
NOTA: TODAS LAS ALTERNATIVAS REQUIEREN:		FECHAS DE ENTRADA ALTERNATIVA 1					FECHAS DE ENTRADA ALTERNATIVA 2					FECHAS DE ENTRADA ALTERNATIVA 3					
CENTRAL	CAPAC.	FECHA	CENTRAL	CAPAC.	FECHA	CENTRAL	CAPAC.	FECHA	CENTRAL	CAPAC.	FECHA	CENTRAL	CAPAC.	FECHA	CENTRAL	CAPAC.	FECHA
Correje 1	100	Jun/88	Yacajara	150	Jun/88	Plapen	240	Jun/88	Yacajara	150	Jun/88	Plapen	240	Jun/88	Correje 1	100	Jun/88
San Carlos	800	Jul/88	Salvajina	150	Jun/88	Correje 2	800	Jul/88	Salvajina	150	Jun/88	Correje 2	800	Jul/88	San Carlos	800	Jul/88
Jaguar	175	Jul/88	Correje 2	150	Jul/88	Correje 2	150	Jul/88	Correje 2	150	Jul/88	Correje 2	150	Jul/88	Jaguar	175	Jul/88

4. Verificación del Costo Mínimo

20. Debido a que las fechas de entrada de varias centrales se repetían en las tres alternativas sus costos asociados se excluyeron del ejercicio de costo mínimo. Estas centrales fueron Tasajero, Guadalupe IV, Playas, Urra I y II, Patía y San Juan. Solo en el caso de Tasajero, por ser una planta térmica, se incluyeron sus costos de combustible por variar estos en cada alternativa. No obstante, sus costos de construcción, de operación y mantenimiento se excluyeron por ser iguales en las tres alternativas
21. Los flujos de costos para las centrales consideradas en cada alternativa estaban en dólares a precios de diciembre de 1976. Estos se escalaron a precios de enero de 1979 tomando como base los presupuestos contenidos en el estudio de ISA. 1/ Los factores que se usaron en la escalación se presentan en el cuadro 8.

1/ ISA, Op. cit, cuadros 73 a 78

Cuadro 8

Factores de Escalación Empleados en la Actualización
de Costos

<u>Conceptos</u>	<u>Factores de Escalación (Diciembre 1976-Enero 1977)</u>
A. Obra Civil	
1. Nacional	1.7469 <u>a/</u>
2. Componentes Importados	1.265 <u>b/</u>
B. Equipos	
1. Nacional	1.5212 <u>c/</u>
2. Importado	1.254 <u>b/</u>
C. Corrección por tipo de Cambio	0.8859 <u>d/</u>

<u>a/</u>	Relación índices de precios de los materiales de construcción en Colombia de diciembre 1976 a enero 1979.
<u>b/</u>	Factor de escalación recomendado por ISA con base en datos del Bureau of Reclamation de E.U.A.
<u>c/</u>	Relación índices de precios al mayoreo de bienes de capital en Colombia de diciembre 1976 a enero 1979.
<u>d/</u>	Relación de tipos de cambio de diciembre 1976 (Ps \$36.32/US\$1.00) a enero 1979 (Ps\$41.00/US\$1.00)

22. Los costos de operación y mantenimiento se calcularon usando los factores de US\$ 2.38 por kW instalado para las centrales hidroeléctricas y US\$ 8.34 para las termoeléctricas. Estos costos se ajustaron para reflejar el hecho de que no todas las unidades de generación de una central entran en operación en la misma fecha.
23. Debido a que en cada alternativa el uso de la capacidad térmica existente, en construcción y en estudio, varía, se incluyeron en el análisis los costos totales de combustibles en el sistema. Sus costos de operación y mantenimiento se presumieron serían los mismos para cada alternativa. Los precios de los combustibles fueron: (1) US\$18.20 por barril de combustaleo; (2) US\$28.00 por tonelada de carbón, y (3) US\$ 1.96 por mil pies cúbicos de gas natural.
24. En los cuadros 9, 10 y 11 se presentan los flujos de costos para cada alternativa. Se ha supuesto que la reposición del equipo y materiales de cada central se tendrán que hacer 25 años después de entrar en operación.

5. Cálculo de Beneficios

25. Los beneficios del SH de Salvajina se estimaron como los costos de construcción, de operación y mantenimiento, y de combustibles de la planta que substituiría a Salvajina en la Alternativa II

Cuadro 9

Flujos de Costos de la Alternativa I
(US\$ miles de enero 1979)

COSTOS DE INVERSION					COSTOS DE OPERACION Y MANTENIMIENTO					
Salvajina	Cerrejon II	Betania	Guavio	Subtotal	Salvajina	Cerrejon II	Betania	Guavio	Subtotal	Combustible
e/84	Oct/84	Oct/85	Nov/86							
613	-	-	-	613	-	-	-	-	-	-
787	-	-	29 429	35 216	-	-	-	-	-	-
123	5 274	14 271	36 664	66 332	-	-	-	-	-	-
520	37 600	58 876	73 125	196 121	-	-	-	-	-	-
293	49 644	83 271	123 832	265 040	-	-	-	-	-	-
441	24 041	114 239	145 817	289 538	429	925	-	-	1 354	148 908
-	-	142 324	190 264	332 588	429	1 250	694	-	2 373	136 935
-	-	51 476	210 963	262 439	429	1 250	1 191	1 552	4 422	138 789
-	-	-	86 493	86 493	429	1 250	1 191	2 322	5 192	124 044
-	-	-	-	-	429	1 250	1 191	2 322	5 192	149 611
-	-	-	-	-	429	1 250	1 191	2 322	5 192	154 158
-	-	-	-	-	429	1 250	1 191	2 322	5 192	133 564
-	-	-	-	-	429	1 250	1 191	2 322	5 192	124 272
050	-	-	-	16 050	429	1 250	1 191	2 322	5 192	124 272
051	34 967	-	-	51 018	429	1 250	1 191	2 322	5 192	124 272
051	34 968	54 187	-	105 206	429	1 250	1 191	2 322	5 192	124 272
-	34 968	54 187	89 658	178 813	429	1 250	1 191	2 322	5 192	124 272
-	-	54 187	89 659	143 846	429	1 250	1 191	2 322	5 192	124 272
-	-	-	89 659	89 659	429	1 250	1 191	2 322	5 192	124 272
-	-	-	-	-	429	1 250	1 191	2 322	5 192	124 272

Cuadro 10

Flujos de Costos de la Alternativa II
(US\$ miles de enero 1979)

COSTOS DE INVERSION					COSTOS DE OPERACION Y MANTENIMIENTO					
Térmica Ene/84	Cerrejón II Oct/84	Betania Oct/85	Guavio Nov/86	Subtotal	Térmica	Cerrejón II	Betania	Guavio	Subtotal	Combustible
-	-	-	-	-	-	-	-	-	-	-
6 198	-	-	29 429	35 627	-	-	-	-	-	-
19 208	5 274	14 271	36 664	75 417	-	-	-	-	-	-
31 640	37 600	58 876	73 125	201 241	-	-	-	-	-	-
36 555	49 644	83 271	123 832	293 302	-	-	-	-	-	-
-	24 041	114 239	145 817	284 097	1 001	925	-	-	1 926	155 669
-	-	142 324	190 264	332 588	1 001	1 250	694	-	2 945	141 925
-	-	51 476	210 963	262 439	1 001	1 250	1 191	1 552	4 994	143 861
-	-	-	86 493	86 493	1 001	1 250	1 191	2 322	5 764	129 420
-	-	-	-	-	1 001	1 250	1 191	2 322	5 764	156 996
-	-	-	-	-	1 001	1 250	1 191	2 322	5 764	161 375
-	-	-	-	-	1 001	1 250	1 191	2 322	5 764	139 985
-	-	-	-	-	1 001	1 250	1 191	2 322	5 764	130 663
28 080	-	-	-	28 080	1 001	1 250	1 191	2 322	5 764	130 663
28 080	34 967	-	-	63 047	1 001	1 250	1 191	2 322	5 764	130 663
28 080	34 968	54 187	-	117 235	1 001	1 250	1 191	2 322	5 764	130 663
-	34 968	54 187	89 658	178 813	1 001	1 250	1 191	2 322	5 764	130 663
-	-	54 187	89 659	143 846	1 001	1 250	1 191	2 322	5 764	130 663
-	-	-	89 659	89 659	1 001	1 250	1 191	2 322	5 764	130 663
-	-	-	-	-	1 001	1 250	1 191	2 322	5 764	130 663

Cuadro 11

Flujos de Costos de la Alternativa III
(US\$ miles enero de 1979)

Año	Costos de Inversión				Subtotal	Costos de Operación-Mantenimiento					Costos de Combustible	Costo Total
	Salvajina Ene/85	Corrección II Ene/84	Betania Oct/85	Guayío Nov/86		Salvajina Salvajina	Corrección II	Betania	Guayío	Subtotal		
1979	-	-	-	-	-	-	-	-	-	-	-	-
1980	613	23 304	-	29 429	53 346	-	-	-	-	-	-	53 346
1981	5 787	34 955	14 271	36 664	91 677	-	-	-	-	-	-	91 677
1982	10 123	34 956	58 876	73 125	177 080	-	-	-	-	-	-	177 080
1983	26 520	23 304	93 271	123 832	266 927	-	-	-	-	-	-	266 927
1984	8 293	-	114 239	145 817	268 349	-	1 250	-	-	1 250	152 846	422 445
1985	5 441	-	142 324	190 264	338 029	429	1 250	694	-	2 373	137 616	478 018
1986	-	-	51 476	210 963	262 439	429	1 250	1 191	1 552	4 422	138 873	405 734
1987	-	-	-	86 493	86 493	429	1 250	1 191	1 191	4 061	124 036	214 590
1988	-	-	-	-	-	429	1 250	1 191	1 191	4 061	149 611	153 672
1989	-	-	-	-	-	429	1 250	1 191	1 191	4 061	154 111	158 172
1990	-	-	-	-	-	429	1 250	1 191	1 191	4 061	133 567	137 628
1991-2006	-	-	-	-	-	429	1 250	1 191	1 191	4 061	124 277	128 338
2007	16 650	34 967	-	-	51 017	429	1 250	1 191	1 191	4 061	124 277	179 355
2008	16 051	34 968	54 187	-	105 206	429	1 250	1 191	1 191	4 061	124 277	233 544
2009	16 051	34 968	54 187	89 658	194 864	429	1 250	1 191	1 191	4 061	124 277	323 202
2010	-	-	54 187	89 659	143 846	429	1 250	1 191	1 191	4 061	124 277	272 184
2011	-	-	-	89 659	89 659	429	1 250	1 191	1 191	4 061	124 277	217 997
2011-2034	-	-	-	-	-	429	1 250	1 191	1 191	4 061	124 277	128 338

(la carboeléctrica de 120 MW) mas la diferencia entre los costos de combustible entre la alternativa con la carboeléctrica y la alternativa con Salvajina. Este procedimiento resulta del hecho de que en ambas alternativas las centrales restantes entran en operación en la misma fecha. El flujo de beneficios se puede ver en el cuadro 12.

C. Subproyecto de Control de Calidad del Agua

1. Reducción en el Grado de Contaminación

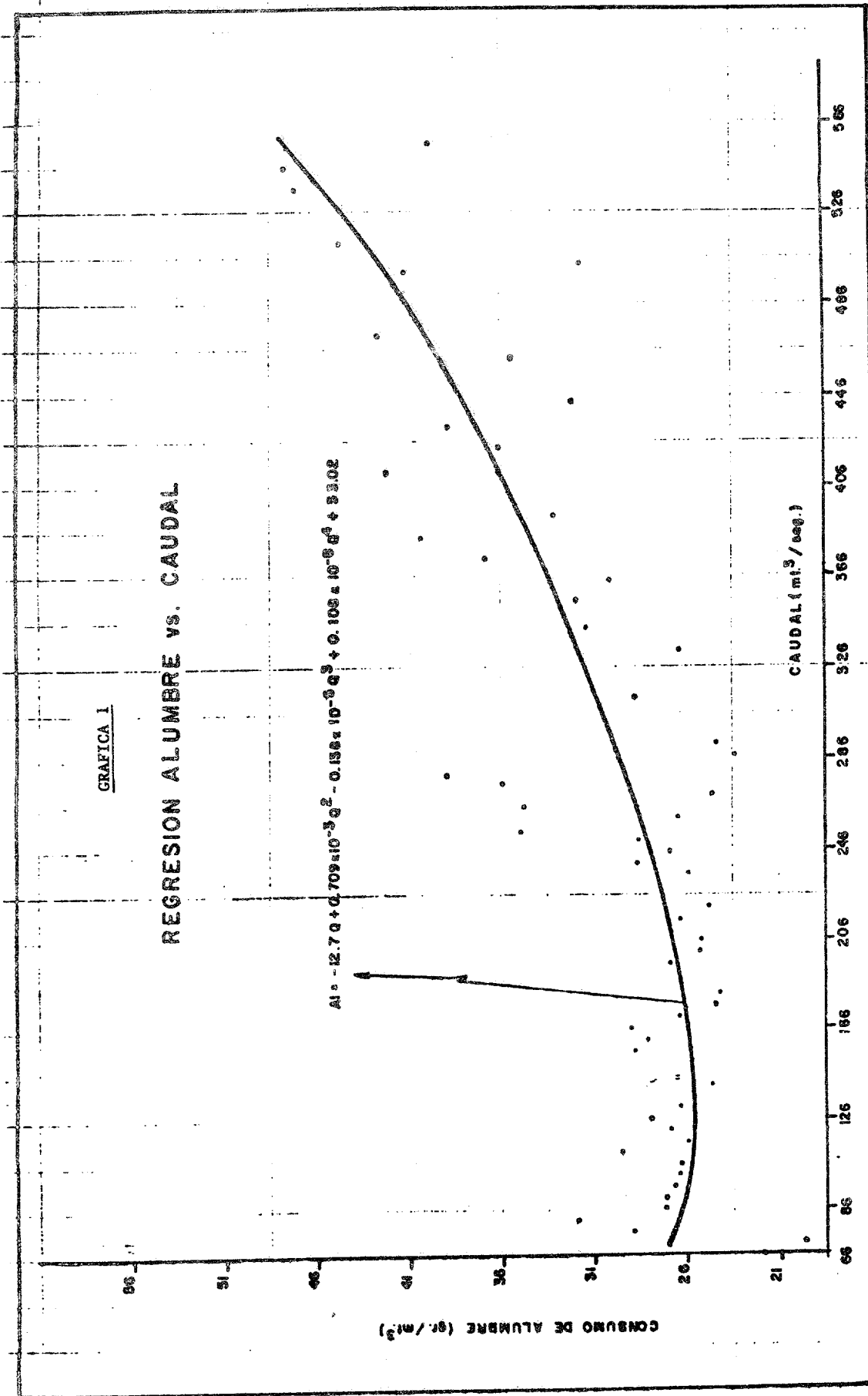
26. Los beneficios por este concepto se estimaron mediante la diferencia entre los costos de inversión, de operación y de mantenimiento que las industrias y entidades contaminantes tendrían que erogar en las situaciones sin y con el proyecto. Les bases de costos de inversión y de operación-mantenimiento provinieron del CEPIS 1/ Debido a que los costos se encontraban a precios de agosto 1974, se actualizaron con los índices apropiados para los componentes de importación y los nacionales. En la proyección de flujos de costos de las plantas de tratamiento de efluentes en las situaciones con y sin el proyecto, se adoptó el supuesto de que los equipos se reponen cada 15 años y las obras civiles, cada 30 años.

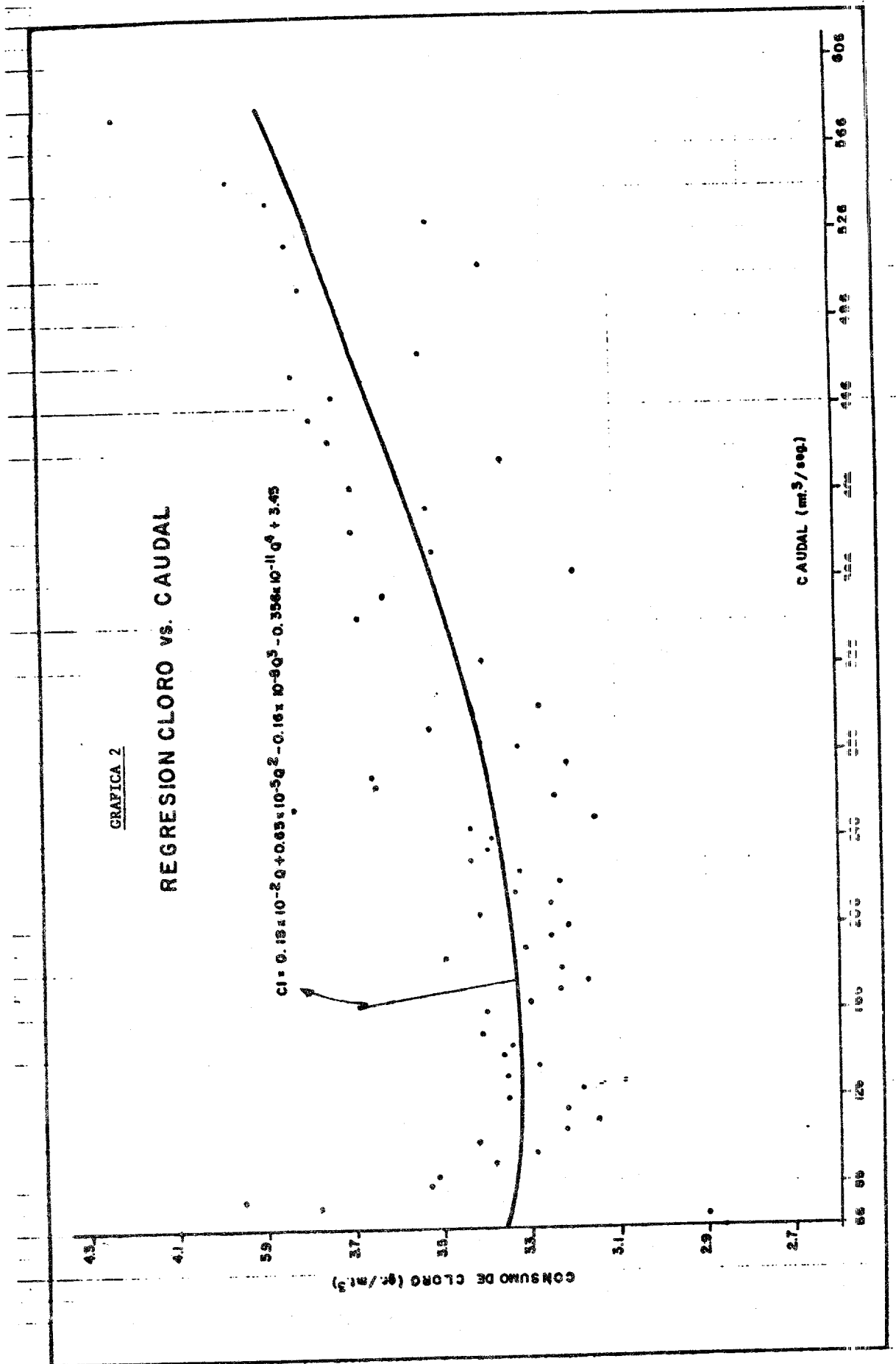
1/ Centro de Estudios para la Ingeniería Sanitaria (Lima, agosto 1974).

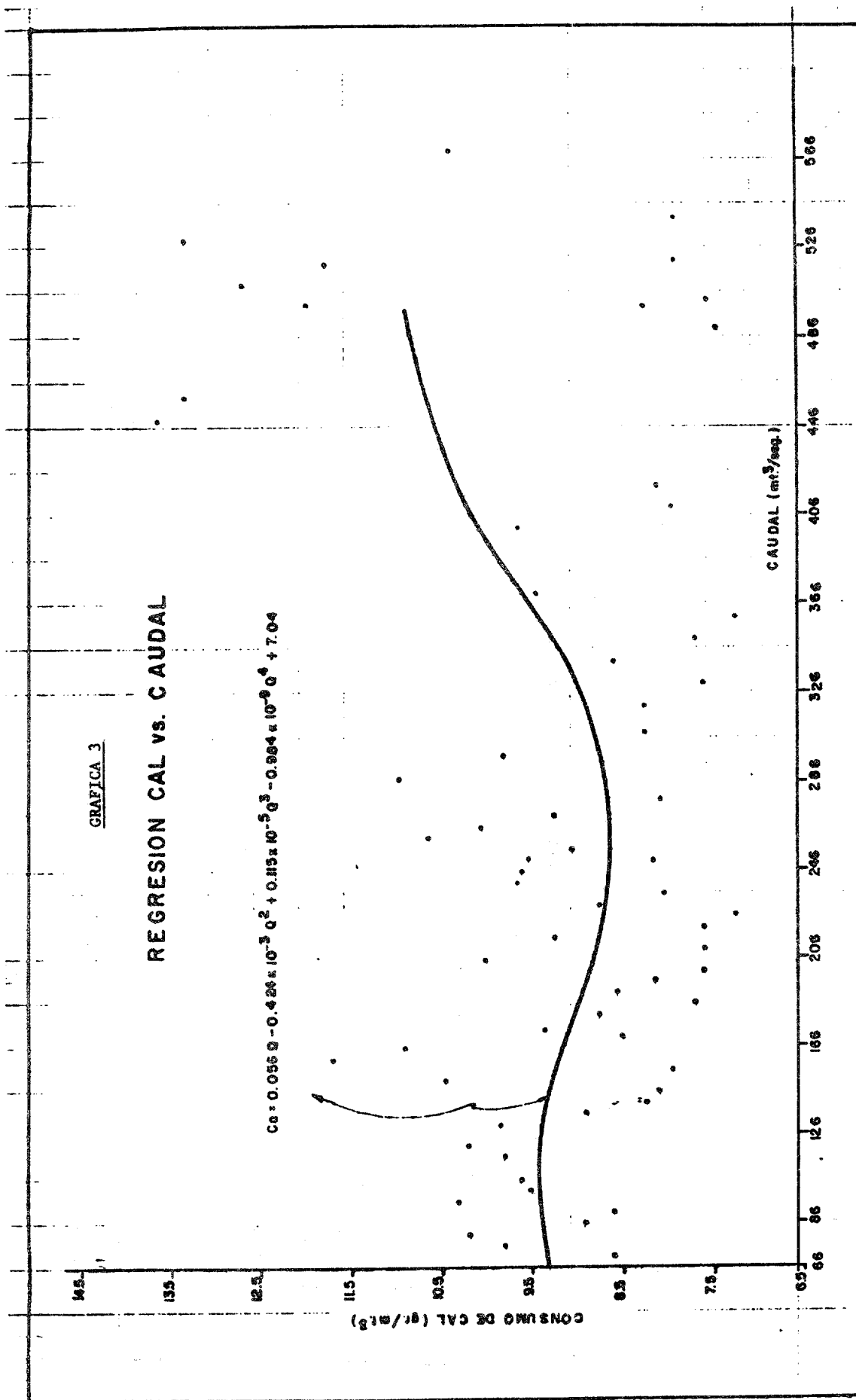
2. Reducción en los Costos de Tratamiento de Agua Cruda

27. Durante la Misión de Análisis se sospechaba que estos beneficios podrían ser relevantes, por lo cual se hizo un estudio estadístico para probar dicho supuesto. La información utilizada fué suministrada por las Empresas Municipales, refiriéndose esta a la producción de agua potable y consumos de reactivos (sulfato de aluminio, cloro y cal) para las plantas de "Rio Cauca " y "Puerto Mallarino".
28. Durante la época de secas el caudal del río lleva carga orgánica y concentración mineral, por lo que el agua cruda debe oxidarse y tratarse para prevenir la proliferación de algas y mejorar la calidad del agua. Además, durante la época de lluvias el caudal presenta alta turbiedad como consecuencia del arrastre del sedimento, del escurrimiento, y de la erosión de los bordes, condición que a su vez incrementa el uso promedio de reactivos.
29. El desarrollo de la metodología siguió los siguientes pasos:
- (1) se encontraron las ecuaciones de ajuste de consumo de reactivos con respecto a caudales; (2) se extrapolaron los consumos de reactivos con bases en los pronósticos de demanda de agua potable y los caudales sin el proyecto y con el proyecto, (3) se calcularon los beneficios.
- Las ecuaciones de ajuste se estimaron mediante un programa de computadora que efectúa el análisis de una regresión polinómica que sucesivamente va aumentando de grado, hasta el punto en que no se presenta reducción en la suma de los cuadrados de los errores (distancia entre los

datos observados y los datos estimados por la curva de ajuste). Los gráficos 1, 2 y 3 presentan las curvas encontradas.







30. Las tasas de crecimiento empleadas para los pronósticos de demanda de agua potable son conservadoras; se basaron en estudios de tendencia, considerando aspectos demográficos y económicos. El Cuadro II presenta dichas tasas de crecimiento.

Cuadro II

Pronósticos de Demanda de Agua Potable en Cali,
1980 - 2034
(Tasas de Crecimiento)

<u>Periodo</u>	<u>Pronóstico (%)</u>
1980 - 1989	8.5
1990 - 1994	6.5
1995 - 1999	6.0
2000 - 2009	5.0
2010 - 2034	4.0

31. Los costos de los reactivos de enero de 1979 se convirtieron a dolares usando el tipo de cambio de \$41 pesos por dolar: (1) sulfato de aluminio, \$5.9 Ps/kilo; (2) cloro, \$16.8 Ps/kilo, y (3) cal, \$4.5 Ps/kilo.

IV. Resumen de los Costos y Beneficios del Proyecto

32. El cuadro 12 muestra los flujos de costos y beneficios del proyecto; mientras que el cuadro 13, los valores presente de los costos del proyecto y de sus alternativas descontados al 12% a principios de 1979.

V. Costos Separables y Beneficios Remanentes

33. Con objeto de distribuir el costo común del proyecto para fines de valorización y de análisis financiero se ha seguido el método conocido como de "costos separables y beneficios remanentes. 1/ Los resultados se presentan en el cuadro 14. Como puede verse el 9% del costo común del proyecto se le asigna al sector agrícola; el 72% al eléctrico; el 20% a las industrias y entidades contaminantes, y cerca del 0.08% a la Empresa Municipal de agua potable.

1/ Se siguió la metodología descrita en J.P. Gittinger, Economic Analysis of Agricultural Projects (Baltimore: John Hopkins, 1972), pp. 147-55

C U A D R O 1 2

COSTOS Y BENEFICIOS ANUALES DEL PROYECTO SALVAJINA

(Miles de Ls de enero de 1979)

Años	C O S T O S					B E N E F I C I O S					Total	Agua Potable	Beneficio Neto	
	Inversión		Operación y Mantenimiento			Total	Hidro- eléctrica	Agrícola	Control Inundaciones	Reducción Contaminación				
	Pres	S H	S A	Pres	S H									S A
1979	3240.00	613.00	0.00	0.00	0.00	3853.00	0.00	0.00	0.00	0.00	0.00	0.00	-3553.00	
1980	33620.26	5787.00	4400.00	0.00	0.00	43807.26	6198.00	0.00	0.00	0.00	0.00	0.00	-37629.26	
1981	20460.25	10123.00	10000.00	0.00	0.00	40783.25	19200.00	0.00	0.00	0.00	0.00	0.00	-21575.25	
1982	29654.25	26520.00	9900.00	0.00	0.00	66674.25	31640.00	0.00	0.00	0.00	2589.00	0.00	-32445.25	
1983	20759.25	8293.00	6000.00	0.00	0.00	36352.25	36555.00	0.00	0.00	0.00	6430.00	0.00	-6632.75	
1984	8072.00	5441.00	4300.00	0.00	0.00	19013.00	7762.00	0.00	0.00	0.00	6430.00	0.00	-4621.00	
1985	0.00	0.00	5300.00	102.00	429.00	7231.00	5991.00	2433.84	3126.55	458.00	458.00	7.07	4755.46	
1986	0.00	0.00	6500.00	102.00	429.00	8631.00	6073.00	3565.91	3387.38	458.00	458.00	7.66	4560.95	
1987	0.00	0.00	6300.00	102.00	429.00	8731.00	6377.00	4839.94	3907.90	2945.00	6822.00	8.32	12954.47	
1988	0.00	0.00	10400.00	102.00	429.00	13031.00	8366.00	6819.27	3907.90	2945.00	90.80	9.80	24193.38	
1989	0.00	0.00	10800.00	102.00	429.00	13831.00	8218.00	8851.84	4429.57	2945.00	106.63	10.63	20921.95	
1990	0.00	0.00	0.00	102.00	429.00	3531.00	7392.00	10930.75	4429.57	1660.00	11.32	11.32	2381.80	
1991	0.00	0.00	0.00	102.00	429.00	3531.00	7392.00	13059.09	4690.40	1660.00	-1457.00	12.05	22737.20	
1992	0.00	0.00	0.00	102.00	429.00	3531.00	7392.00	15431.07	4950.09	12.83	12.83	12.83	27155.69	
1993	0.00	0.00	0.00	102.00	429.00	3531.00	7392.00	17852.95	5210.92	248.00	13.56	13.56	25922.46	
1994	0.00	0.00	0.00	102.00	429.00	3531.00	7392.00	16766.86	4912.01	249.00	14.54	14.54	24525.18	
1995	0.00	0.00	0.00	102.00	429.00	3531.00	7392.00	15617.39	4646.26	387.00	16.15	16.15	23934.15	
1996	0.00	0.00	0.00	102.00	429.00	3531.00	7392.00	14402.06	4409.97	16.34	16.34	16.34	22474.27	
1997	0.00	0.00	0.00	102.00	429.00	3531.00	7392.00	13118.04	4199.89	17.32	17.32	17.32	21921.89	
1998	0.00	0.00	0.00	102.00	429.00	3531.00	7392.00	11762.46	4013.11	3105.00	18.37	18.37	21153.75	
1999	0.00	0.00	0.00	102.00	429.00	3531.00	7392.00	10332.34	3847.04	382.00	19.46	19.46	16753.96	
2000	0.00	0.00	0.00	102.00	429.00	3531.00	7392.00	8824.95	3698.55	382.00	20.44	20.44	16165.85	
2001	0.00	0.00	0.00	102.00	429.00	3531.00	7392.00	8854.86	3698.55	382.00	21.46	21.46	14755.89	
2002	0.00	0.00	0.00	102.00	429.00	3531.00	7392.00	8918.98	3698.55	382.00	22.54	22.54	17328.07	
2003	0.00	0.00	0.00	102.00	429.00	3531.00	7392.00	8945.17	3698.55	583.00	23.66	23.66	17111.38	
2004	0.00	0.00	0.00	102.00	429.00	3531.00	7392.00	8975.45	3698.55	382.00	24.85	24.85	16911.86	
2005	0.00	0.00	0.00	102.00	429.00	3531.00	7392.00	9005.81	3698.55	382.00	26.10	26.10	29933.45	
2006	0.00	16050.00	0.00	102.00	429.00	3531.00	7392.00	9066.83	3698.55	382.00	27.39	27.39	27923.21	
2007	0.00	16051.00	0.00	102.00	429.00	3531.00	7392.00	9097.45	3698.55	-693.00	28.75	28.75	24658.13	
2008	3385.00	16051.00	0.00	102.00	429.00	3531.00	7392.00	9128.19	3698.55	-693.00	30.20	30.20	17258.20	
2009	0.00	0.00	0.00	102.00	429.00	3531.00	7392.00	9159.02	3698.55	571.00	31.68	31.68	17102.42	
2010	0.00	0.00	0.00	102.00	429.00	3531.00	7392.00	9189.92	3698.55	383.00	32.98	32.98	17133.54	
2011	0.00	0.00	0.00	102.00	429.00	3531.00	7392.00	9220.32	3698.55	382.00	34.29	34.29	19154.76	
2012	0.00	0.00	0.00	102.00	429.00	3531.00	7392.00	9252.03	3698.55	2971.00	35.66	35.66	22719.13	
2013	0.00	0.00	0.00	102.00	429.00	3531.00	7392.00	9283.23	3698.55	6760.00	37.10	37.10	25658.68	
2014	0.00	0.00	0.00	102.00	429.00	3531.00	7392.00	9314.52	3698.55	17109.00	38.56	38.56	33930.34	
2015	0.00	0.00	0.00	102.00	429.00	3531.00	7392.00	9345.89	3698.55	392.00	40.12	40.12	17275.19	
2016	0.00	0.00	0.00	102.00	429.00	3531.00	7392.00	9377.36	3698.55	6745.00	41.73	41.73	23592.17	
2017	0.00	0.00	0.00	102.00	429.00	3531.00	7392.00	9408.92	3698.55	6745.00	43.37	43.37	20615.27	
2018	0.00	0.00	0.00	102.00	429.00	3531.00	7392.00	9440.59	3698.55	2780.00	45.12	45.12	19793.59	
2019	0.00	0.00	0.00	102.00	429.00	3531.00	7392.00	9472.34	3698.55	382.00	46.93	46.93	17429.07	
2020	0.00	0.00	0.00	102.00	429.00	3531.00	7392.00	9504.13	3698.55	382.00	48.80	48.80	20993.70	
2021	0.00	0.00	0.00	102.00	429.00	3531.00	7392.00	9536.13	3698.55	-2736.00	50.76	50.76	14375.49	
2022	0.00	0.00	0.00	102.00	429.00	3531.00	7392.00	9568.17	3698.55	-2735.00	52.80	52.80	14413.48	
2023	0.00	0.00	0.00	102.00	429.00	3531.00	7392.00	9600.30	3698.55	-1472.00	54.88	54.88	15710.60	
2024	0.00	0.00	0.00	102.00	429.00	3531.00	7392.00	9632.33	3698.55	381.00	57.10	57.10	17597.95	
2025	0.00	0.00	0.00	102.00	429.00	3531.00	7392.00	9664.84	3698.55	381.00	59.37	59.37	17622.45	
2026	0.00	0.00	0.00	102.00	429.00	3531.00	7392.00	9697.65	3698.55	1275.00	61.76	61.76	22092.15	
2027	0.00	0.00	0.00	102.00	429.00	3531.00	7392.00	9697.65	3698.55	2289.00	64.22	64.22	19610.42	

S H : Subproyecto Hidroeléctrico
S A : Subproyecto Agrícola

Cuadro 13

Valores Presentes de los Costos del
Proyecto y de los Proyectos Alternativos a/
(Miles de US\$ de enero 1979)

<u>Proyecto Salvajina</u>	<u>VP Costos</u>	<u>Proyectos Alternativos</u>	<u>VP Costos</u>
Presa	89 057	Electricidad	108 294
Hidroeléctrica	45 130	Agrícola	115 589
Agrícola	54 454	Reducción Contaminación	57 823
Reducción Contaminación	40 628	Tratamiento Agua	10 391
Tratamiento Agua	10 325		
Totales	<u>239 594</u>		<u>292 097</u>

a/ Descontados a principios de 1979 con la tasa de 12%.

Cuadro 14

Costos Separables y Beneficios Remanentes del
Proyecto Salvajina ^{a/}
(VP en miles de US\$ de enero 1979)

	Propósitos				Total
	Agrícola	Electricidad	Contaminación	Agua Potable	
I. Costos a Distribuir					89056.59
A. de Construcción					88575.94
B. de Operación-Mantenimiento					480.65
II. Beneficios	62182.99	108294.03	17195.76	66.15	187738.93
III. Costos de Proyectos Alternativos	115588.71	108294.03	-	-	-
A. de Construcción	86759.11	-	-	-	-
B. de Operación-Mantenimiento	28829.60	-	-	-	-
IV. Menor de II o de III	62182.99	108294.03	17195.76	66.15	187738.93
V. Costos Separables	54454.29	45130.39	-	-	99584.68
A. de Construcción	40788.41	43108.85	-	-	-
B. de Operación-Mantenimiento	13665.88	2021.54	-	-	-
VI. Beneficio Remanente: (IV-V)					
A. Unidades de Valor	7728.70	63163.64	17195.76	66.15	88154.25
B. Porcentaje (%)	8.77	71.65	19.51	0.08	100.0
VII. Costo Total por Subproyecto	62262.20	108940.57	17371.77	66.83	188641.27
A. Costo Común Asignado	7807.81	63810.18	17371.77	66.83	89056.59
B. Costo Separable	54454.29	45130.39	-	-	99584.68

^{a/} VP descontados al 12% a principios de 1979.

Análisis de Beneficiarios

1. Para este análisis se consideran esencialmente cuatro grupos de afectados: (1) los beneficiados por el empleo generado por el proyecto; (2) los afectados por la inundación del embalse; (3) los beneficiados por los propósitos del proyecto, y (4) los beneficiados por las transferencias del Sector Público. A efecto de distinguir a los afectados por el proyecto de bajos ingresos, se tomó la cifra de Ps Col. 22.000 (precios de mayo 1979) como el nivel per cápita por debajo del cual se encuentran los grupos de escasos recursos.
2. El principio usado para estimar los beneficios atribuibles a los grupos de bajos ingresos es el de calcular el incremento neto del beneficio en la situación con el proyecto en relación a la situación que prevalecería de no hacerse nada.

I Beneficiados por el Empleo Generado por el Proyecto

3. El problema para identificar a los beneficiados por este concepto es el de estimar el incremento en los ingresos de los trabajadores del proyecto. Si el trabajador no tiene ningún incremento en relación a su ocupación anterior, se considera como no beneficiado por el proyecto. Este es el caso de un trabajador que cambia de empleo por razones personales 1/ y no económicas.

1/ Se puede aducir que este también es un beneficio. No obstante, para los fines de este análisis y dada la dificultad para su estimación, este beneficio no se calcula.

4. La mano de obra especializada empleada en el proyecto se considera estaba ocupada en condiciones similares en la situación previa al proyecto y con un ingreso superior a los \$22.000 pesos anuales.
5. Con base en cálculos hechos por el consultor y la CVC, se estima que la participación de los pagos a la mano de obra no calificada asciende a 5,7% de los costos totales durante la construcción y operación del proyecto en el sitio Salvajina, y 7,9% de los costos en la planicie. Para efectos de este análisis, se supone que en la situación sin el proyecto estos trabajadores estaban desempleados y/o subempleados parte del año y percibiendo un ingreso anual per cápita de \$13.634 pesos 1/. Con el proyecto estarán percibiendo aproximadamente \$41.475, lo cual da un incremento neto de \$27.841 pesos (67,1% del salario con el proyecto). Por tanto, el beneficio neto atribuible a estos beneficiarios es del 3,8% ($0,057 \times 0,67$) de los costos de construcción y operación del proyecto en Salvajina y del 5,3% ($0,079 \times 0,67$) de los costos de construcción y operación en la planicie.

II. Afectados por la Inundación del Embalse

6. La CVC realizó en junio de 1979 una encuesta en la zona del embalse para determinar las características socio-económicas de los pobladores. Se determinó, con una muestra de 100 informantes (20,7% del universo), que el 49,5% ganaban menos de los \$22.000 pesos anuales. Considerando que el número de familias asciende a 482 y el número de familiares y

1/ El salario sombra se estima en \$51,45 pesos por día y el año agrícola, en 265 días.

residentes es en promedio de tres por familia, los afectados totales serían 1.446 pobladores, de los cuales 660 ganan menos que la cifra de referencia.

La política de la CVC para la adquisición de las tierras en el embalse comprende los siguientes lineamientos: (1) pagar el valor de mercado de las tierras y mejoras de los propietarios no residentes; (2) pagar el valor de mercado de las tierras y mejoras de los propietarios residentes que trabajan fuera de su propiedad y entregar, como parte del pago, si el interesado lo desea, un terreno cercano al embalse, y (3) pagar el valor de mercado de la tierra, mejoras y cultivos de los propietarios que residen y trabajan en su propiedad, o si estos lo desean, entregarles tierra equivalente en valor. Por todo lo anterior, se supone que todos los afectados por el llenado del embalse (y los afectados por la construcción de los diques), son compensados a su satisfacción, por lo que no hay un costo ni un beneficio directamente atribuible a los grupos de escasos recursos por este concepto.

III. Beneficiados por los Propósitos del Proyecto

8. El proyecto Salvajina produce tres tipos de beneficios directos: (a) control de inundaciones; (b) generación de electricidad, y (c) control de calidad de agua. Debido a que el último beneficio es absorbido, en una primera instancia, por los industriales y entidades municipales de la zona y, posteriormente, transferidos en parte al sector público vía impuestos, sólo se consideran en este apartado los dos primeros.

A. Beneficiarios Agrícolas

9. Con base en la encuesta elaborada por la CVC en junio de 1979 y el estudio elaborado por J. Millán y J.M. Mejía ^{1/} se destaca el hecho de la gran concentración de la propiedad que existe en la zona de influencia del proyecto. Aún considerando las dificultades de integrar el ingreso personal considerando algunos de los diferentes componentes tales como ingreso de capital, trabajo del productor y extensión de la propiedad, es indiscutible que el factor relevante de la distribución del ingreso en la agricultura Colombiana lo constituye la propiedad de la tierra. En el caso que nos ocupa, es evidente que la disponibilidad inicial de los factores tierra, capacidad empresarial y acceso al crédito, determinan en gran medida la concentración en la distribución de los beneficios.
10. En 1970, el 84% de los predios en la zona del proyecto era menor a las 10 hectáreas, ocupando apenas el 8.5% del área total. Los predios mayores a las 100 hectáreas representan el 3,8% del total de predios, ocupando el 64,8% del área total en la zona de beneficio del proyecto. El cuadro 1 presenta el coeficiente de concentración de Gini, para varias regiones y la zona del proyecto.

Cuadro 1

Concentración de la Propiedad en 1970

<u>Area</u>	<u>Coeficiente Gini</u>
Colombia	0,83
Valle del Cauca	0,80
Planicie	0,87
Zona del Proyecto	0,84

Fuente: J. Millán y J.M. Mejía, Op. cit. p. 100

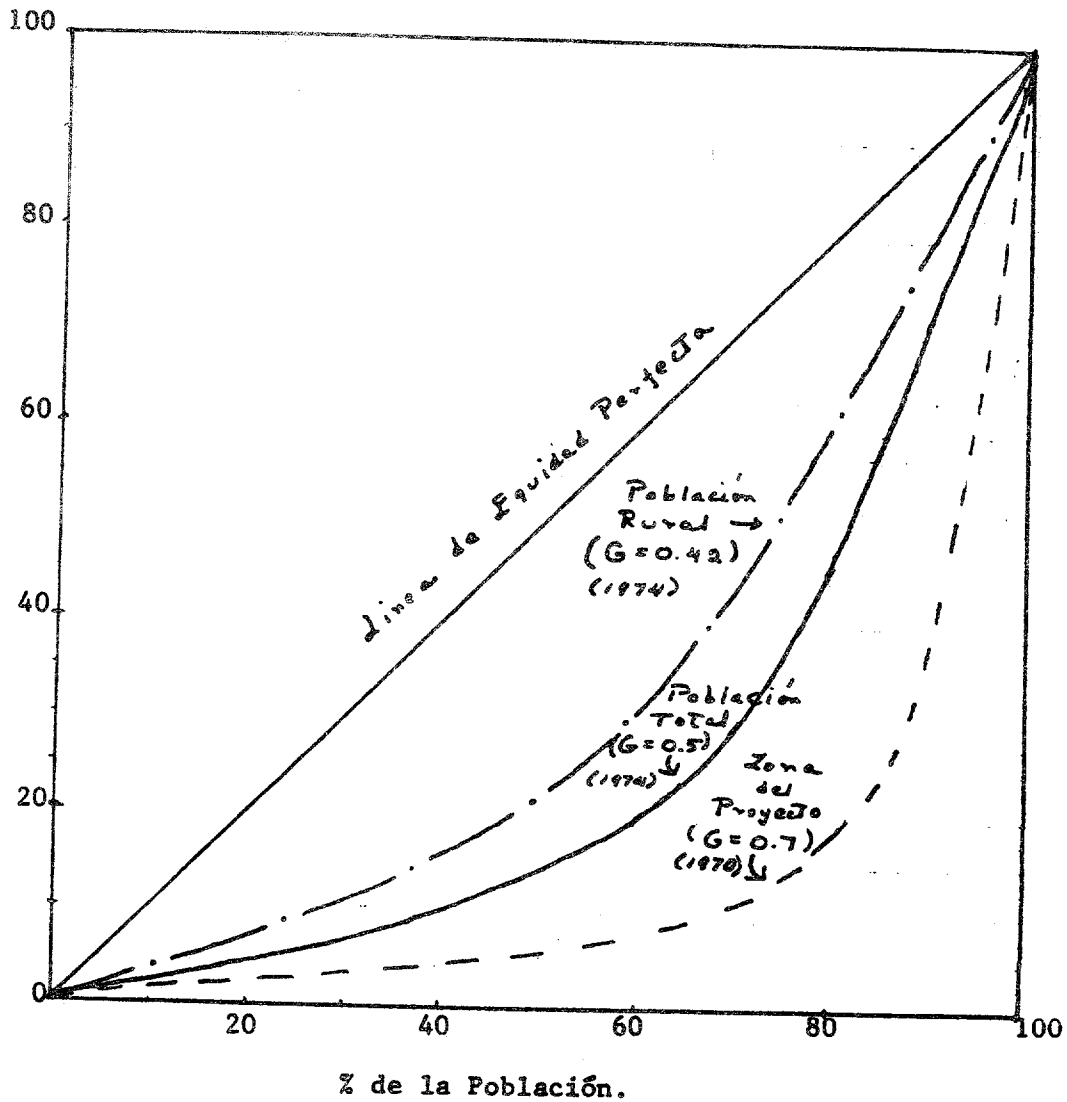
^{1/} Evaluación de proyectos hidráulicos en Colombia: Proyecto de regulación del Río Cauca (Bogotá: CEDEGE y CETIH, marzo 1976).

11. Como puede observarse en el Cuadro anterior la concentración de la propiedad en el area del proyecto es superior al promedio para Colombia y la del Valle del Cauca. No obstante, el resultado anterior no es representativo, pues un mismo propietario puede poseer más de un predio.
12. El problema es tratar de pasar del coeficiente de concentración de la propiedad al coeficiente de concentración de los ingresos. Millan y Mejia hicieron una estimación para la situación con proyecto llegando a un cálculo del coeficiente de Gini cercano al 0,7, el cual es bastante elevado, como puede observarse en la gráfica 1.

Gráfica 1

Distribución de Los Ingresos:
Diferencias entre la Zona del Proyecto,
el Area Rural y Colombia

% del in-
greso



13. Con base en los resultados de la encuesta se encontró que, para una muestra de 202 entrevistados, el 20,5% de la población de la zona del proyecto recibía menos de los \$22.000 pesos anuales. Por otro lado, Millan y Mejia estimaban que el 63% de los beneficios quedaban en manos del 2,9% de los beneficiarios de mayores ingresos, dejando un 37% de posibles beneficios por repartirse. Si suponemos que el 37% restante se reparte proporcionalmente entre el 97,1% restante de la población, los grupos de bajos ingresos (20,5%) recibirían el 7,8% de los posibles beneficios netos del subproyecto agrícola.

B. Beneficiados por Generación de Electricidad

14. En el análisis de los beneficiarios por este concepto, se adopta el supuesto de que el subproyecto hidroeléctrico (SH) - al ser integrado al sistema interconectado - sus beneficios se distribuyen a nivel nacional. El cuadro siguiente presenta la estructura del consumo nacional en 1977.

Cuadro 2

Estructura del Consumo en 1977

<u>Tipo de Consumo</u>	<u>% del Consumo</u>
1. Residencial	44,7
2. Comercial	14,1
3. Industrial	33,3
4. Oficial	5,4
5. Alumbrado Público	2,5
Total	100,0

Fuente: ICEL, La Electrificación en Colombia (Bogota: informe 1977-1978)

15. A su vez se supone que los tipos de consumo (1), (4) y (5) del cuadro 2 se distribuyen al interior de dichos consumidores de manera análoga al último estudio de distribución de ingresos para Colombia(1974) (Vease Cuadro 3). Los tipos de consumo (2) y (3) se presume serán absorbidos por personas de ingresos superiores a los \$22,000 pesos anuales.

Cuadro 3

Porcentaje de Familias con Electricidad
por Nivel de Ingreso, 1974

<u>Ingreso per capita anual</u>	<u>Promedio Colombia</u>	
<u>Pesos de Mayo 1977</u>	<u>(%)</u>	<u>Σ%</u>
0 - 5.782	41,9	41,9
5.783 -11.563	8,9	50,8
11.564 -26.981	16,6	67,4
26.982 -53.963	19,6	87,0
Mas de 53963	13,0	100,0

Nota: las cifras del estudio citado abajo estaban en dólares de 1974. Estos se ajustaron convirtiéndolos a pesos con el tipo oficial de aquel año y se revaluaron con el índice de precios al consumidor a mayo de 1979.

Fuente: M. Selowsky, Who Benefits from Government Expenditure: a Case Study of Colombia (London: Oxford University Press, 1979)

16. Otros supuestos necesarios para el análisis son los siguientes: (1) Los beneficios del SH se reparten de igual manera que la estructura del consumo observada en 1977, y (2) los beneficios estimados en el análisis económico del SH (ahorros a la industria) son iguales en magnitud a los beneficios de los usuarios (disposición a pagar). El último supuesto es imprescindible para no tener dos medidas diferentes de beneficios.
17. Con base en lo anterior, el 52,6% de los beneficios del SH se reparten conforme a los datos del Cuadro 4. De tal manera el 32,6% ($0,526 \times 0,62$) de los beneficios del SH van a manos de los grupos de bajos ingresos.

Cuadro 4

Distribución de los Beneficios del Subproyecto
Hidroeléctrico por Nivel de Ingreso

<u>Ingreso</u> <u>(Ps al año)</u>	<u>Población</u> <u>(%)</u>	<u>Beneficios del SH</u> <u>(%)</u>
de 0 a 22.000	62	32,6
de 22.001 a más	38	67,4

Nota: Para encontrar la distribución de la población con base en los datos del Cuadro 3, se supuso que había una distribución uniforme de la población dentro de la clase de ingresos de 11.564 a 26.981.

18. El beneficio neto atribuible a los grupos de bajos ingresos es la diferencia entre lo que pagan y el beneficio total que perciben. Con base en la tarifa promedio de 1978 para el país se estimó la tarifa de mayo de 1979 en US\$21.0 mills. Considerando esta tarifa y la energía generada por el SH; se estimó que los beneficiarios pagarían las dos terceras partes del total del beneficio. Por lo tanto el beneficio eléctrico neto atribuible a los grupos de bajos ingresos sería el 10.8% del total de beneficios del SH.

IV Beneficiados por las Transferencias del Sector Público

19. Las importaciones requeridas por este proyecto estarán libres de gravámenes. No obstante, hay un impuesto general del 6% de compra-venta a los componentes locales, parte del cual es recibido - via transferencias - por los grupos de bajos ingresos.

V Resultados del Análisis

20. Como puede observarse en el Cuadro 5, el VP de los beneficios netos del proyecto (incluyendo las transferencias del Sector Público) que van a los grupos de bajos ingresos es positivo mientras que el VPN del proyecto es negativo. No obstante esto, el proyecto esencialmente beneficia a grupos de altos ingresos, debido a la concentración de la propiedad en el área del proyecto. Si no se consideran el VP de los costos del proyecto, el VP de los beneficios a los pobres como proporción de los beneficios totales del proyecto es de 15,6%.

Cuadro 5

Cálculo de los Beneficios Recibidos por Grupos
de Bajos Ingresos

(Miles de US\$ de enero 1979)

		<u>Valores Presentes</u>	
		<u>Costos y Beneficios</u>	
		<u>Del</u>	<u>Beneficios netos a</u>
		<u>Proyecto</u>	<u>Grupos de Bajos</u>
			<u>Ingresos</u>
I	Por la construcción y operación del proyecto		
	A. Presa y Central - Salvajina	-134,186,98	5.134,33
	B. Diques - Planicie	- 54.454,29	2.887,74
II	Por los propósitos del proyecto		
	A. Beneficios Agrícolas	62.182,99	4.850,27
	B. Beneficios Eléctricos	108.294,03	11.654,56
	C. Otros	17.261,91	
III	Por transferencias del sector público		<u>1.672,30</u>
IV	Total	- 902,34	29.199,20

Notas:1)Descontados a principios de 1979 al 12%.

2) Por efectos de redondeo las cifras pueden no cuadrar.