

Proj. 5120258
PH- (2)

499.

BR
621312
H265a

DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
Washington 25, D.C.

PD-AAH-287-B1

DEVELOPMENT LOAN PAPER

Proposal and Recommendations
For the Review of the
Development Loan Committee

BRAZIL - SANTA CRUZ THERMAL PLANT (CHEVAP)

512-26-220-258
512-4-011

4-17-63

AID-DLC/P-138

~~CONFIDENTIAL~~

DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
Washington 25, D.C.

~~OFFICIAL USE ONLY~~

AID-DLC/P-138
Revised April 17, 1963

MEMORANDUM FOR THE DEVELOPMENT LOAN COMMITTEE

SUBJECT: Brazil - Santa Cruz Thermal Plant (CHEVAP)

Attached are revised pages to be inserted in the loan paper for this project.

The recommendations for authorization of a loan in an amount not to exceed \$15,500,000 to the Companhia Hidrelétrica Do Vale Do Paraiba to assist in financing the foreign exchange costs of equipment, materials and services required to construct and put into operation a 150 megawatt thermal power plant and associated facilities at Santa Cruz were discussed by the Development Loan Staff Committee at its meeting on April 17, 1963.

A telephone poll will be conducted on this proposal by noon on Friday, April 19, 1963 in order to secure for the Administrator the recommendations of the Development Loan Committee. It is requested that one copy of this Memorandum signed, as appropriate, be returned to this office.

CONCUR: _____

DATE: _____

OBJECT: _____

REASON: _____

Walton C. Groce
Secretary
Development Loan Committee

Attachments: (Revised)
Summary and Recommendations, p. 1
Project Analysis, p. 2

Previously Distributed:
Summary and Recommendations
Project Analysis
Annexes I-V

~~OFFICIAL USE ONLY~~

DEVELOPMENT LOAN PAPER

BRAZIL: Santa Cruz Thermal Power (CHEVAP)

<u>TABLE OF CONTENTS</u>	<u>Page</u>
SUMMARY AND RECOMMENDATIONS.....	i
SECTION I - PLACE OF PROJECT IN PROGRAM	
A. Sector Goal.....	1
B. Relation of Project to Sector Goal.....	1
C. Project's Contribution to Country's Economic Development.....	1
SECTION II - DETAILED DESCRIPTION OF PROJECT	
A. Borrower.....	3
B. Background of Project.....	5
C. Engineering Analysis.....	8
1. Description of Project.....	8
2. Engineering Plan.....	9
3. Technical Feasibility.....	10
4. Conclusions.....	15
D. Economic Analysis.....	16
E. Financial Analysis.....	18
1. Total Financing Requirement of Project.....	18
2. Borrower's Financial Status.....	18
3. Other Free World Financing Available.....	19
4. Financial Plan.....	19
5. Other CHEVAP Financial Needs.....	20
SECTION III - EFFECT UPON THE U. S. ECONOMY	
A. Competition with U. S. Enterprise.....	22
B. Source of Procurement of Goods and Services.....	22
SECTION IV - SPECIAL TERMS AND CONDITIONS.....	22
SECTION V - ISSUES.....	22

~~OFFICIAL USE ONLY~~

ANNEX I Program Framework
ANNEX II Checklist of Statutory Criteria
ANNEX III Detailed Technical Description (to be distributed)
ANNEX IV Exhibits and Financial Data (Nos. 1-12)
ANNEX V Draft Loan Authorization

~~OFFICIAL USE ONLY~~

BRAZIL: SANTA CRUZ THERMAL PLANT (CHEVAP)

SUMMARY AND RECOMMENDATION

1. BORROWER: The Companhia Hidreletrica do Vale do Paraiba (CHEVAP) of Rio de Janeiro, Brazil.
2. AMOUNT: Not to exceed \$15,500,000.
3. TOTAL COST OF PROJECT: Total project cost is estimated at \$32.4 million, of which \$15.5 million is the direct foreign exchange cost, for which an A.I.D. loan is proposed. Cruzeiro funds equivalent to \$16.8 million will be provided from CHEVAP capital (\$8.4 million) and from an internal loan and/or additional equity (\$8.4 million) made available by the National Bank for Economic Development (BNDE) from its own or Eletrobras funds.
4. PURPOSE: To assist in financing the cost of imported equipment, materials and services required to construct and put into operation a 150 megawatt thermal power plant with associated facilities at Santa Cruz, State of Guanabara, Brazil. All funds provided by the A.I.D. loan will be for U.S. goods and services.
5. BACKGROUND: This power generation project has high priority for the economic development of Guanabara State and the City of Rio de Janeiro. Under the Federal Emergency Electrification Program of July 26, 1961, the project also has high priority in the development of the Central-South power pool region. Initial loan application to A.I.D. was made on June 15, 1962; CHEVAP's latest letter dated March 26, 1963, requested an increase in A.I.D. loan financing from \$15,200,000 to \$15,500,000. The loan application has been considered by USAID/Brazil and by AID/W and the Project Committee is satisfied that the project as now planned is technically and economically sound. The project should not be considered a part of the project loan commitment provided for in this exchange of letters between Finance Minister Dantas and A.I.D. Administrator Bell of March 25, 1963.

6. PROJECT DESCRIPTION: Construction of a 150 MW modern reheat-cycle thermal power plant near Santa Cruz on the Bay of Sepetiba, with associated 132 KV and 33 KV step-up substations and four 132 KV transmission lines totaling 140 KMs. The prime contractor proposed to supply the equipment is Westinghouse Engineering International, which will guarantee performance of all subcontractors. An independent U.S. consulting engineering firm, financed under the proposed A.I.D. loan, will assist CHEVAP in the supervision and execution of the entire project.
7. EXIM BANK CLEARANCE: October 9, 1962.
8. VIEWS OF COUNTRY TEAM: The Country Team has assigned highest priority to this project and recommended immediate approval of the loan. See Classified covering memorandum.
9. STATUTORY CRITERIA: All statutory criteria have been met at this time. See Annex II.
10. ISSUES: No outstanding issues.
11. RECOMMENDATIONS: Authorization of a loan to the Companhia Hidrelétrica do Vale do Paraíba (CHEVAP) for an amount not to exceed fifteen million, five hundred thousand dollars (\$15,500,000) with the following terms:
 - (a) Repayment of the loan by the Borrower within twenty (20) years from first disbursement, including a grace period of not to exceed three (3) years. Borrower shall pay interest in U.S. dollars at a rate of three and one-half (3 1/2) percent per annum, including a credit fee of three-quarters of one (3/4 of 1) percent per annum on the disbursed balance.
 - (b) If the Government of Brazil so elects, under separate agreement with A.I.D., the Government of Brazil shall assume Borrower's obligations to A.I.D. for interest, credit fee and repayment of principal and shall repay the loan within forty (40) years, including a ten (10) year grace period. The Government of Brazil to pay a credit fee of three-quarters of one (3/4 of 1) percent per annum.

- (c) The loan shall be guaranteed by the Government of Brazil.
- (d) Borrower shall agree to increase its long-term indebtedness only with prior approval by A.I.D.
- (e) Goods and services financed with the proceeds of this loan will be of U.S. origin and procured in the United States.
- (f) Borrower shall obtain prior A.I.D. approval of investments and of contractual obligations assumed for the construction of the Funil hydroelectric dam and power plant project.
- (g) Other terms and conditions as A.I.D. may deem advisable, including the following conditions precedent to disbursement:
 - (i) Borrower shall provide satisfactory evidence of the official registration of the A.I.D. loan with appropriate Brazilian Government authorities.
 - (ii) Borrower shall provide a schedule of capital subscription and internal loan arrangements sufficient to carry out the project as now planned.

Project Committee:

Loan Officer:	Harley M. Roberts
Counsel:	Herbert Adelman
Engineer:	William H. Reed
Desk Officer:	W. J. Feuerlein

Drafting Officers: Harley M. Roberts, William H. Reed

SECTION I - PLACE OF PROJECT IN PROGRAM

A. Sector Goal

The Sector Goal which embraces the proposed loan for the Santa Cruz Thermal Power Plant is that of Industrial and Infrastructural Development. In the absence of a detailed comprehensive national development plan, high priority projects are being selected within this Goal to remove serious industrial and infrastructural bottlenecks in the Brazilian economy. Within this sector, assistance through loans is being made to areas of private industry, transportation, power development, public utilities and agriculture.

B. Relation of Project to Sector Goal

The proposed loan would provide additional power to the critical South-Central industrial area of Brazil and thus promote a high priority requirement within the Industrial and Infrastructural Development Goal.

C. Project's Contribution to Country's Economic Development

The project proposes to finance U.S. equipment for a 150 MW thermal electric plant with 132 KV and 33 KV step-up substations near Santa Cruz, State of Guanabara, as the first stage of the planned addition of 300 MW capacity to serve the City of Rio de Janeiro and Guanabara State. This power would be available about January 1966 to meet growing shortages in the Rio area. The relocation of industries in Rio's two industrial districts and other demands are expected to increase electricity needs of the area steadily. Estimates of Rio's power needs indicate a deficit of at least 300 MW generating capacity by 1966.

Lack of sufficient electric power has been and will continue, at least for some years, to be a major deterrent to the fuller development of Brazil. Total production of electric power has more

than doubled between 1953 and early 1962, but much of the country still remains without power. Even in the industrially most developed part of Brazil, the Central-South area (comprising the triangle, Rio-Sao Paulo-Belo Horizonte), severe shortages exist which result in periodic power rationing due to insufficient generating capacity in the plants or to lack of adequate transmission lines and distribution systems. Despite these limitations, industrial growth in the Central-South area has been high during the past ten years but continued growth depends now, more than ever, on increased power production. The United Nations Special Fund has also taken special note of the growing power problems of the Central-South region, and has undertaken a survey project administered by the IBRD to determine the region's power needs and to plan power productive capacity to meet needs over the next fifteen years.

D. Relationship to March 1963 Financial Arrangements

The proposed loan to CHEVAP should not be considered a part of the \$100.0 million project loans which A.I.D. is prepared to commit, as stated in Mr. Bell's letter to Finance Minister Dantas of March 25, 1963. (Annex I). The U. S. government commitments for the period through May 1964, except the immediate credits of \$84 million, are based "on the assumption that external financial assistance will successfully be negotiated by June 1963 from other sources." Therefore, only project loans approved subsequent to the June negotiations will be considered as part of our project commitment.

During the Dantas discussions there was no decision or intention to hold up the approval of any project which was already under intensive review or preliminary negotiation. The Santa Cruz application was received in June 1962 and has been under review in AID/W since September 1962. Lack of complete technical and financial data has prevented earlier approval. All outstanding questions were resolved with the final CHEVAP supplemental submission of March 26, 1963.

SECTION II - DETAILED DESCRIPTION OF PROJECT

A. Borrower

1. Name and Description

The Borrower is the Companhia Hidreletrica do Vale do Paraiba (CHEVAP -- "Hydroelectric Company of the Paraiba Valley"), with main offices at 151 Avenida Rio Branco, City of Rio de Janeiro, State of Guanabara, Brazil. CHEVAP was incorporated on September 9, 1960, by Federal Government of Brazil decree, as a mixed capital company (public and private) for the purpose of constructing and operating electric power plants in the Paraiba Valley and its vicinity, together with transmission systems and electric power distribution and related facilities, under concession from the Federal Government of Brazil.

Originally, CHEVAP was assigned the construction of the Funil Hydro-electric Power Station on the Paraiba River in the State of Guanabara with a capacity of 210,000 kw. By Federal Law No. 51.058 of July 26, 1961, however, the Federal Government of Brazil also assigned the Santa Cruz Steam Electric Generating Station in the State of Guanabara to CHEVAP for construction and operation, as part of the Federal Emergency Electrification Program.

* The capital of CHEVAP is Cr. \$3,200,000,000 (\$6.75 million). The majority shareholder (51%) originally was the Banco Nacional do Desenvolvimento Economico (BNDE), and the participation of other public and private shareholders to the balance of the shares of CHEVAP were subscribed as follows:

State of Sao Paulo	10%
State of Guanabara	10%
National Steel Mill Co.	8%
Rio Light Co.	8%
State of Rio de Janeiro	10%
Federal Railway System	3%
Total	<u>49%</u>

* A conversion rate of Cruzeiros 475 per U.S. dollar is used throughout, unless otherwise indicated.

The total subscribed capital was originally planned and to be made available to CHEVAP in five annual payments as follows:

1960 - 10%	-	Cr\$ 320 million
1961 - 25%	-	800 "
1962 - 25%	-	800 "
1963 - 25%	-	800 "
1964 - 15%	-	480 "

2. Ownership and Management

The original seven shareholders of CHEVAP remain as provided in the original application except that, as a result of Federal Decree, a new Federal corporation, Empresa Centrais Electricas Brasileiras, S.A. (ELETROBRAS) has been assigned all functions formerly performed by the BNDE, in relation to holding Federal shares in existing electric power utilities, making investments in electric utilities, and in administration of the National Electrification Fund, which is derived from the Federal Government's share of 40% of proceeds from the nation-wide Unified Tax on Electric Power Consumption. ELETROBRAS was planned to be solely a holding company for Federal Government equity investment in the power generation, transmission and distribution field. ELETROBRAS has therefore become majority shareholder (51%) of CHEVAP, and its future allocations to CHEVAP from the Federal Electrification Fund will provide the bulk of the share capital needed to carry out CHEVAP's program for Santa Cruz and for the Funil hydroelectric project.

The other shareholders of CHEVAP will probably continue to retain their present respective shares of CHEVAP equity. The respective agencies of the States of Sao Paulo, Rio de Janeiro and Guanabara, which will influence the operations of the corporation, have been instrumental in the heavy industrialization and power development of their States, especially the State of Sao Paulo which has a heavy concentration of industry. The Rio Light Company, itself a large producer of electric power, has had many years of experience in operating power plant and distribution facilities. Jointly, these minority shareholders have sufficient resources to guarantee the financial success of CHEVAP, and have taken appropriate steps to make financial resources available as needed.

A review of the directing officers of CHEVAP shows that they have considerable experience in the power field. The President-Director of CHEVAP, Jose Varonil de Albuquerque Lima, has been a Professor of Electric Power Transmission and Distribution for many years, as well as a member of the National Council of Water and Electric Power. He most recently served as Chairman of the Committee on Water Utilization in the Paraiba Valley, Chairman of the Committee for the Economic Development of the Paraiba Valley, Chairman of the Work Group established by the Government of the State of Guanabara to study the power needs of that State (in February 1961) and Chairman/Vice-President of the Work Group established by the Ministry of Mines and Energy to study the power situation and recommend an adequate program for power development in the Central-South Region which led to Decree 51.508 of July 26, 1961, establishing the Federal Emergency Electrification Program.

The Director-Vice President of CHEVAP has held such positions as General Director of the Department of Water and Electric Power, Director of the Hydro-electric Company of the Rio Prado (CHERP), and presently, besides his function with CHEVAP, is Director of the Secretariat of Public Health and Social Assistant of the State of Sao Paulo and Vice-President of the Interstate Commission of the Parana-Uraguai Basin. The Administrative Director has held the position of Director-General of the Post Office and Tele-Communication Department.

CHEVAP is staffed with a limited number of competent lower echelon engineers and other personnel. As it expands into actual construction operations of its power plans and distribution systems, CHEVAP can draw on trained and qualified engineers in other power companies, including its shareholders, and on the experience gained by these companies. CHEVAP has used contractual help from specialized Brazilian engineering firms freely when necessary.

B. Background of Project

1. History

CHEVAP was founded solely for the purpose of constructing the Funil Hydro-Electric Power Plant, which was the subject of repeated studies of the utilization of the Paraiba River, between the

years 1952 to 1958. The decision to assign to CHEVAP the construction of a thermal power plant in the State of Guanabara was made as the result of studies by the State of Guanabara (February 12, 1961) and the Ministry of Mines and Energy (June 1961) which found that this thermal plant could be constructed in sufficiently short time to solve the serious power crisis then developing in the Guanabara region. The decision by the Federal Government to delegate to CHEVAP the immediate construction of the Santa Cruz Plant as part of the Federal Emergency Electrification Program was taken July 26, 1961.

CHEVAP retained the services of Companhia International de Engenharia e Construcoes of Rio de Janeiro, a subsidiary of International Engineering Company of the U.S.A. to study the detailed requirements for a steam power station, and bids for the Santa Cruz Plant were advertised in the "Diario Oficial" of October 12, 1961. Submission of Proposals was fixed for April 16, 1962, and subsequently postponed to May 15, 1962, and June 15, 1962.

After CHEVAP's Judging Committee determined upon the Westinghouse bid as the best, CHEVAP obtained approval from the Council of Ministers of Brazil to apply for financing from the "Alliance for Progress" and submitted its first application to the AID Mission in Rio de Janeiro on June 15, 1962. Further information and documentation were submitted on July 23, 1962, on August 11, 1962, on December 3, 1962, and on March 26, 1963. Westinghouse Electric International Company and its associates Christiani-Nielsen S.A., executing the civil construction, and Empreza Brasileira de Engenharia, S.A. (EBE), who will erect the power plant equipment, were awarded a letter of intent on September 28, 1962, subject to the obtaining of suitable financing from A.I.D.

2. Results of Competitive Bidding

The Judging Commission of CHEVAP received bids from six suppliers of equipment and seven civil construction firms at the time of bid proposal review in October 1962. Over-all bidders on the turnkey basis included two American companies and one each from Germany, Poland, Japan, and Italy. A letter of award to Westinghouse International, subject to suitable arrangements for financing, was made on September 28, 1962. Since that time there has been

controversy between the various shareholders of CHEVAP, caused by the delay of the project and postponement of the scheduled completion date from early 1965. Other original bidders have attempted to reopen the award for supply of equipment for the CHEVAP thermal power plant by offering very prompt delivery. For this reason, CHEVAP has requested immediate consideration by A.I.D. for the financing of the foreign exchange requirements for this project. A covering classified memorandum to this loan paper discusses this point.

With its letter to A.I.D. of March 26, 1963, CHEVAP submitted supplementary equipment specifications to the basic plant equipment schedule which was originally submitted to A.I.D. These supplementary equipment specifications are reviewed in Annex III, Technical Annex, and the Project Committee considers that these supplementary specifications have enabled A.I.D. to judge the technical soundness of the project and reach a favorable conclusion.

3. Country Team Recommendations

The Country Team recommended approval of CHEVAP's loan application in September 1962 when it transmitted the original application to AID/W. CHEVAP's original application requested a total A.I.D. loan of \$18.6 million, to include a portion of the local financing costs for the Santa Cruz thermal plant. The Country Team recommended, however, an A.I.D. loan for only the foreign exchange portion of the project, or a total of \$15.2 million. In his letter to USAID/Brazil of March 26, 1963, the President of CHEVAP requested an increase of the total amount of A.I.D. financing by \$300,000 (to \$15.5 million) to provide for services of an independent consulting engineering firm, and services of a plant supervisor for equipment installation and initial operations at the Santa Cruz plant. The Country Team has approved this increased loan request which provides for consulting services which A.I.D. felt were essential to the success of the project, since Westinghouse International would have over-all responsibility for plant design, supervision, civil construction and erection of the machinery for which it is main supplier. The Country Team concurs with CHEVAP's request and urges earliest consideration of the loan application by A.I.D.

4. Alternative Sources of Financing

The Export-Import Bank advised on October 9, 1962, that it was unable to consider financing CHEVAP's Santa Cruz or the Funil hydroelectric projects. The Bank however expressed its interest concerning any financing to be provided to these power projects in Brazil and requested to be kept informed of A.I.D. decisions regarding these projects. A.I.D. has discussed CHEVAP's Santa Cruz thermal plant proposal with the Export-Import Bank from time to time and has advised the Bank that it is considering this loan application seriously.

The IBRD is not presently financing projects in Brazil and IDB has other commitments that preclude action on this project.

C. Engineering Analysis

1. Description of Project

The project is for the construction of a 150 MW thermal-electric plant to be located in the vicinity of Santa Cruz, Guanabara, Brazil, along the lower southern bank of the Sao Francisco River near the Bay of Sepetiba. (See map Annex IV, Exhibit 1.)

The plant and project will consist of two 75,000 kw reheat turbine-generator units, two 507,000 pounds per hour capacity steam generators, 1800 psig, 1000° F/1000° F, suitable for firing of both Brazilian coal and oil, necessary auxiliary station equipment, a 132/33 - 13.8kv step-up substation, and 140 kms of 132 KV transmission lines.

The power plant design will be based on the unit system concept. The arrangement will be "Semi-Outdoor" where the boilers will be outdoor units with the turbine generator units and most auxiliary equipment housed in a power plant structure. It will be in the direct vicinity of the planned Guanabara Steel Works (COEIGUA) to which it will deliver a large block of power, and with which it will share fuel supply access facilities.

A 132kv and 33kv transmission system will distribute the power and deliver it to the distribution substations which are either existing or to be constructed by private, State or Federal Government. (See map Annex IV, Exhibit 2.) This proposed thermal plant will be interconnected with the Funil Hydroelectric power plant.

The present needs of CHEVAP and its growing system requires the output of this power facility at the earliest possible time. The total cost of the project is estimated to be \$32.34 million in equivalent U.S. dollars of which A.I.D. is requested to finance \$15.50 million. Of the remainder CHEVAP will provide the equivalent of \$8.42 million in cruzeiros from capital and Eletrobras, and others the equivalent of \$8.42 million in cruzeiros.

2. Engineering Plan

CHEVAP will be responsible for the construction, operation and management of the project. Preliminary plans and specifications were prepared by Cia International De Engenharia of Rio De Janeiro (a subsidiary of International Engineering, USA). The plan for detail design and construction was set up on a "turn-key" basis and formed the basis of international bidding. Six proposals were received from suppliers of equipment including one from International General Electric and one from Westinghouse International Co., both of U.S.A. The Westinghouse bid was selected as the best bid and has been given the award, subject to A.I.D. financing.

In making its bid, Westinghouse retained the Engineering firm of Gibbs and Hill of New York to develop the detailed design. Westinghouse will provide all the equipment, supervise its erection and installation and take responsibility for the timely completion of the entire project including the erection and civil works. Westinghouse allied itself with Christiani-Nielsen who will perform the civil work and Empresa Brasileira de Engenharia (EBE) who will perform the erection and installation of machinery and equipment. The capability and reputation of these latter two firms have been checked by USAID/Rio personnel and found to be satisfactory for this project. There will be a separate contract with each of the

above three organizations; however, the work to be performed and the time for completion will be guaranteed by Westinghouse and, within the limits of Brazilian law, Westinghouse has the role, functions, and responsibilities of a prime contractor.

The engineering firm of Gibbs and Hill, employed by Westinghouse as a sub-contractor, will perform the engineering and design of the Santa Cruz plant. This will include all the mechanical and electrical design work but excludes the civil design detail which will be performed by either Christiani-Nielsen or EBE. However, Gibbs and Hill will prepare plot plans, arrangement drawings, etc. They will also perform the critical civil design work such as turbine generator foundations and check and approve vendors and sub-contractor work and prepare schedules. (See Annex IV, Exhibit 3, for organization chart showing relationship for the construction of the project.)

Because the engineering responsibility of Gibbs and Hill will be to the prime contractor, Westinghouse, A.I.D. will require CHEVAP to employ an independent U.S.A. engineering firm which will act in CHEVAP's behalf to assure that the contractors and suppliers fulfill their contractual obligations.

A reasonable schedule has been developed by Gibbs and Hill for the project. It indicates that initial operation of Unit No. 1 would occur about 26 months after award of the contract and both units would be in commercial operation 30 months after contract award. Thus if contracts are signed by June 1 the plant should be available for full operation by November 1965. (See Annex IV, Exhibit 4, for details of schedule.)

3. Technical Feasibility

a. Studies

A work group of the State of Guanabara was established December 24, 1960, to review the State's needs for electric power and to prepare a solution capable of avoiding a threatened collapse in the supply of power. CHEVAP was represented by its president, who was chairman of the work group. The report bore out

the certainty of an accelerated worsening of the power situation and recommended that it was imperative that the capacity of the regional system be increased by at least 300mw in two stages of 150mw each. The first stage was to be started immediately.

Original feasibility studies, soil investigations, review of fuel, labor and operating requirements were conducted by CHEVAP's own technical staff, International Engineering Co. and Technosolo-Engenharia e Tecnologia de Solos e Materiais, S.A. The Companhia Internacional de Engenharia e Constructoes of Rio De Janeiro, a subsidiary of International Engineering Co. of the U.S.A. was retained to make a preliminary study of the detailed requirements for a steam station, define the technical requirements, analyze the economic soundness of the project and assist CHEVAP in preparation of specifications to solicit international bids.

Extensive market surveys of the area in the direct vicinity of the Santa Cruz plant have been made and forecasts of the load growth the area will experience have been made for the period 1961-1970 by CHEVAP.

Detailed studies have been made of CHEVAP's 132kv and 33kv transmission system and a continuing plan for expansion has been established to provide for the system's growing requirements based on the power market surveys.

Detailed studies have been made to select the most suitable site by Companhia Internacional de Engenharia from among several possible locations.

Basically, two additional investigations will be required, one pertaining to the conditions of the Sao Francisco Canal which will supply cooling water and the other to determine on the basis of further test borings the exact location of the power plant within the confines of the site. These are details to be settled during implementation of the project and have no bearing on the project's technical soundness.

A power study is presently under way which will involve CHEVAP's power area, by a joint venture known as "Cananbra" which consists of Gibbs and Hill of U.S.A., Montreal Engineering Company of Canada, and Crippen Associates of Canada. It is being financed by the United Nation's Special Fund and implemented by the World Bank. The objective of the study is to establish an integrated power development program for the South Central part of Brazil for the next 15 years. The group will also make recommendations for short range development over the next four years; these are due in September 1963. The Project Committee has been informed by Gibbs and Hill that the proposed Santa Cruz plant is compatible with any plan likely to be developed by "Cananbra."

b. Plant Size and Design

The forecast of power (kw) and energy (kwh) in relation to capacity to supply is shown for the Guanabara Region for the years 1962 through 1967 in Annex IV, Exhibit 5. Included are all the principal suppliers in the area. By 1963 a deficit in capacity is reached which will grow until Santa Cruz power becomes available in 1965. About the same time Rio Light expects to obtain about 180mw from Sao Paulo, along with a small increase in capacity of the self-producers. A small reserve of 115kw will be available. However, this reserve will diminish each year and again become a deficit by 1968. This analysis assumes that the second stage of Santa Cruz, which is not yet programmed, will be available by 1966.

The availability of financial resources in the country and the capital funds of CHEVAP limit the present capacity programmed for the Santa Cruz plant to 150mw. There are no funds available at the present to install reserve capacity which is needed if reliable power is to be assured to consumers.

The power supply for the Guanabara-Rio area is predominately hydro which has good peaking capability but limited energy capacity especially during low water periods. There is a serious need for the prompt installation of base load capacity to supply the energy deficiency for which a thermal plant is being adapted. By reference to Annex IV, Exhibit 5, it is apparent that the output of Santa Cruz 150mw first stage will be fully utilized. Even with

capacity of the 150mw second stage of Santa Cruz and Funil Hydro-electric plant, only the years 1965, 1966 and 1967 show possibility of reserve power, which possibility disappears by 1968. A continuing need to increase the power supply is clearly indicated.

The plant will be designed to conform with the most modern practices in power plant engineering based on proven U.S. standards and methods. Due to the relative high cost of fuel, high plant efficiency is stressed, which dictates the use of a re-heat steam cycle. The steam generators will be designed and equipped to fire both Brazilian residual oil and coal.

The use of two 75mw units is to provide a size of unit that would best meet the needs of CHEVAP's interconnected operations, taking account of the size and capacity of other generating units with which these will operate.

c. Fuel Water and Labor

The principal fuel is "sotelca" coal from Santa Catarina State, which is a high ash, low grade bituminous coal with a heating value of about 9300btu per lb. It can be transported either by rail or water; however current planning is based on maritime deliveries. A stockpile for a minimum of 60 days reserve will be maintained at the plant. Provisions will be included for ash disposal for ten years of operation.

The price of coal is higher than the cost of residual fuel oil. However, the National Coal Institute has indicated its willingness to guarantee a price for steam coal such that the production costs for the Santa Cruz plant when using coal will not exceed that when using fuel oil. Due to dieselization of the railroads there has been a substantial reduction in the consumption of steam coal. The growth in thermo-electric generation has not increased as yet sufficiently to make up for the reduction. As a consequence, stocks of steam coal have grown up at a rapid rate in the State of Santa Catarina, from 80,000 tons in 1958 to 1,450,000T in 1963.

Residual fuel oil is planned to be the secondary fuel although it will be used for initial operations. It can be obtained from two sources, the State of Bahia and imported oil. Oil will be used for both low load operation of the Santa Cruz Plant and during periods of possible coal shortage. Initially the planned harbor for COSIGUA will not be available so transportation will be by truck or railroad tank car until the harbor is constructed and fuel oil can be delivered by pipeline to the plant storage tanks.

The cost of the oil which would also be the basis of coal cost is Cr\$18,000 per ton (\$3.80 US/ton). The delivered cost of fuel oil to the plant is about \$0.61 per million BTU.

The water supply for plant cooling will be taken from the Sao Francisco canal. The canal mouth being close to the Bay of Sepetiba, the plant equipment will be designed for sea water. Water for boilers will be the same source but will be treated and processed by the water-treating equipment in the plant.

Supervisory, operating and maintenance labor will be recruited from the local area. The location of the plant close to the most heavily developed part of the country assures availability of any specialized personnel and labor necessary for the construction and operation of the plant.

CHEVAP will employ the necessary technical staff, plant engineers and plant operators. The first group will be given training in the U.S.A. under the supervision of Gibbs & Hill. During the initial operating period the contractor will provide the services of U.S. operator or operators to supervise CHEVAP's operating staff until they are sufficiently experienced to take over full operation of the plant.

d. Cost Estimates

The cost estimates are detailed in Annex IV, Exhibit 7. They are based on the results of the turn-key bidding already received and analyzed by CHEVAP as well as subsequent supplementary specifications proposed by Westinghouse; therefore they are reasonably firm. An overall plant cost of \$32.4 million dollars for a 150mw plant represents a

cost of \$215KW. Taking into account that this is a new plant on a newly developed site, requiring all common services such as fuel storage and handling, land, water supply, etc., this represents a reasonable cost for a plant, the basic design concepts of which emphasize high efficiency and reliability for base load operation. The following shows the estimates broken down into broad categories:

	<u>CR\$x1000</u>	<u>US\$</u>
1. Land and Right of Way	624,000	-
2. Engineering, Supervision and Training	268,000	654,000
3. Generating Plant	5,820,875	14,373,500
4. Transmissiointie-Lines	1,000,000	-
5. Contingency	287,125	472,500
Total	<u>Cr\$8,000,000</u>	<u>US\$15,500,000</u>
U.S. Dollars as equivalent Cruzeiros	7,362,000	-
Cruzeiros as equivalent U.S. Dollars	-	16,842,000
	<u>Cr\$15,362,000</u>	<u>\$32,342,000</u>

NOTE: All conversions have been made at a rate of Cr. 475 per dollar

4. Conclusions

Engineering reports and plans presented in support of the request for A.I.D. assistance in financing this project indicate that the project is technically sound. Cost estimates have been developed in a logical manner and can be considered reasonably firm. Therefore the requirements as set out in FAA 201 (b) (2) and 611 (a) (1) have been met.

D. Economic Analysis

1. Despite constant inflationary pressure on costs and prices, Brazil's industrial sector has developed rapidly and has been the major cause of continued high rates of growth for the economy, both in money and real terms. Industrial output has more than doubled over the last ten years, and its present growth rate is about 9 per cent a year. This industrial growth has taken place largely in the South-Central region where power has previously been available although always in short supply relative to demand. Power development is essential for Brazil's continued economic development, if present growth rates are to be continued.

In 1960, total electric generating capacity in Brazil was about 4550 Megawatts or about 70 Watts per capita; total energy consumed was about 16 billion KWH. The Central-South region includes the largest part of Brazil's total installed capacity, and the Guanabara State region represents about 22 per cent of the Central-South electrical capacity. Capacity at end of 1961 was: Guanabara 813mw, Central-South Region 3650mw. The initial capacity to be added to the Guanabara system by Santa Cruz represents an addition of almost 20 per cent.

2. Economics of the Santa Cruz Plant

The Santa Cruz thermal plant will operate in CHEVAP's interconnected system with Rio city, a total system which will include 850mw capacity of Rio Light, 70mw of Cia. Brasileira de Energia Eletrica (CBEE) and 72mw of self-producers and small companies. The major part of this capacity is hydro-electric with limited energy (KWH) capacity dependent on water availability and storage. While the Guanabara-Rio area is short of power, its energy capacity is the greater deficiency. (See Annex IV, Exhibits 5 and 6.) Therefore the 150mw of thermal capacity to be added by the Santa Cruz plant will operate base loaded. This will benefit the system, not only by adding 150mw of much needed capacity, but by improving the utilization of the available water for the hydro-electric plants.

The annual production costs are detailed in Annex IV, Exhibit 10, which is based on GOB "Regulation for Electric Energy Services (Decree 41.019) and is shown on an Available Funds basis. The 838,500 MWH per year available for sale from the Santa Cruz plant is a reasonable assumption taking account of the plant and distribution losses. This will include adequate time allowances for down time of units for maintenance. On this basis of operation, the cost of power on an interest and depreciation basis would be as follows:

Plant Capacity	150mw	
Gross Generation	919,800 MWH annually	
Annual Plant Factor	70%	
Net Sales	838,500 MWH	
	Cr. x1000	USA\$
		(Cr.\$475= \$1USA)
Plant Investment (with financing costs)	17,547,000	36,942,000
Direct Production Expenses		
1. Operation & Supervision	315,965	665,190
2. Maintenance & Supplies	63,835	134,390
3. Misc. Operating Costs	39,000	82,105
4. Fuel	3,778,200	7,954,105
Sub-total Production Expense	Cr\$4,197,000	\$8,835,790
Indirect Power Costs		
5. Depreciation	780,170	1,642,460
6. Insurance	61,000	128,420
7. Interest on Capital	868,770	1,828,990
Sub-total Indirect Costs	Cr\$1,709,940	\$3,599,870
Cost of Power	Cr\$5,906,940	\$12,435,660
Cost/KWH Sold	Cr\$7.04	14.83 mills

The above may be compared with the average sale price of power as used in Annex IV, Exhibit 10, of Cr\$8.49 (U.S. 17.87 mills).

E. Financial Analysis

1. Total Requirement of Project

The total cost of the CHEVAP Santa Cruz project is \$32,342,000 or Cruzeiros 15,362 million. This excludes the financial costs during construction and working capital needs. \$15,500,000 of this amount or 48 per cent is required in foreign exchange and CHEVAP requests an A.I.D. loan for this; the Brazilian local currency balance will be made available during the 1963-1965 construction period from scheduled increases in CHEVAP's capital investment, from a proposed internal loan from the BNDE or from additional equity investment by Eletrobras which now administers the National Electrification Fund and holds the 51 per cent of CHEVAP shares which were formerly held by the BNDE.

Total anticipated financing sources for the project's construction period costs, 1963-1965, are summarized below:

	<u>Cr. \$ x 10⁶</u>	<u>Dollars</u>	<u>%</u>
CHEVAP Capital	4,000	\$8,421,000	26
BNDE Loan, etc.	4,000	8,421,000	26
A.I.D. Loan	7,362	15,500,000	48
Subtotal - Direct Costs	<u>15,362</u>	<u>32,342,000</u>	<u>100</u>
Construction Financing Costs	1,835	3,863,200	-
Working Capital	350	736,800	-
Total Investment	<u>17,547</u>	<u>\$36,942,000</u>	<u>-</u>

2. Borrower's Financial Status

CHEVAP is a new company, founded in September 1960, and it has not had any income other than capital payments, or any operations other than preliminary expense and construction. Although a current balance sheet was not submitted, all shareholders are obligated to pay capital in on a definite schedule.

The legal subscribed capital of CHEVAP is Cr \$3,200 million by its incorporation act of September 1960; due to the rapid devaluation of the cruzeiro since 1960 this capitalization is insufficient for CHEVAP's planned contribution to either the Santa Cruz thermal plant (Cr \$4,000 million - \$8,421,000) or the Funil hydroelectric project (Cr \$3,200 million at 350/F, or \$9,143,000). Brazilian law requires that the full legal capital must be paid in before nominal capital can be increased and A.I.D. should request acceleration of capital payments and an increase of registered capital to an amount adequate for both the Santa Cruz and Funil projects by December 1963 at the latest.

3. Other Free World Financing:

The Export-Import Bank advised A.I.D. on October 9, 1962 that it was unable to consider this project. See Section II B 4 above. In asking for "turnkey" bids from an international group of bidders during June 1962, CHEVAP was unable to obtain offers of satisfactory financing terms from the suppliers represented; in addition, CHEVAP is currently seeking financing for the Funil hydroelectric project, to be available concurrently with the construction of Santa Cruz. Other Free World sources therefore are not considered to be available on comparable or adequate terms for the Santa Cruz project. See the covering memorandum to this Loan Paper for additional comments.

4. Financial Plan

The financial data presented by CHEVAP for the Santa Cruz project contains a forecast of the operating results from the 150mw thermal installation for which A.I.D. financing is requested for the five-year period through 1970. Brazil's electric power law, Decree No. 41.019 of February 26, 1957, requires that returns on power investment and power rates charged must be related to the historical costs of the assets and installations used to produce or transmit energy. The law is very intricate in its detailed applications, but in basic principle allows a ten-percent return or "profit" on total pre-operating investment, and permits rate adjustments upward for increases in labor and fuel costs or for foreign debt escalation due to exchange rate changes.

Exhibits 9, 10, and 11 of Annex IV cover the first five years of operation of the Santa Cruz thermal plant and provide the annual production costs, for profit and loss, and short-form consolidated balance sheets. The data are shown in constant-value cruzeiros at the March 1963 official free rate of Cr \$475/US \$. The basic assumptions underlying and connecting these tables are: that CHEVAP will sell a constant 838,500 megawatt-hours annually; that the rates charged and income from sales will be unchanged for the full three-year period between legal tariff adjustments by the National Council of Water and Electric Energy (CNAEE); and that there will be an accumulation of legally required reserves (amortization and depreciation) and of earned surplus (from net profits) over the 1966-1970 period equal to Cr \$10,341 million or 48 per cent of gross assets and liabilities.

Interpretation of these tables requires care, due to the specialized meaning, under Decree 41.019, of various major categories. The apparent large increase in current assets and cash shown in the Consolidated Balance Sheets is caused largely by the growth of the legal Amortization Reserve ("Reversion Reserve") which is on deposit at the Banco de Brasil or with the BNDE (Articles 33 and 42 of Law 41.019). The definitions of major categories are provided as footnotes to Exhibit 10, Annex IV.

In summary, CHEVAP's current and short-run financial position is sound, and legally-authorized income should be sufficient to repay an A.I.D. loan over the 20-year period proposed.

5. Other CHEVAP Financial Needs

CHEVAP began construction in 1960 of the Funil hydroelectric dam and power plant on the Paraiba River about 110 miles west of the City of Rio de Janeiro. This concrete-dome dam, of 225 feet power-head with a reservoir capacity of 750,000 acre-feet, will have associated power generating capacity of 210mw and is scheduled for completion about June 1966. Total project cost is \$42,678,000

(Cr \$14,937 million at Cr \$350/US \$)* and includes a small portion in imported equipment needs of \$1,400,000 (Cr \$490 million).

Financial details for the Funil project are not fully available, although CHEVAP has made an initial application to AID/W for financing of this second project. As originally proposed in June 1962, CHEVAP expected to finance 21.4 per cent of the cost of the Funil project (Cr \$3,200 million - \$9,143,000) from its own capital and to obtain an internal loan from the BNDE of 31 per cent (Cr \$4,648 million - \$13,280,000). Foreign financing for the remainder of this project was proposed.

Since financing for the Funil project is still to be obtained, and since the construction period for this CHEVAP project nearly coincides with the Santa Cruz construction period, it is recommended that CHEVAP be required to obtain A.I.D. approval prior to assuming any long-term debt for the Funil project and prior to any increases of paid-in capital which are earmarked exclusively for the Funil dam, power plant and transmission line construction.

* Rate of exchange used is Cr \$350/US \$, since all data on CHEVAP's Funil project are as of June 1962. Cruzeiro equivalents are 30=40% larger, at present exchange rates.

Section III - Effect upon the U.S. Economy

A. Competition with U.S. Enterprise

This project does not involve any competition with U.S. enterprise; CHEVAP has held the electric power concession since 1960.

B. Procurement of Goods and Services

The goods and services to be financed by the proposed AID loan to CHEVAP will be used exclusively for the procurement of goods and services from the United States which are of U.S. origin. Other goods and services financed by Cruzeiro borrowing and by CHEVAP capital will be procured in Brazil from Brazilian suppliers.

Section IV - Special Terms and Conditions

No unusual terms or conditions are contemplated by the Project Committee for this loan. See the Summary and Recommendations section for terms and conditions to be applied, which are those normally applied by AID for technically sound public sector projects. Terms and conditions for loan implementation will include AID review and approval of the prime contract to be entered into between CHEVAP and Westinghouse International, of the subcontracts proposed under the project, and of the contract between CHEVAP and the engineering consulting firm.

Section V - Issues

There are no special economic or technical issues outstanding for this project; the Project Committee feels that all technical questions have been resolved during the period of discussions with CHEVAP and with Westinghouse over the past months.

ANNEX I - PROGRAM FRAMEWORK

TABLE OF CONTENTS

	<u>Page</u>
SECTION I - Framework for A.I.D. Strategy.....	1
A. U. S. Interests in the Country.....	1
B. The Country's Development.....	3
SECTION II - U. S. Aid Strategy	
A. External Resource Requirements.....	7
B. Goals to be Supported.....	9
C. Self-Help to be Induced.....	9
D. Planning.....	9
E. Long-Range Commitment.....	10

ANNEX I - Program Framework

Section I - Framework for A.I.D. Strategy

A. U.S. Interests in the Country

1. Nature of Importance

As the largest and most populous nation in Latin America, Brazil is a pivotal country whose political, economic and social development is important to the viability of U.S. Latin American policy. It is consequently essential to the inter-American system that Brazil achieve political and economic stability and sustained economic growth.

2. Threats to U.S. Interests

There is little doubt that the Alliance for Progress would lose a considerable part of its meaning if Brazil is not one of the successful partners in this endeavor. Conversely, the demonstration by Brazil of a potential for rapid and steady growth engendered by the Alliance would be beneficial to the United States.

Until the closing months of 1962 there was little about the Brazilian scene to encourage optimism as to the likelihood of Brazil becoming a leader in the Alliance for Progress. While the potential was present, governmental discipline was lacking. Between the time that former President Quadros resigned his office in August 1961 and the final months of 1962, foreign investment had diminished to a trickle, discouraged by the enactment of a restrictive profits remittance law and by actual or threatened expropriation. Lack of comprehensive national planning had resulted in inefficient allocation of resources. Continued inaction on much-needed social reforms accentuated political unrest.

Economic difficulties and political uncertainties in Brazil generated internal stresses which presented opportunities for groups intent upon disrupting development of the country to come to the fore. The impoverished inhabitants of the Northeast were particularly susceptible to being aroused by opportunists. Inflation, which had brought price increases of up to 5% monthly, impeded and distorted economic development and spurred social unrest. From the beginning of 1963 a better prospect emerged. President Goulart has been able to reorganize his administration

as the result of the January 1963 plebiscite which permitted return to "presidentialism". He will need both internal and external support if he is to be successful in building a cohesive and stable political base and to make forthright decisions on critical economic problems.

3. Role and Influence of Economic Aid

U.S. assistance is based on the conviction that our aid can be an effective instrument of U.S. foreign policy in removing or partially neutralizing existing obstacles to Brazilian development, and a belief that conditions now exist which are somewhat more encouraging to the success of our efforts.

United States aid is designed to assist in maintaining an adequate rate of development and also to encourage both the initiation and continuance of reforms. During financial discussions with the GOB in March of 1963 the United States made it clear that the total level of U.S. assistance, as well as U.S. support for Brazilian requests from other lending sources, would in large part be determined by Brazilian efforts to (a) reduce inflation sharply, (b) maintain previous levels of investment (on the order of 15% of GNP) and (c) undertake foreign and domestic policies which promote Alliance for Progress concepts. The United States is interested in providing assistance to the extent possible on a project basis, though it is recognized that the urgency of the Brazilian balance of payments situation will require some program loans in addition to the emergency stop-gap loans.

The GOB has declared its intent to undertake reforms as outlined by Finance Minister Dantas in his letter to A.I.D. Administrator Bell. Measures taken or to be taken include adoption of tax reforms, elimination of subsidies on wheat and petroleum imports, increasing rates for public utilities, curtailment of budgetary expenditures for 1963, reorganization of the banking system, proposal of an agrarian reform program, and reduction of the federal deficit. The United States has indicated its willingness to respond to Brazil's performance in these areas with appropriate financial assistance.

4. Application of Development Criteria

The direction and emphasis of United States assistance will be related to the following elements of Brazil's Three Year Plan of Development: (1) improving the use of existing resources through the encouragement of sounder economic planning and through the careful selection of capital investment projects, which will remove major bottlenecks in the development effort, strengthen the private sector, and promote import-saving and export-earning activities; (2) assisting the development of key skills needed in economic development; (3) improving the production and distribution of food, particularly meat, to provide better diets and to contribute substantially to export earnings; and (4) helping to ensure that pressing social problems do not lead to civil disturbances which could be exploited by anti-democratic elements in the society.

The Governments of Brazil and the United States on April 13, 1962, signed the Agreement for the Promotion of Economic and Social Development in the Brazilian Northeast. Under this Agreement A.I.D. is providing assistance to projects in education, health, community water supply, rural community electrification and community development. It is expected that the individual states and other indigenous groups will increasingly take over financial and operational responsibility for these activities.

B. The Country's Development

1. Economic Situation and Trends

a. The Current Status - Presently, Brazil is well along the road of development in certain areas of the country. Since the end of World War II, according to Brazilian statistics its GNP has increased about 5 to 6 percent annually, and in the face of a 3.1 percent annual population increase, the country has managed to maintain a yearly increase in per capita income of about 1 to 2 percent. Industrial growth has been striking during the past decade. Electric power has quadrupled in the last decade. Since 1957, steel and iron ore production has doubled, and during this period the production of chemicals, plastics, cement, machine tools, and other manufactures has shown similar large gains.

~~OFFICIAL USE ONLY~~

ANNEX I

Page 4 of 10 Pages

Current economic policy, as in the past decade, calls for a program of import substitution. However, the introduction of new industries to satisfy consumer demand (chiefly in the fields of automobiles, electrical appliances, and other consumer durables), often leads to the protection of inefficient industries, the establishing of possible monopoly positions in those industries, and high-cost production. Industry has displaced agriculture as the leading contributor to the national output. Furthermore, its proportion of the output may increase as the states of the interior and the northeast prepare themselves to participate in the country's industrialization.

Agriculture still employs over 50 percent of the labor force, but because of low capital application, lack of educated manpower, and governmental pricing policies, it continues to be a field of relative low supply and high-cost production, especially for those crops which serve as staples for the Brazilian population -- beef, rice, beans, fruits, etc. Brazil has further discouraged both the diversity and size of agricultural export crops by its exchange rate system which has in the past, favored the importation of capital goods.

Brazil's railroad system, with its five different gauges and antiquated rolling stock, does not provide the transportation backbone which is required to broaden markets and reduce costs. Inadequate rail transport makes agricultural production and distribution subject to high transportation costs and high rates of spoilage. Other basic facilities, such as roads, power, shipping, and communications remain short of satisfying existing demand.

~~OFFICIAL USE ONLY~~

b. Trends in the Economy

The expansion of the economy has shown recent signs of retreating from its pace of the last decade. The effects of inflation and changing government policy have been recently aired in the Furtado Plan and in the discussions of Finance Minister Dantas with officials of the U.S. Government in March 1963. The result of such awareness is that Brazilian economic policy may now be directed toward stabilization, diversification and stimulation of the export industry, with continued emphasis on nationwide development. As it appears now, Brazil is moving toward self-sufficiency in agricultural staples, with the exception of wheat. Agricultural export will continue to be chiefly coffee, cotton, and sugar, though agriculture within Brazil is expected to become more diversified and a greater revenue producer. Export commodities capable of stimulation are rice and leguminous foods, fish, poultry, meat and meat products.

Brazil is striving to increase rapidly its power supply, steel output, and the production of consumer durables. In light of stated import substitution policies, it appears that there will be a greater effort to produce more capital goods. It is also quite possible that Brazil may be able to export such goods to its Latin American neighbors.

The business community looks to the government to remove the shackles placed on it in the past which have distorted both the direction and intensity of production in the industrial and agricultural sectors. Brazil finds itself today financially pressed, both internally and externally. The degree to which it applies itself to the measures described by Finance Minister Dantas in his exchange with Administrator Bell (mentioned in Section I) should be decisive in plotting the future course of Brazil's economy and in acquiring assistance from abroad.

2. Social and Political Trends

Brazil has two social nodes emanating from the colonial days. One, that of the Northeast, constitutes a potentially dangerous source of social unrest. Because of the extreme poverty, illiteracy and special political factors obtaining in that area, Northeast Brazil is economically and socially treated as an almost separate area. The vast majority of the population of 23 million exists at a submarginal level, with an income of about one-third of the national average. Because of a feudal land tenure and political system, inadequate food supply for

a rapidly growing population, and the adverse effects of climate involving periodic droughts and floods, political unrest is widespread. The situation is ripe for the application of reforms.

In the south of Brazil, both industry and agriculture produce an income higher than the national average. Because of a generally more democratic social stratification, higher literacy rates, and a more rewarding economic and natural environment, the social temper of the southern states tends to be more tranquil than that of the Northeast.

Although the last eighteen months has been marked by serious political instability, Brazilian history shows that political activity in the past has been almost without armed intervention. In order to regain full presidential powers, which had been sharply reduced in 1961, President Joao Goulart has relied on extremist, anti-American elements to put pressure on the Brazilian Congress. Full presidential powers were restored by plebiscite on January 6, 1963. Since then Goulart has moved more to the middle of the road. It appears that the country is more likely, than for some time past, to institute economic reforms and adopt anti-inflationary measures which will bring about gradual reductions in budget deficits, foreign exchange shortages, and price rises. While far-leftist political advisors sometimes do play a crucial role in Brazil's government, it is now felt that President Goulart probably intends to pursue economic policies and to take political positions which will be more in line with interests and policies of the United States. The Government of Brazil, for example, has recently supported the U.S. movement in the OAS to effect an arms embargo against Cuba and has been noticeably unhelpful to promoters of the Cuban Solidarity Congress.

3. Development Goals

Brazil in late December 1962 made public its Three-year Plan for Economic and Social Development. While this Plan requires refinement and has shortcomings as to realism of the goals and consistency in approach, it does provide a significant base for national development and stabilization. Elements of the Plan include the reduction of the rate of inflation to 10 percent over the three-year span, while maintaining a GNP growth rate of close to 7 percent per annum. Perhaps more significant than specific goals in the long-run are certain policy measures in the Plan such as the elimination of subsidies, redirection of government spending, and reducing

expenditures about 40 percent in 1963, placing a ceiling on new currency issue in 1963, and maintaining the present balance between government and private investment activity. In addition, the Plan pays heed to basic reforms -- agrarian, administrative, banking, and fiscal (taxes) -- though details of these reforms have yet to be worked out. It also stresses the need for further import substitutions to relieve the demand for foreign exchange, the need for additional school construction and teacher training, development of the power sector including petroleum, hydroelectric and nuclear power, and attention to agricultural production and its problems. Performance under the Plan will be watched with interest both within and outside Brazil.

4. Self-Help

Since the drafting of the Three-Year Plan, Brazil has undertaken important self-help measures in the fields of taxation, subsidy-removal, removal of price controls, credit controls, and moral suasion with regard to government spending on both the federal and state level. Of note were the removal of subsidies on wheat, petroleum, and tax legislation which is expected to increase tax revenues by 25 percent primarily through improved collection methods. Further evidences of self-help are the measures outlined in the previous subsection regarding development goals.

Section II -- U.S. Aid Strategy

A. External Resource Requirements

1. Assurance of Non-U.S. Resources

The Government of Brazil has indicated that the volume of resources required by the Three-Year Plan for development, as well as its trade and investment connections with Western European countries and Japan, render it desirable to enlist support of those countries and also of international organizations such as the International Monetary Fund. The United States Government has noted that the Government of Brazil intends to seek a standby agreement with the Fund by June of 1963, to initiate conversations for long-term financing with the International Bank for Reconstruction and Development and the International Development Association, and to obtain further financial support from other international banking institutions such as the Inter-American Development Bank and from the principal Western European

countries and Japan. The United States Government has noted the encouraging results of Brazil's initial conversations with the International Monetary Fund and the other international financial organizations.

As a result of these discussions, a combined supply of external resources is expected to be forthcoming for Brazil from the United States, the other creditor countries, and international agencies in support of Brazil's program for development and stabilization. Anticipated assistance is expected to be adequate to cover fully Brazil's balance of payments deficit as now estimated for 1963 and to make a substantial contribution toward meeting the 1964 deficit at the same time. The major portion of the credit from the United States will provide support for key elements in Brazil's program for economic development, such as roads, electric power supply, and the expansion of small and medium industrial enterprises.

2. U.S. Resources

On the assumption that external financial assistance will successfully be negotiated by June 1963 from other sources, the United States Government has indicated that it will be prepared to commit for the period through May of 1964, subject to applicable legislation, the following financial resources totaling approximately \$400 million in support of the Brazilian program for stabilization and development:

Funds to be provided immediately:

Export-Import Bank	\$ 33.0 million
Treasury	25.5 million
Agency for International Development	25.5 million

Further Funds:

Agency for International Development	
Program Support	100.0 million
Project Loans	100.0 million

Export-Import Bank	
Refunding of debt repayments falling due between June 1, 1963 and May 31, 1964	44.5 million

Public Law 480, Title I	
Commodity shipments (estimated)	<u>70.0 million</u>

TOTAL	\$398.5 million
-------	-----------------

B. Goals to be Supported

The current A.I.D. program concentrates on seven specific goals: (1) Industrial and Infrastructural Development, with capital loans for selected projects, including loans through intermediate credit institutions, and with special emphasis on the encouragement of private enterprise; this goal will comprise over half the total program in monetary terms; (2) Development Research and Planning, to assist Brazilian agencies to evaluate and to plan the more effective use of available resources; (3) Human Resources Development, including particularly projects to improve Brazilian educational systems; (4) Social Development, through projects designed to relieve pressing social problems such as malnutrition, inadequate community water supplies, overcrowded slum housing conditions and widespread malaria; (5) Public Safety Improvement, by technical assistance to Brazilian police forces in the fields of internal security and maintenance of law and order; (6) Agricultural Development, by projects aimed at doubling meat production by 1970 and at improving facilities for food storage, handling and marketing; and (7) Development of the Northeast, through capital projects and technical assistance to supplement and advance the SUDENE program in that area.

C. Self-Help to be Induced

Of measures announced by Minister Dantas to be undertaken by Brazil, the United States will be particularly watchful of progress in the following areas to provide the basis for additional United States assistance: (1) efforts to reduce budgetary deficits, including reduction of government subsidies, particularly in basic consumption items and in railway transport; (2) improved tax administration; (3) encouragement of foreign private investment; (4) export promotional policies; (5) efforts to obtain increased assistance from Europe and international organizations; and (6) development of sound projects and programs for economic growth.

D. Planning

The direction and emphasis of United States assistance will be directed to important elements of Brazil's Three-Year Plan, in particular as it relates to: (1) improving the use of existing financial and natural resources; (2) assisting the development of key skills needed in economic development; (3) increasing food

production; distribution and exports; and (4) helping to ensure that pressing social problems do not lead to civil disturbances which could be exploited by anti-democratic elements in the society, especially in the Northwest.

E. Long-Range Commitment

The Government of Brazil has stated its intention to detail further its Three-Year Plan as a basis for long-term economic and social development and to seek international collaboration in support of it in accordance with the principles and procedures of the Charter of Punta del Este. The United States has given assurances that it will be prepared to participate wholeheartedly in that effort. Thus international financial cooperation with Brazil can be freed from the pressures of intermittent balance of payments crises, and placed on the constructive basis of support for long-term economic and social progress.

ANNEX II - CHECK LIST OF STATUTORY
CRITERIA

1. F.A. Act of 1961, as amended, Section 251(a).

This loan will promote economic development in Brazil, and in particular is designed to assist in the development of economic resources and the increase of industrial capacities in the Guanabara area and in the Central-South power pool region. See Section II, C and Annex III.

2. F.A. Act of 1961, as amended, Section 251(b).

This loan is primarily related to the development of economic resources and will assist in creating additional production and income in one of Brazil's largest metropolitan areas, Rio de Janeiro.

3. F.A. Act of 1961, as amended, Section 251(b)(1).

Account has been taken of the principles of the Act of Bogota and of the Charter of Punta del Este.

4. F.A. Act of 1961, as amended, Section 251(b)(1).

Account has been taken of the extent to which Brazil is showing responsiveness to the economic, political, and social concerns of its people through planning and legislation for development which demonstrate a determination to take effective self-help reform measures. See Annex I.

5. F.A. Act of 1961, as amended, Section 251(b)(2).

The activity to be financed is technically and economically sound, and merits the criteria established by Section 611 of the Act.

The following abbreviations are used:

FAA: Foreign Assistance Act of 1961, as amended.

FAApp: Foreign Assistance and Related Agencies
Appropriation Act, 1963.

6. F.A. Act of 1961, as amended, Section 251(b)(3).

The activity is consistent with and related to other development activities being undertaken or planned, and will contribute to applicable long range objectives. See Annex I and II.

7. F.A. Act of 1961, as amended, Section 251(b)(4).

This loan will not have any adverse effect on the U.S. economy; all goods and services financed by the loan will be procured in the United States and where possible, from U.S. areas of substantial labor surplus.

8. F.A. Act of 1961, as amended, Section 251(b),

Financing from other free world sources on reasonable terms for this project is not available in whole or in part.

9. F.A. Act of 1961, as amended, Section 251(b).

Brazil is making efforts and has passed legislation to encourage the investment of capital within Brazil by its own citizens, and it is expected that this will encourage the repatriation of capital.

10. F.A. Act of 1961, as amended, Section 251(b).

There are reasonable prospects of repayment of this loan.

11. F.A. Act of 1961, as amended, Section 251(b), 201(d).

Not applicable.

12. F.A. Act of 1961, as amended, Sections 251(b) and 204.

This loan is within the standards and criteria for lending operations as established by the DLC.

13. F.A. Act of 1961, as amended, Sections 251(e).

The loan application as received gives sufficient information and assurances to indicate reasonably that loan funds will be used in an economical and technically sound manner.

14. F.A. Act of 1961, as amended, Section 601.

This loan will facilitate participation by private enterprise to the maximum extent practicable.

15. F.A. Act of 1961, as amended, Section 602(a)(1),(2),(3).

To the extent practicable and consistent with the accomplishment of American objectives, small business will be assisted to participate equitably in the furnishing of goods and services financed from this loan.

16. F.A. Act of 1961, as amended, Section 603, and Merchant Marine Act of 1936, as amended, Section 901.

Shipment of goods financed by funds provided under this loan will be consistent with the requirements of the referenced statutes.

17. F.A. Act of 1961, as amended, Section 604 and Presidential Determination of October 18, 1961.

The commodities and services financed under this loan will be obtained in the United States.

18. F.A. Act of 1961, as amended, Section 604(b).

Funds made available under this loan will not be used to purchase commodities in bulk.

19. F.A. Act of 1961, as amended, Section 604(d). Marine insurance, as required, will be purchased on a competitive basis, pursuant to statutory requirements.

20. F.A. Act of 1961, as amended, Section 606(c).

Funds made available under this loan will not be used to purchase drugs.

21. F.A. Act of 1961, as amended, Section 611(a)(1).

The necessary substantive technical and financial planning in connection with this project has been completed satisfactorily.

22. F.A. Act of 1961, as amended, Section 611.

All contracts for construction in Brazil will be made on a competitive basis to the maximum extent practicable.

23. F.A. Act of 1961, as amended, Section 611(b).

This loan does not involve plans for water or related land resources construction.

24. F.A. Act of 1961, as amended, Section 611(a)(2).

There is no necessary legislative action required within Brazil to facilitate the completion of this project.

25. F.A. Act of 1961, as amended, Section 619.

Consideration has been given to financing this loan through multilateral organizations, which did not show any willingness to provide funds for this project in Brazil at this time.

26. F.A. Act of 1961, as amended, Section 620(a).

No assistance will be furnished under this loan to the Government of Cuba. The Government of Brazil has not furnished military or economic aid to the Government of Cuba.

27. F.A. Act of 1961, as amended, Section 620(b).

The Secretary of State has determined that Brazil is not controlled by the international Communist movement.

28. F.A. Act of 1961, as amended, Section 620(c).

Brazil is not indebted for goods or services to a U.S. citizen who has exhausted available legal remedies, or whose claim is not denied or contested or which claim arises under an unconditional guaranty of payment. See classified covering memorandum.

29. F.A. Act of 1961, as amended, Section 620(d).

This loan does not finance construction or operation of a productive enterprise which will compete with a U. S. enterprise.

30. F.A. Act of 1961, as amended, Section 620(e).

This criterion is satisfied, at this time. See Classified covering memorandum.

31. F.A. Act of 1961, as amended, Section 620(f).

Satisfied; see No. 27 above.

32. F.A. Act of 1961, as amended, Section 620(g).

The assistance provided in this loan will not be used to compensate for expropriated property.

33. F.A. Act of 1961, as amended, Section 620(h).

Assistance provided under this loan will not be used in a manner which promotes or assists the foreign aid projects of the Communist Bloc countries.

34. F.A. App of 1963, Section 102.

The required reports will be filed.

35. F.A. App of 1963, Section 104.

None of the funds provided for this loan are to be used for pensions, annuities or other prohibited purposes.

36. F.A. App of 1963, Section 107(a) and (b).

The Government of Brazil does not furnish ships under its registry: to carry material to Cuba, as prescribed in subsection 107(a) or to carry items of economic assistance to Cuba, as prescribed in subsection 107(b).

37. F.A. App of 1963, Section 109.

The Government of Brazil is not based upon a Communistic theory of Government. See no. 27 above.

38. F.A. App of 1963, Section 110.

The United States will not be a party to the contracts entered into pursuant to this loan.

39. F.A. App of 1963, Section 111.

All contracts pursuant to this loan will require that U. S. citizens performing services thereunder be investigated for loyalty and security as though regularly employed by the United States.

40. F.A. App of 1963, Section 112.

The United States will directly approve the terms of contracts and the firms providing engineering procurement, or construction, services on the project.

41. F.A. App of 1963, Section 114.

None of the loan funds will be used to pay any assessments, arrears or dues to the United Nations.

42. F.A. App of 1963, Section 601.

None of the loan funds will be used for publicity or propaganda within the United States.

ANNEX III - DETAILED TECHNICAL DESCRIPTION

The System

The area of Rio de Janeiro-Guanabara State is in the CHEVAP Region and will be supplied with electric power from CHEVAP's two planned projects, Santa Cruz thermal and Funil hydroelectric plants. The shortage of power is more pronounced in this region than any other in the Central-South. While the Santa Cruz thermal plant is located in the State of Guanabara it is impossible to isolate this area from the large adjacent area of the State of Rio de Janeiro as it constitutes a homogeneous industrial and residential complex.

The region incorporates the existing system of Rio Light Co., and the Companhia Brasileira de Energia Electrica S. A. (C.B.E.E.). It has two main electric systems, the 50-cycle system comprising Rio Light Company, the Volta Redonda Steel Mill and other smaller companies with a total installed capacity of 710mw, and the 60-cycle system comprising CBEE, Companhia Nacional de Cimento-Portland, Refinaria Duque de Caxia and other smaller companies with a total capacity of 103mw. Each system in the past operated virtually independent of one another, with only a 10mva frequency converter tie between them at Petropolis.

The only possible additional power at the present time is through imports from the Cubatao Plant of the Sao Paulo system over the 220kv transmission line to Nilo Pecanha. However, this additional supply is limited by the capacity of the 50mw Aparecida frequency charger. The planned solution for short-term relief during 1963 is to supply power from the Furnas system to the Sao Paulo Light Company. This will permit removal of the 60-cycle loads on the Cubatao Power Plant and its conversion to 50-cycle generation, to deliver 180mw into the Rio Light System. This relief will be insufficient by the end of 1964 when the proposed Santa Cruz thermal plant should help to meet needs.

The power supply for the area is predominately hydroelectric energy output. While the area is short of KW capacity, it is even more limited in its energy (KWH) supply. For this reason the proposed Santa Cruz plant will be predominately operated base load to supply the deficiency. (See Annex IV, Exhibit 8, showing relation of power supply to system energy requirements.)

Transmission System

Besides the 150mw Santa Cruz thermal plant CHEVAP also is constructing the 210mw Funil Hydroelectric plant in the Paraiba River in the State of Rio de Janeiro. The electric energy produced by these two stations will be distributed through a 132kv and 33kv transmission system. The arrangement is shown on the map, Annex IV, Exhibit 2. CHEVAP has contracted the services of Levantamento Aerofotogrametricos, S.A. (LASA) to prepare basic design and preliminary engineering of the transmission lines. LASA is a Brazilian design and engineering company experienced in transmission systems, lines and substations. They have prepared a detailed study and analysis of the transmission requirements and have prepared design for eight circuits, four of which relate to the Funil power plant and are not part of this project. The following four circuits are associated directly with the Santa Cruz plant and their costs are included with it:

1. 27.4 miles, double circuit, from Santa Cruz through Campo Grande to Acari.
2. 24.4 miles, double circuit, from Santa Cruz through Guandu to Vieva da Garca.
3. 15.2 miles, Santa Cruz to Mangaratiba.
4. 20.1 miles Mangaratiba to Angra dos Reis.

These lines are 132kv, on steel towers, employing 636mm, ACSR conductor. All material and construction will be of Brazilian origin and will be contracted in Brazil, with LASA to furnish designs and engineering supervision. There are a great number of transmission

lines in Brazil, with voltages as high as 845kv, which have been designed and constructed by local engineering and construction companies.

The detailed study of the lines emanating from the Santa Cruz plant will be made by Gibbs and Hill as part of their obligation to determine the characteristics of the relays protecting the lines.

Included will be eight 132/33kv step-down substations with a total capacity of about 240MVA, to be built or expanded by 1964/5 when the Santa Cruz plant will be completed.

To properly coordinate the industrial expansion of the new Rio City industrial region, as undertaken by COPEG and other agencies and companies, with the distribution and supply of additional electric power, and because of inadequate capacity of the Rio Light Co. system, steps are presently being taken to create a subsidiary company of CHEVAP, to construct and expand existing distribution facilities with the assistance of and in coordination with Federal and State Government Agencies. (Electrobras, COPEG, etc.)

Santa Cruz Service Area

While the proposed Santa Cruz thermal plant is a component of the CHEVAP system, its output will be primarily absorbed in the local Guanabara-Rio area. The 132kv circuit to Campo Grande-Acari (44km) will serve a power-short area of Guanabara where new industries are locating. This will include the industrial complex along the Avenida das Bandeiras, for which \$4 million of A.I.D. financing has been made available to COPEG Credito (AID-DLC/P-92 and AID Loan 512-L-008).

The line to Guandu and Viuva da Graca (39km) will supply the Guanabara Steel Works (COSIGUA) and the Lameirao Pumping Station, which is under construction, financed by an IDB loan (a final 60mw load). This line will also provide interconnection with the Funil hydro plant, with the Rio and Sao Paulo Light Systems and later with the FURNAS system.

The lines to Mangaratiba (24km) and to Angra dos Reis (32km) will provide a much needed power supply to the 33kv subtransmission system serving this general area of the State of Rio de Janeiro. It will eventually form a part of a complete loop circuit between Funil Hydro and the Santa Cruz power plant.

Frequency Conversion Program

A frequency conversion program was started in 1962 to change over the city of Rio area to a standard 60-cycle frequency, to be completed by 1972. This is required in order to include the Rio-Guanabara area in the Central-South Region power pool. The schedule for Rio is such that the load growth plus a proportionate share of the old load will gradually be converted. It is planned to make changes in the 50-cycle system in advance, to prepare a 60-cycle market area for CHEVAP when Santa Cruz starts operating.

Funds for this conversion are to be made available from the Guanabara State Electrification Fund and from the Federal national tax for electrification, which in 1963 has available 600 million cruzeiros. Also the BNDE is currently increasing its resources and will assure sufficient funds to complete this program of Rio frequency conversion.

Description of Project

The project consists of a 150,000 KW modern reheat steam electric power plant, and a 132 KV and 33 KV step-up outdoor substation to be located in the vicinity of Santa Cruz in the State of Guanabara, Brazil, along the lower southern bank of the Sao Francisco River near the Bay of Sepetiba. A 132 KV and 33 KV transmission system will distribute the power and deliver it to distribution substations, which are either existing or to be constructed by private, State or Federal Government sources, and into the interconnection with the Funil Hydro-electric power plant being built by CHEVAP.

The plant will be in the direct vicinity of the planned Guanabara Steel Works (COSIGUA) to which it will deliver a large block of electric power over a 132 KV feeder line and with which company it will share the fuel supply and access facilities.

The plant will be designed to conform with the most modern practice in power plant engineering, consistent with the importance of maximum economy and reliability and ease of operation and maintenance. It will consist of two (2) 75,000 KW reheat turbine-generator units, two (2) 507,000 pounds per hour capacity steam generators suitable for firing of both Brazilian coal and oil, necessary auxiliary and station equipment, and a 132 KV and 33 KV step-up outdoor substation, all as further described and listed below.

Standards

The project will be designed by the power plant design and consulting firm of Gibbs and Hill, Inc., of New York, N. Y., U.S.A., employing the latest United States engineering practices and standards.

The equipment and material will be furnished in accordance with the latest issue and addenda of the following codes, insofar as they are applicable:

- a) American Standards Association -ASA
- b) American Institute of Electrical Engineering - AIEE
- c) American Society of Mechanical Engineers - ASME
- d) National Electrical Manufacturers Association - NEMA
- e) American Institute of Steel Construction - AISC
- f) American Society for Testing Materials - ASTM

The Construction design will be based on the respective Brazilian Standards and Codes with due consideration to the requirements of the relevant North American Standards and practices.

Principle Engineering Features

Reheat Units

A reheat cycle will be employed in order to effect maximum fuel economy. The reheat cycle takes steam from the turbine outlet back to the boiler reheat element.

The reheat cycle is now applied in nearly all of the large modern power plants throughout the world, where the cost of fuel is appreciable, generally in excess of U.S. \$0.35 per million BTU. The cost of fuel oil delivered to the Santa Cruz plant is approximately U.S. \$0.61* per million BTU (the cost of coal being guaranteed not to exceed that of oil by the Brazilian National Coal Institute). The estimated savings to CHEVAP with the Santa Cruz Plant reheat units and low heat rate will be around U.S. \$210,000.00 per year compared to the same units employing a non-reheat cycle.

A comparison of the plant heat rate of the Santa Cruz plant with other thermal power stations in Brazil shows that except for the Piratininga Power Plant, which has almost the same efficiency, it will be the most efficient plant in Brazil.

Unit System

The project will be based on the unit system concept. The ultimate advantage of the unit system is that it provides the lowest unit cost per kilowatt of installed capacity for a given or acceptable level of reliability.

The unit system isolates each unit so far as possible from all other units, so that troubles or casualties, large or small, in other units, or in the whole system will not shut down or cripple a

* Based on a conversion rate of U.S. \$1= CR \$350.00. This conversion rate was used in the original loan application documents, June 1962.

given unit. The unit becomes completely self-contained, supplying all its own needs and defensively isolated from the problems of other units.

Isolation of the unit system is achieved by eliminating cross-connections between units in steam, water, power and control functions. The unit system prevents fluid failure, contamination or leakage from spreading to other units.

Semi-Outdoor Plant

The boilers will be erected as outdoor units, whereas the turbine-generator units and most auxiliary and unit equipment will be inside the power house building. This arrangement, while saving cost also eliminates boiler heat leakage from causing excessive temperatures inside the building.

Description of Main Equipment

Steam Generating Units and Accessories

The steam generators will be designed in accordance with the latest A.S.M.E. Code for power boilers and will be suitable for coal and oil firing, reheat type with regenerative type air heaters and economizers. Each boiler will supply 507,000 lbs. of steam per hour at 1875 pounds per square inch gauge and 1005° F. temperature. The reheat outlet temperature is 1005 F.

Turbine-Generator with Accessories

The turbine-generator will be 75,000 KW tandem compound with impulse and reaction blading, double flow, reheat condensing type designed for steam conditions of 1800 pounds per square inch gauge, 1000 F. at the throttle with reheat to 1000 F. and exhausting at 2.0 inches of mercury, referred to a 30 inch barometer. Provisions will be made for five points of non-automatic steam extraction for feedwater heating. A complete turbine oil system gland sealing and oil purification system are included.

The main generators will be of the horizontal shaft, totally enclosed hydrogen cooled, revolving field type. It will be designed to operate at 13,800 volts, 60-cycle at 3600 revolutions per minute, and will be rated 96,000 KVA at 0.85 power factor and 30 pounds hydrogen pressure. Excitation will be provided by a 235 KW, 250 volt, 3600 r.p.m. main exciter.

Condenser

The condensers will be single pass, radial flow type surface condensers with divided steel water boxes, capable of maintaining 2.0 inches HG back pressure while condensing steam and passing condensing cooling water. Two full capacity condensate pumps, twin element, two stage steam jet air ejectors and a non-condensing steam jet priming ejector are included.

Main Transformers

The main transformers are type FOA, oil immersed, oil-forced air cooled power transformers, complete with all necessary auxiliaries, each single phase, rated 25/33 MVA, 60-cycle, 13.8 KV/132 KV ratio.

Plant Systems

Circulating Water

The cooling water for the condensers will be taken from the Sao Francisco canal through an intake structure with traveling screens and sand settling tanks to each condenser. The discharge will tentatively be through a common canal on the lower steam side of the plant.

Make-Up and Station Service Water

The make-up and station service water will be taken from the Lameirao Water Pumping Station which is part of the water supply system for the State of Guanabara, and will be fed to a storage tank, from where the make-up water will be supplied to the demineralizing plant.

Feedwater System

Two low pressure, one deaerating and two high pressure unit feed water heaters using turbine extraction steam will be utilized to supply heat to the feedwater and remove its oxygen content.

Electrical System

The plant will be equipped with Duplex central electrical control, metering, relay protection, synchronizing, generator voltage control and monitoring of alarm system for each generator as a unit with its main step-up transformer, and for the auxiliary power transformers. The plant will also be equipped with isolated phase metal-enclosed bus duct connecting each generator to its main step-up transformer and for neutral grounding.

Metal-clad switchgear for 4160 volts, unit auxiliary switchgear and power centers for 480 volts including all auxiliaries will be provided.

The plant will be equipped with a complete 132 KV and 33 KV outdoor substation with all necessary control, relaying metering and associated equipment.

Plant Performance

The equipment being furnished for this Project will have the latest U.S. design features for maximum reliability and availability.

The efficiency of the steam generators which will be furnished is 88.9% based on firing oil with a heating value of 18,400 BTU/LB.

The turbine heat rate, when operated under the specified condition will not exceed 7,985 BTU/KW hr. at a load of 75,051 KW.

Buildings

The buildings will be of reinforced concrete construction.

The foundations will require concrete piles and caps. Soil tests have been made to indicate the nature of the soil and actual test borings will be made to fix the exact foundation requirements. The building will be constructed from local material with reinforced concrete slabs properly treated to resist wear.

Auxiliary Structures

A circulating water intake structure and sand settling tanks for cooling water requirements will be constructed of reinforced concrete. A reinforced concrete canal to bring the water to the circulating water pumps and a common canal to discharge the heated water will be part of the cooling water system.

A pipe line will bring in the service water from the Lameirao pumping station; the pipe will be designed to handle water requirements of the final plant capacity of 500,000 KW.

A properly sized coal handling system will be constructed to reclaim the coal in the coal storage area, transport it from the reclaiming hopper via conveyor belts to the hopper station about the day bunkers.

A river fuel oil pumping station to unload oil barges, as well as a railroad tank car and oil track unloading station will be included. Steel oil storage tanks will be constructed to store the oil until it is used.

Site Description and Investigation

Site Location

The project site, as outlined above, is located along the Sao Francisco Canal at the Bay of Sepetiba, in the State of Guanabara. The site owned by CHEVAP is now a swampy unused area and the construction of the plant will not cause any displacement of people. For all practical purposes the site is flat.

The existing grade of the site lies below the highest water elevation and the site will be filled approximately 2 meters. The buildings will be placed so high that high water will not effect the operation of the plant.

A dam is presently under construction about 100 meters from the banks of the canal, intended for control of floods in the area. When widened, the dam crest will serve as a temporary access road. Permanent road and railroad connection to the plant will be executed. This road will be connected initially to the road linking Santa Cruz to Itaquai and will later be extended to link the Rio-Santos Federal Highway.

The access railroad will start at the Mangaratiba branch line of the Central do Brasil-Railroad, close to the bridge over the Sao Francisco Canal. It will be built on a 1.60 meter wide track following all specifications of the Brazilian Railroad Department.

Satisfactory layout drawings of the plant, the site and the adjacent steel mill were included in the Exhibits to the loan application, as well as piling and foundation requirements diagrams.

Engineering Plan

A tentative commitment based on world-wide bidding has been made to Westinghouse to supply all power plant equipment, to be imported from the U.S.A. and in accordance with the Westinghouse Proposal Specification. The complete power plant will be designed by the power plant design and consulting firm of Gibbs & Hill, Inc. of New York, retained by Westinghouse for this purpose, employing the latest United States engineering practices and standards. Westinghouse will furnish or cause to be furnished all necessary equipment for the plant within the scope defined and the time limits specified by that company.

The erection of the equipment will be carried out by Empreza Brasileira de Engenharia, S.A. (E.B.E.) of Rio de Janeiro, Brazil, a large and reputable Brazilian construction company, who have performed the erection of nearly all the power plants built by Westinghouse in Brazil. This company will be supervised and assisted by a staff of Westinghouse U.S.A. supervisory personnel and factory specialists, and will perform the erection in accordance with plans, drawings and instructions furnished by Westinghouse. This company will contract directly with CHEVAP but the quality of the work by E.B.E. and the time within which it will be performed will be guaranteed by CHEVAP by Westinghouse.

The civil construction for the project will be executed by Christiani-Nielsen, Engenheiros e Constructores, S.A. of Rio de Janeiro, one of the largest world-wide civil contractors. This company will contract directly with CHEVAP but the quality of the work performed by Christiani-Nielsen and the time which in it will be executed will be guaranteed to CHEVAP by Westinghouse.

Westinghouse will furnish to CHEVAP a performance bond for its supplies and services and for the guarantees it will establish for E.B.E. and Christiani-Nielsen.

Westinghouse also has accepted severe penalties for late completion of the units of this plant and for not meeting the efficiency (heat rate) it has guaranteed in its Bid Specification.

The joint efforts of the above companies, their reputation and financial exposure in the form of performance bonds and performance penalties should assure the construction of a highly efficient and properly designed power plant.

Completion of Engineering Plans

The original study of the technical feasibility of the plant was made by International Engineering Company, with the main purpose of developing data and conception of the plant to enable CHEVAP to issue International Invitations to Bid.

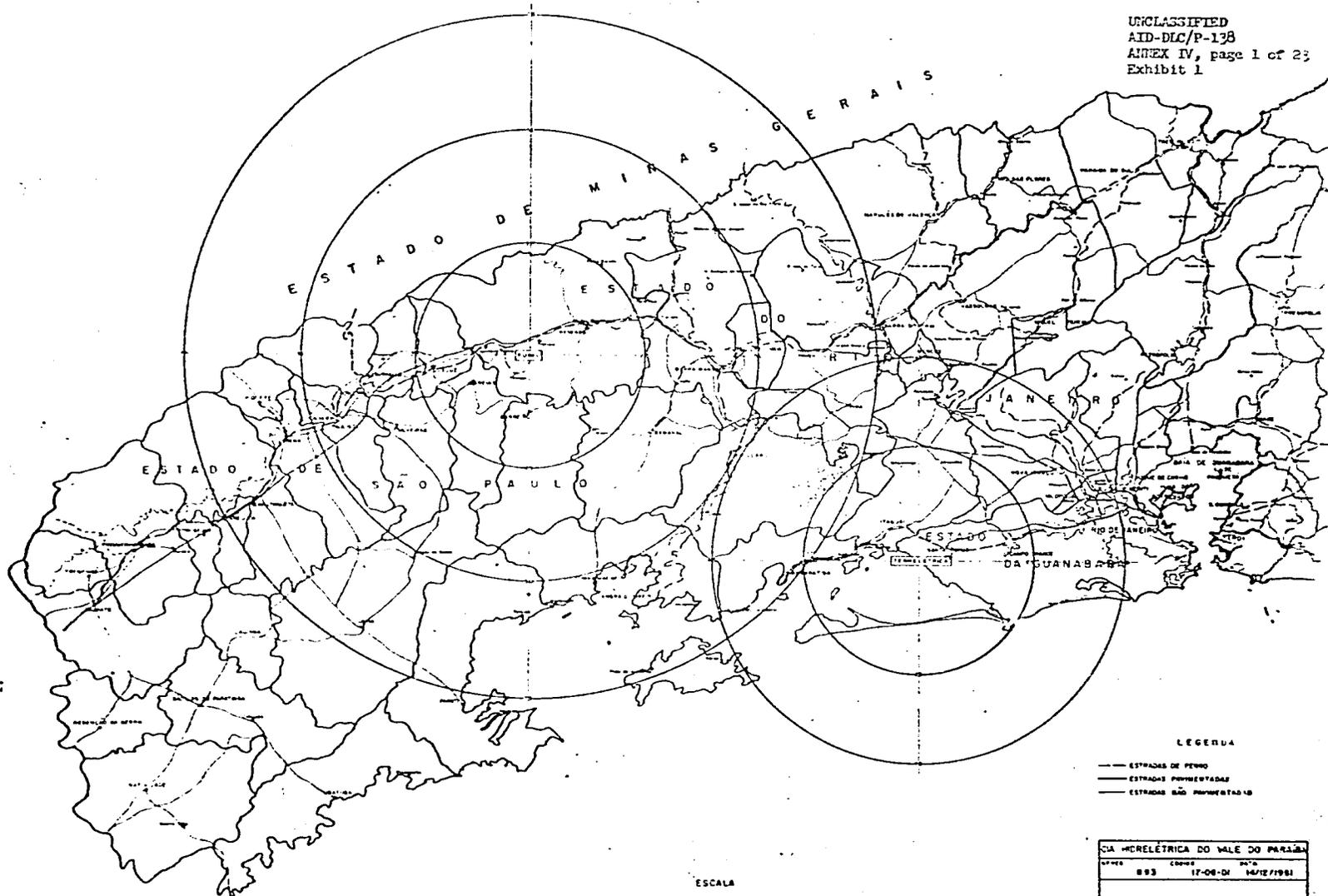
In making its offering, Westinghouse, in cooperation with Gibbs & Hill developed a conceptional design of the plant and a relatively complete design of the major equipment, such as the steam-generators, the turbine-generator units and the Feedwater Cycle Equipment, Switchgear and other auxiliaries of the plant. The equipment offered was based on this design, as was the efficiency and construction schedule of the plant equipment guaranteed by Westinghouse.

Upon receipt of CHEVAP's tentative commitment to Westinghouse, Westinghouse, Gibbs & Hill, E.B.E. and Christiani-Nielsen have jointly developed a complete program of design, engineering, supply of equipment from U.S.A. and Brazilian sources, erection and civil construction for the complete project, with the objective to enable the immediate start of construction upon approval of satisfactory financing. Basically, the design and other arrangements are completed and await finalization only of relatively minor details and the various legal documents. The contracts will be subject to A.I.D. approval and will be reviewed by A.I.D.

ANNEX IV - EXHIBITS AND FINANCIAL DATA

<u>Exhibit No.</u>	<u>Exhibit Title</u>	<u>Page</u>
1	CHEVAP Area Map	1
2	CHEVAP System Map	2
3	Chart-Organization to Construct	3
4	Construction Progress Schedule	4
5	Power Forecast (MW)	6
6	Energy Forecast (MWH)	8
7	Cost Estimates	10
8	Disbursement Schedule	16
9	Profit and Loss Statement	17
10	Annual Production Costs	19
11	Consolidated Balance Sheets	22
12	Graph - Balance of Firm Energy for the Market in the Guanabara Region	23a

UNCLASSIFIED
 AID-DLC/P-138
 ANNEX IV, page 1 of 23
 Exhibit 1

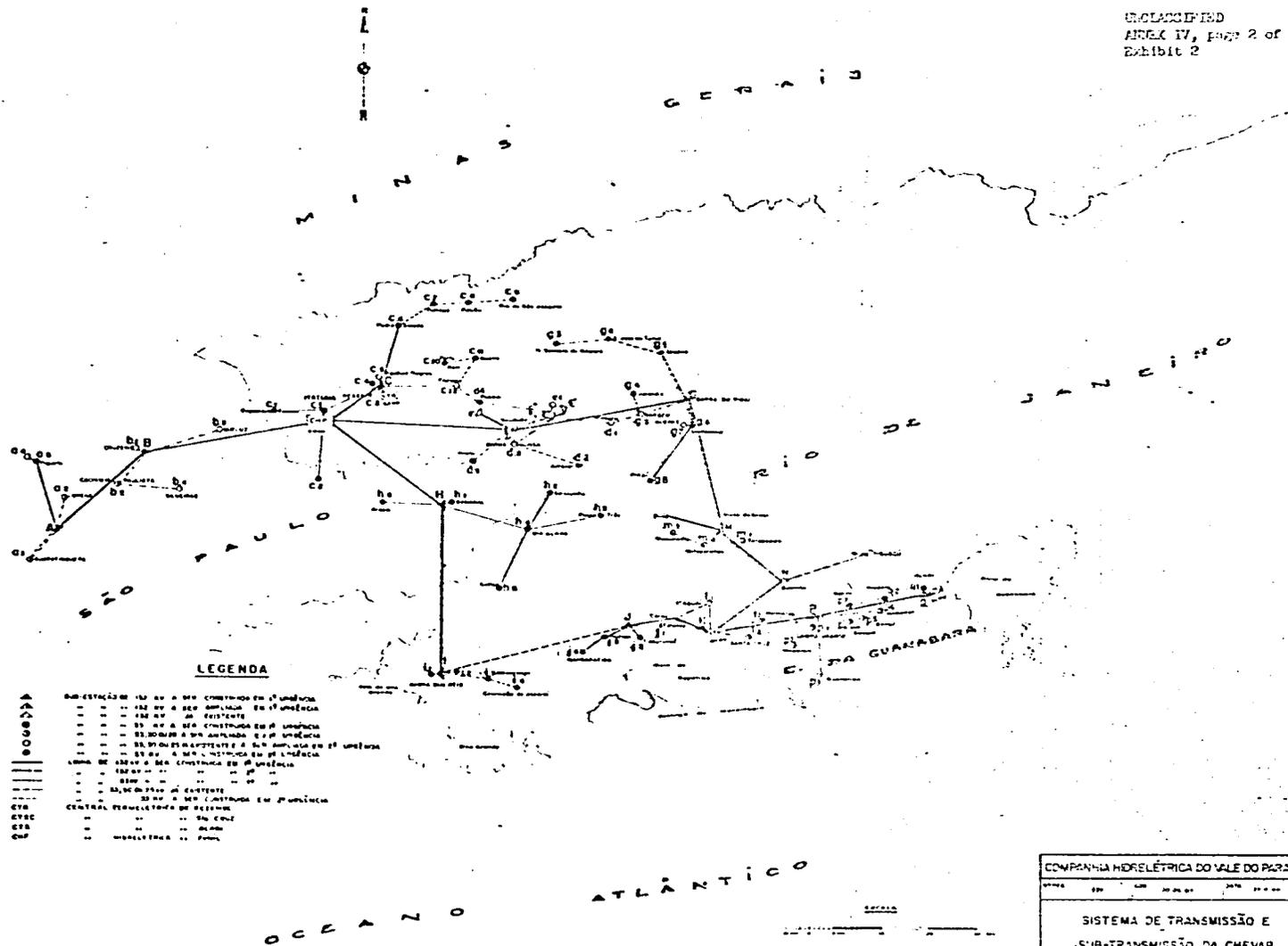


LEGENDA

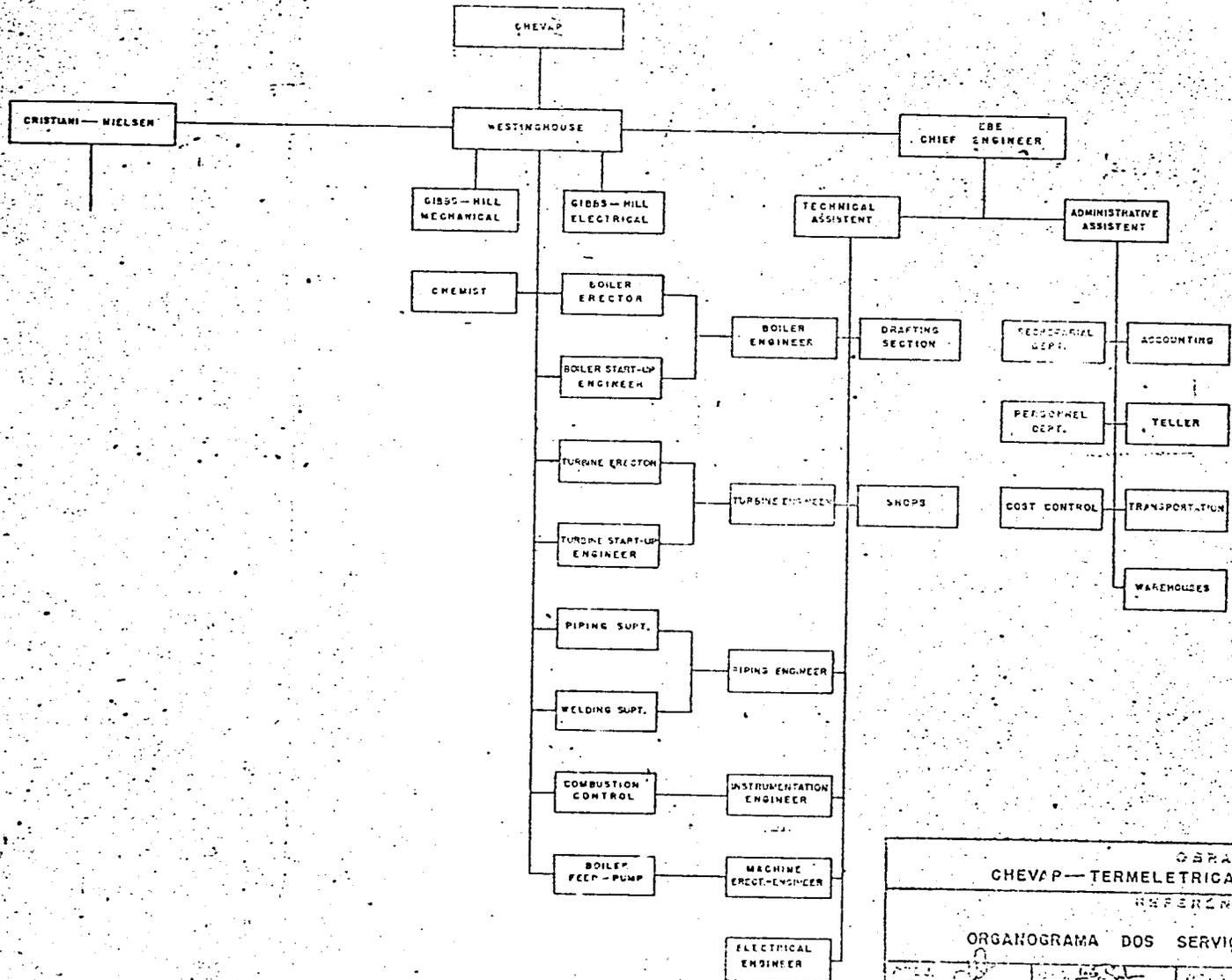
- ESTRADES DE FERRO
- ESTRADES PAVIMENTADAS
- ESTRADES NÃO PAVIMENTADAS



CIA HIDRELÉTRICA DO VALE DO PARAGUAI			
OPERA	COMO	DATA	
003	17-08-51	14/12/1951	
ZONA DE INFLUÊNCIA DA CHEVALLIER			
REVISADO POR: [Signature]			
COMPROVADO POR: [Signature]			
DATA: [Signature]			
LUGAR: [Signature]			



COMPANHIA HIDRELÉTRICA DO VALE DO PARAÍBA
 SISTEMA DE TRANSMISSÃO E
 SUB-TRANSMISSÃO DA CHEVAP



OSPA
CHEVAP - TERMELETRICA DA GUANABARA
REFERENCIA
ORGANOGRAMA DOS SERVIÇOS DE MONTAGEM

REC. 1	REC. 2	REC. 3	REC. 4	0-4134-E-3
DEZEMBRO 1962			FABRIL 63	
EMPRESA BRASILEIRA DE ENGENHARIA S. A. RIO DE JANEIRO				

GUANABARA REGION

POWER FORECAST (MW)

S Y S T E M	1962			1963			1964			1965		
	Peak Demand	Peak Capacity	Balance	Peak Demand	Peak Capacity	Balance	Peak Demand	Peak Capacity	Balance	Peak Demand	Peak Capacity	Balance
Rio Light	801	850	+ 49	858	850	- 18	940	850	- 90	1019	1030 ^a	+ 11
CBEE	47	70	- 17	95	70	- 25	103	70	- 33	113	70	- 43
Self producers	62	62	0	67	67	0	73	73	0	79	79	0
Small companies	10	10	0	11	10	- 1	12	10	- 2	13	10	- 3
CHEVAP	960	992	+ 32	1041	997	- 44	1128	1003	-125	1224	1189	- 35
	-	-	-	-	-	-	-	-	-	-	150 ^b	+150
Final Balance	960	992	+ 32	1041	997	- 44	1128	1003	-125	1224	1339	+115

(a) Includes 180 MW from São Paulo Light

(b)^c CHEVAP Thermal Plant

(c) CHEVAP Thermal and Hydro Plants

UNCLASSIFIED
ANNEX IV, page 6 of 23
Exhibit 5

GUANABARA REGION

POWER FORECAST (MW)

1966			1967			1968			1969			1970		
Peak Demand	Peak Capacity	Balance												
1104	1030 ^a	- 74	1197	1030 ^a	- 167	1297	1030 ^a	- 267	1405	1030 ^a	- 375	1523	1030 ^a	- 493
123	70	- 53	134	70	- 64	146	70	- 76	160	70	- 90	174	70	- 104
86	86	0	93	93	0	101	101	0	110	110	0	119	119	0
14	10	- 4	15	10	- 5	16	10	- 6	17	10	- 7	18	10	- 8
1327	1196	- 131	1433	1203	- 236	1560	1211	- 349	1692	1220	- 472	1834	1229	- 605
-	330 ^c	+ 330												
1327	1526	+ 199	1439	1533	+ 94	1560	1541	- 19	1692	1550	- 142	1834	1559	- 275

GUANABARA REGION

ENERGY FORECAST (10⁶ kwh)

S Y S T E M	1962			1963			1964			1965		
	Energy Demand	Energy Available	Balance	Energy Demand	Energy Available	Balance	Energy Demand	Energy Available	Balance	Energy Demand	Energy Available	Balance
Rio Light	4371	4161	- 210	4739	4161	- 578	5142	4161	- 981	5580	5361 ^a	- 219
CBEE	464	438	- 26	508	438	- 70	552	438	- 114	604	438	- 166
Self producers	394	394	0	428	428	0	464	464	0	503	503	0
Small Companies	44	44	0	48	44	- 4	52	44	- 8	56	44	- 12
CHEVAP	5273	5037	- 236	5723	5071	- 652	6210	5107	- 1103	6743	6346 ^b	- 397
											860	+ 860
Final Balance	5273	5037	- 236	5723	5071	- 652	6210	5107	- 1103	6743	7206	+ 463

(a) Includes 1200 x 10⁶ kwh from São Paulo Light

(b) CHEVAP Thermal Plant

(c) CHEVAP Thermal and Hydro Plants

UNCLASSIFIED
ANNEX IV, Page 9 of 23
Exhibit 6

GUANABARA REGION

ENERGY FORECAST (10⁶ kwh)

1966			1967			1968			1969			1970		
Energy Demand	Energy Available	Balance												
6053	5361 ^a	- 692	6544	5361 ^a	- 1183	7131	5361 ^a	- 1770	7726	5361 ^a	- 2365	8392	5361	- 3031
666	438	- 228	727	438	- 289	797	438	- 359	885	438	- 447	972	438	- 534
546	546	0	592	592	0	642	642	0	697	697	0	756	756	0
61	44	- 17	66	44	- 22	72	44	- 28	78	44	- 34	85	44	- 41
7326	6389	- 937	7929	6435	- 1494	8542	6485	- 2157	9365	6540	- 2846	10205	6599	- 3606
	1860 ^c	+ 1860												
7326	8249	+ 923	7929	8295	+ 426	8342	8345	- 297	9385	8400	- 986	10205	8459	- 1746

CHEVAP - Santa Cruz Thermal Plant

COST ESTIMATE

	<u>CR\$ x 1000</u>	<u>US \$</u>
A. <u>Land and right-of-way</u>		
1. Power Plant	24,000.	
2. Transmission System	600,000.	
B. <u>Engineering costs</u>		
1. Supervision by CHEVAP	205,000.	
2. Engineering (see note 1)	63,000.	295,000.
3. Erection Supervision for Supplementary Equipment		114,000.
4. Plant Operators (see note 2)		100,000.
5. Training of Personnel (see note 3)		145,000.
 <u>Construction Cost</u>		
Power Plant		
1. Site Improvement	185,000.	
2. Temporary facilities	25,000.	
3. Structures & Buildings	600,000.	
4. Foundations	300,000.	
5. Oil & Coal Storage Facilities (civil construction only)	63,000.	
6. Roads, Railroads & Bridges	200,000.	
7. Urbanization, Sanitation, Fire protection, Lighting	114,000.	
8. Equipment		
1. Basic Plant Equipment, including Engineering & Erection Supervision (see note-4)		12,638,527.
2. Supplementary Plant Equipment (see note 5)		1,529,803.
3. Allowance to change type of Steam-generators (see-note-6)		390,000.

COST ESTIMATE

cont'd.

	<u>CR\$ x 1000</u>	<u>US \$</u>
8. Equipment (cont'd)		
4. Spare Parts		500,000.
5. Not included in US\$ package (see-note 7)	315,000.	
6. Deleted from US\$ package for procurement in Brazil (see- note 8)	480,000.	(-) 684,830.
7. Ocean freight and insurance (US\$ 945,000 x Cr\$ 475/US\$) - see note 9	448,875.	
8. Clearance at Custom's	150,000.	
9. Transportation to Plant site	40,000.	
9. Erection	1,500,000.	
Step-up Substation		
10. Equipment & Erection	1,000,000.	
Transmission System		
11. Material, Design & Erection	1,400,000.	
12. Contingency (see note 3)	<u>287,125.</u>	<u>472,500.</u>
Totals	8,000,000.	15,500,000.

Grand Total - Cr\$ 15,362,500.00

Conversion Rate Cr\$ 475.00 = US\$ 1.00

NOTES TO Exhibit 7

UNCLASSIFIED
ANNEX IV, Page 12 of 23
Exhibit 7

NOTE 1 - The amount of \$ 295,000.00 for engineering includes the following:

a) For Independent (third Party) consultant services	\$ 200,000.00
b) For Engineering and Design of Supplementary Equipment, item C.8.2, estimated	<u>\$ 95,000.00</u>
Total Item B.2	\$ 295,000.00

NOTE 2 - The amount of \$ 100,000.00 has been allocated for the services of a plant operator or operators, as discussed with AID. The plant operator(s) will be assigned to the plant to maintain an instruction program for and supervise the operation of the plant by CHEVAP's own operating personnel. The total number of operating supervisors and their length of service will be determined later.

NOTE 3 - The amount of \$ 145,000.00 has been allocated to establish and maintain a training program of CHEVAP's operating personnel in the U.S.A. A full description of this training program, classification of personnel to be trained and an approximate time schedule for this program is contained in the attached report. The total number of personnel to be trained and the final schedule and length of training of each man will be established later.

The above amount also includes expenses to be paid in US Dollars for CHEVAP's engineering representative, located in Gibbs and Hill's New York office for approximately 32 weeks. The functions to be performed by this engineering representative are outlined in the attached report.

NOTE 4 - The amount of \$ 12,638,527.00 covers the basic plant equipment, as offered by Westinghouse in response to our original invitation to bid, and as detailed in the Westinghouse Equipment Specification of May, 1962, which includes necessary Engineering and Design Services and Supervision of Erection.

The above amount has been used as the basis for our evaluation of the bids received for the Basic Plant Equipment. ANNEX IV, Page 13 of Exhibit 7

NOTE 5 - SUPPLEMENTARY PLANT EQUIPMENT

Item C.8.2. of Annex A covers equipment listed in the Westinghouse Specification of December, 1962 entitled "Specification for Supplementary Equipment for Santa Cruz Steam Electric Generating Station; adding such equipment to the Basic Plant Package specified in the Westinghouse Specifications of May, 1962 as will be required for a complete and operating power plant within the defined terminal points.

Copies of the supplementary equipment specification prepared by Westinghouse have previously been submitted to AID. In accordance with AID's request a breakdown of the estimated cost of the various major items or category of items is given in the following.

These cost estimates given below are organized to follow the arrangement of the above supplementary equipment specification (S.E.S.) and also include a reference to the appropriate section of the Basic Plant Equipment Specification (B.P.E.S.).

BREAKDOWN OF COST ESTIMATES

Section II - S.E.S. referring to Section II of B.P.E.S. Coal Handling System	\$ 190,753.00
Section III- S.E.S. referring to Section II of B.P.E.S. Ash Handling System	\$ 134,891.00
Section IV - S.E.S. referring to Section II of B.P.E.S. Oil Handling System	\$ 3,626.00

Section V	- S.E.S., referring to Section IV of B.P.E.S. Station Water System	
	a) Circulating Water System	\$ 423,649.00
	b) Miscellaneous Services	\$ 80,016.00
	c) Fresh Water System	\$ 104,431.00
Section VI	- S.E.S. referring to Section VI of B.P.E.S. Piping	\$ 54,301.00
Section VII	- S.E.S., referring to Section VI of B.P.E.S. Isolated Phase Bus Duct	\$ 170,668.00
Section VIII	- S.E.S., referring to Section VI of B.P.E.S. Outdoor Switchyard Equipment	\$ 126,466.00
Section IX	- S.E.S. referring to Section VII of B.P.E.S. Miscellaneous Plant Equipment	\$ 160,932.00
		<hr/>
	Total Supplementary Equipment	<u>1,529,803.00</u>

NOTE 6

The amount included under item C.8.3. of Annex A and referred to in note 4 is based on the lowest cost, pressurized type steam generators, each equipped with one Forced Draft Fan, rated for 100% capacity.

The type of steam generators best suited for our particular conditions has since been thoroughly investigated by us, Gibbs & Hill and Westinghouse.

In view of the lack of experience in Brazil with pressurized steam-generators, the expected higher availability of balanced draft type, steam-generators, the greater ease of operation and maintenance, and more conservative design of balanced draft type boilers, and other similar factors convinced us that the balanced draft type boiler is better suited for this power plant. Also, in order to obtain greater flexibility of operation, i.e. operation of the steam-generators at partial load in case of outage of one of the fans or air-heaters, we decided to procure the balanced draft type steam-generators, each equipped with two sets of fans and air heaters.

To cover the necessary modifications of the steam-generators included in the equipment under item C.8.3. the amount of \$ 390,000.00 has been added to the cost estimates.

NOTE 7 - The cost estimates included under item C.8.5 covers equipment not included in the Package of Equipment to be imported from the U.S.A., basically power and control cable, grounding material, conduit, supports, piping and miscellaneous items procured in Brazil. The amount of cruzeiros under this item is based on estimates furnished by Gibbs and Hill and on a conversion rate of \$1.00 = C\$ 700.00.

NOTE 8 - To determine the true needs for U.S. Dollars for equipment and services imported from the U.S.A. we have deducted from the total Dollar amount, the sum of \$ 684,830.00 earmarked for purchase of equipment in Brazil which is now included in the specifications for equipment and services to be furnished from the U.S.A.

While it is impossible at this stage and before the design of the plant has been completely developed and finalized, to determine which items will have to be purchased in Brazil, it is estimated based on past experience, that these will amount to approximately 5% of the cost of the equipment included in the above total amount, or approximately \$ 684,830.00, which has been transferred to the cruzeiro side of Annex "A", based on a conversion rate of \$1.00 = C\$ 700.00.

NOTE 9 - During our discussions with AID on the question of transportation of the equipment to be imported from the U.S.A. you indicated that there is no rigid policy concerning the nationality of ships to carry this equipment but indicated that 50% of the equipment might have to be shipped on U.S. vessels. On the other hand, on past occasions as much as 100% of the shipments were carried on Brazilian Flag ships.

In view of the relative uncertainty as to how the transportation of the imported equipment will ultimately be affected, we have added under item C.8.12 - contingency, the amount of \$ 472,500.00 corresponding to 50% of the estimated cost of ocean freight, insurance and handling charges.

In the case that 100% of the shipment can be made on Brazilian vessels, we consider this item a contingency fund to cover unforeseen U.S. Dollar expenditures, and have included in the cruzeiro estimates the necessary funds to pay for the total costs of ocean freight, insurance and handling charges.

ANTICIPATED DISBURSEMENT SCHEDULE

<u>Year</u>	<u>Quarter</u>	<u>US\$ Disbursement</u>	<u>CR\$ x 1000 Disbursement</u>
1963	III	1, 472, 750	250, 000
	IV	2, 945, 500	260, 000
1964	I	3, 045, 500	540, 000
	II	100, 000	740, 000
	III	3, 418, 000	1, 250, 000
	IV	2, 945, 500	960, 000
1965	I	25, 000	1, 230, 000
	II	25, 000	890, 000
	III	25, 000	950, 000
	IV	1, 497, 750	930, 000
		<u>15, 500, 000</u>	<u>8, 000, 000</u>

PROFIT & LOSS STATEMENTS (Cont.)

DEBTS

	<u>1 9 6 9</u>	<u>1 9 7 0</u>
1. Direct Production Expenses (see Annex I)	4,258,000	4,258,000
2. Depreciation & Amortization Reserves (see Annex I)	1,212,975	1,189,570
3. Interest Charges & Inspection fees (Tables II & III)	435,069	332,864
4. Gross Profit	902,576	1,028,186
Less for taxes	180,515	205,637
Net profit	722,061	822,549
Total debts	6,808,620	6,808,620

CREDITS

5. Income from operations (see Annex I)	6,808,620	6,808,620
6. Others		
Total credits	6,808,620	6,808,620

PROFIT & LOSS STATEMENTS

<u>DEBTS</u>	<u>1 9 6 6</u>	<u>1 9 6 7</u>	<u>1 9 6 8</u>
1. Direct Production Expenses (see Annex I)	4,258,000	4,258,000	4,258,000
2. Depreciation & Amortization Reserves (see Annex I)	1,283,190	1,259,785	1,236,780
3. Interest Charges & Inspection fee (Tables II & III)	358,070	639,485	537,277
4. Gross Profit	1,219,605	961,595	1,086,808
Less for taxes	243,921	192,319	217,362
Net profit	975,684	769,276	869,448
Total debts	7,118,865	7,118,865	7,118,865
 <u>CREDITS</u>			
5. Income from operations (see Annex I)	7,118,865	7,118,865	
6. Others			
Total credits	7,118,865	7,118,865	7,118,865

ANNUAL PRODUCTION COSTS

ENERGY SALES	<u>1 9 6 6</u>	<u>1 9 6 7</u>	<u>1 9 6 8</u>
1 Plant capability KW	150,000		
2 Station Load Factor %	70		
3 Netstation heatrate BTU/KWH	10,000		
4 Gross generation MWH	919,800		
5 Station auxiliaries MWH	55,000		
6 Transformer losses MWH	4,800		
7 Transmission losses MWH	21,500		
8 Net sales MWH	838,500	838,500	838,500
INVESTMENT CR\$ x 1000	17,547,518	17,547,518	17,547,518
9 Less depreciation reserve	780,170	1,560,340	2,340,510
10 Remunerative investment	16,767,348	15,987,178	15,207,008
PRODUCTION EXPENSES			
11 Direct expenses			
12 Fuel	3,778,200 ✓		
13 Operating labor & Sup.	315,965 ✓		
14 Lubricants & Maintenance	53,800 ✓		
15 Overhead (G & A)	39,000 ✓		
16 Insurance	61,000 ✓		
17 Unaccounted	10,035 ✓		
18 Sub-total	4,258,000	4,258,000	4,258,000
19 Indirect expenses			
20 Depreciation accrual	780,170	780,170	780,170
21 Amortization	503,020 -	479,615	456,210
22 Return on Rem. Invest.	1,676,735 -	1,598,718	1,520,701
23 Sub-total	2,959,925	2,858,503	2,757,081
24 Total	7,217,925	7,116,503	7,015,081
25 COST PER KWH SOLD CR\$	8.61	8.49	8.37
26 INCOME	7,118,865	7,118,865	7,118,865

ANNUAL PRODUCTION COSTS (Cont.)

	<u>1 9 6 9</u>	<u>1 9 7 0</u>	<u>1 9 8 3</u>
ENERGY SALES			
1 Plant capability KW			
2 Station Load Factor %			
3 Netstation heatrate BTU/KWH			
4 Gross generation MWH			
5 Station auxiliaries MWH			
6 Transformer losses MWH			
7 Transmission losses MWH			
8 Net sales MWH	838,500	838,500	838,500
INVESTMENT CR\$ x 1000	17,547,518	17,547,518	17,547,518
9 Less depreciation reserve	3,120,680	3,900,850	14,043,060
10 Remunerative investment	14,426,838	13,646,668	3,504,458
PRODUCTION EXPENSES			
11 Direct expenses			
12 Fuel			
13 Operating labor & Sup.			
14 Lubricants & Maintenance			
15 Overhead (G & A)			
16 Insurance			
17 Unaccounted			
18 Sub-total	4,258,000	4,258,000	4,258,000
19 Indirect expenses			
20 Depreciation accrual	780,170	780,170	780,170
21 Amortization	432,805	409,400	105,134
22 Return on Rem. Invest .	1,442,684	1,364,667	350,446
23 Sub-total	2,655,659	2,554,237	1,235,750
24 Total	6,913,659	6,812,237	5,493,750
25 COST PER KWH SOLD CR\$	8.25	8.12	6.55
26 INCOME	6,808,620	6,808,620	5,492,175

ANNUAL PRODUCTION COSTS (Cont.)

Remarks on previous pages:

(20) 5% of depreciable assets (Cr\$ 15, 603, 425) per Art. 168 parag. 3 of Decree 41, 049,-

(21) 3% of remunerative investment, per Art. 169 sole parag. of Decree 41, 049.

(22) 10% of remunerative investment, per Art. 161 of Decree 41, 049.

(26) Based on average cost for 3 years.

CONSOLIDATED BALANCE SHEETS AS OF DECEMBER 31

ASSETS	<u>1 9 6 6</u>	<u>1 9 6 7</u>	<u>1 9 6 8</u>
1. Fixed Assets			
Power Plant	13,614,018		
Step up Subst.	1,194,470		
Transmission System	2,388,940		
Total	17,197,518	17,197,518	17,197,513
2. Current Assets			
Cash	602,618	1,273,140	2,097,074
Accounts receivable	593,239	593,239	593,239
Total	1,195,857	1,866,379	2,690,313
Total Assets	18,393,375	19,063,897	19,887,831
LIABILITIES			
1. Non-Demand			
Capital & interest	4,540,000	4,540,000	4,540,000
Depreciation reserve (")	780,170	1,560,340	2,340,510
Amortization reserve	503,020	982,635	1,438,845
Total	5,823,190	7,082,975	8,319,355
2. Demand			
AID financing	7,520,340	7,064,563	6,608,786
Internal financing	3,830,240	2,979,080	2,127,920
Taxes	243,921	192,319	217,362
Total	11,594,501	10,235,962	8,954,068
3. Surplus	975,684	1,744,960	2,614,408
Total liabilities	18,393,375	19,063,897	19,887,831

CONSOLIDATED BALANCE SHEETS AS OF DECEMBER 31 (Cont.)

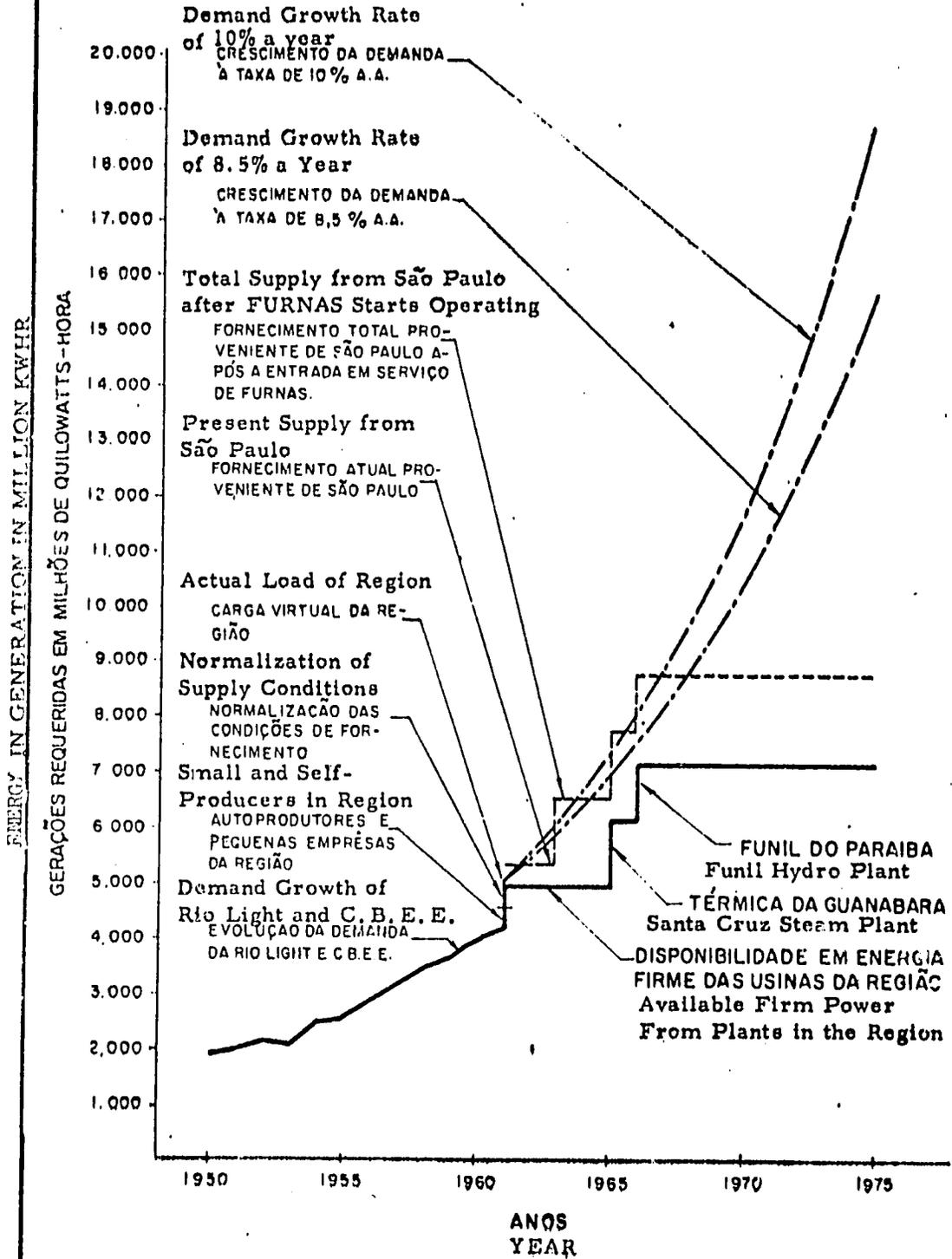
ASSETS	<u>1 9 6 9</u>	<u>1 9 7 0</u>
1. Fixed Assets		
Power Plant		
Step up subst.		
Transmission system		
Total	17,197,518	17,197,518
2. Current Assets		
Cash	2,714,179	3,444,482
Accounts receivable	567,385	567,385
Total	3,281,564	4,011,867
Total Assets	20,479,082	21,209,385
LIABILITIES		
1. Non-Demand		
Capital & interest	4,540,000	4,540,000
Depreciation reserve (*)	3,120,680	3,900,850
Amortization reserve	1,871,650	2,281,050
Total	9,532,330	10,721,900
2. Demand		
AID financing	6,153,008	5,697,230
Internal financing	1,276,760	425,600
Taxes	180,515	205,637
Total	7,610,283	6,328,467
3. Surplus	3,336,469	4,159,018
Total liabilities	20,479,082	21,209,385

(*) According to Brazilian law, depreciation comes under liabilities rather than deducted from assets.

BALANÇO DE ENERGIA FIRME DO MERCADO DA REGIÃO DA GUANABARA

BALANCE OF FIRM ENERGY OF THE MARKET
IN THE GUANABARA REGION

UNCLASSIFIED
ANNEX IV, page 23a
Exhibit 12 of 23



*Roberts
file
Chevap*

DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
Washington 25, D.C.

A.I.D. Loan No. 512-L-011
(Ref. AID-DLC/P-138)

LOAN AUTHORIZATION (AMENDED)

Provided From: Alliance for Progress Funds
(BRAZIL: Santa Cruz Thermal Plant (CHEVAP))

Pursuant to the authority vested in the Administrator of the Agency for International Development (hereinafter called "A.I.D.") by the Foreign Assistance Act of 1961, as amended, and the delegations of authority issued thereunder and after consultation with the Development Loan Committee, I hereby authorize the establishment of a loan pursuant to Part I, Chapter 2, Title VI, the Alliance for Progress, to the Companhia Hidreletrica Do Vale Do Paraiba (hereinafter called "Borrower") of not to exceed fifteen million five hundred thousand dollars (\$15,500,000) to assist in financing the foreign exchange costs of equipment, materials and services required to construct and put into operation a 150 megawatt thermal power plant and associated facilities at Santa Cruz, this loan to be subject to the following terms and conditions:

1. Interest, Credit Fee and Terms of Repayment:

- (a) Borrower shall repay the loan to A.I.D. in United States dollars within twenty (20) years from first disbursement under the loan, including a grace period of not to exceed three (3) years. Borrower shall pay to A.I.D. in United States dollars interest at the rate of five (5) percent per annum and a credit fee of three-quarters of one ($\frac{3}{4}$ of 1) percent per annum on the disbursed portion of the loan; provided, that such amounts becoming payable during said grace period may be capitalized over the term of the loan.
- (b) If prior to the first disbursement under the loan the Government of Brazil (hereinafter called the "Government") so elects, Borrower shall fulfill its United States dollar obligations under the loan by paying to the Government the equivalent, in the currency of Brazil, of the United States dollar amounts payable to A.I.D. under (a) above, and in such event, the Government shall pay to A.I.D.:

- (i) the equivalent in United States dollars of all amounts, except interest, paid to the Government by the Borrower, as follows:
 - a. credit fee immediately upon receipt;
 - b. principal within forty (40) years, including a grace period of not to exceed ten (10) years from the date of the first disbursement under the loan;
- (ii) a credit fee in United States dollars of three-quarters of one ($3/4$ of 1) percent per annum on all amounts of outstanding principal paid by the Borrower to the Government from the respective dates of such payments of principal.

2. Other Terms and Conditions:

- (a) The loan shall be guaranteed by the Empresa Centrais Electricas Brasileiras, S.A., an autonomous agency of the Government of Brazil.
- (b) Equipment, materials and services financed by the loan shall be procured from the United States.
- (c) Borrower shall not increase its long-term indebtedness unless such indebtedness precludes payment to such creditors at any time that Borrower is in default under the A.I.D. loan.
- (d) Borrower shall not make any investment or expenditure, other than in connection with the project financed by the A.I.D. loan during any period in which it is in default under the A.I.D. loan.
- (e) Other terms and conditions as A.I.D. may deem advisable, including the following conditions precedent to disbursement:
 - (1) Borrower shall provide satisfactory evidence of the official registration of the A.I.D. loan with appropriate Brazilian Government authorities.

- (ii) Borrower shall provide a schedule of capital subscription and internal loan arrangements sufficient to carry out the project as now planned.

/s/ David E. Bell
Administrator

August 22, 1963
Date